National Cancer Institute

17

Evaluating ASSIST

A Blueprint for Understanding State-level Tobacco Control

Other NCI Tobacco Control Monographs

Strategies to Control Tobacco Use in the United States: A Blueprint for Public Health Action in the 1990's. Smoking and Tobacco Control Monograph No. 1. NIH Pub. No. 92-3316, December 1991.

Smokeless Tobacco or Health: An International Perspective. Smoking and Tobacco Control Monograph No. 2. NIH Pub. No. 92-3461, September 1992.

Major Local Tobacco Control Ordinances in the United States. Smoking and Tobacco Control Monograph No. 3. NIH Pub. No. 93-3532, May 1993.

Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders. Smoking and Tobacco Control Monograph No. 4. NIH Pub. No. 93-3605, August 1993.

Tobacco and the Clinician: Interventions for Medical and Dental Practice. Smoking and Tobacco Control Monograph No. 5. NIH Pub. No. 94-3693, January 1994.

Community-based Interventions for Smokers: The COMMIT Field Experience. Smoking and Tobacco Control Monograph No. 6. NIH Pub. No. 95-4028, August 1995.

The FTC Cigarette Test Method for Determining Tar, Nicotine, and Carbon Monoxide Yields of U.S. Cigarettes. Report of the NCI Expert Committee. Smoking and Tobacco Control Monograph No. 7. NIH Pub. No. 96-4028, August 1996.

Changes in Cigarette Related Disease Risks and Their Implications for Prevention and Control. Smoking and Tobacco Control Monograph No. 8. NIH Pub. No. 97-4213, February 1997.

Cigars: Health Effects and Trends. Smoking and Tobacco Control Monograph No. 9. NIH Pub. No. 98-4302, February 1998.

Health Effects of Exposure to Environmental Tobacco Smoke. Smoking and Tobacco Control Monograph No. 10. NIH Pub. No. 99-4645, August 1999.

State and Local Legislative Action to Reduce Tobacco Use. Smoking and Tobacco Control Monograph No. 11. NIH Pub. No. 00-4804, August 2000.

Population Based Smoking Cessation. Smoking and Tobacco Control Monograph No. 12. NIH Pub. No. 00-4892, November 2000.

Risks Associated with Smoking Cigarettes with Low Machine-Measured Yields of Tar and Nicotine. Smoking and Tobacco Control Monograph No. 13. NIH Pub. No. 02-5047, October 2001.

Changing Adolescent Smoking Prevalence. Smoking and Tobacco Control Monograph No. 14. NIH Pub. No. 02-5086, November 2001.

Those Who Continue to Smoke. Smoking and Tobacco Control Monograph No. 15. NIH Pub. No. 03-5370, September 2003.

ASSIST: Shaping the Future of Tobacco Prevention and Control. Tobacco Control Monograph No. 16. NIH Pub. No. 05-5645, May 2005.

Dedication

I wish to acknowledge the invaluable contributions of time and intellect that were provided to the ASSIST evaluation by the many dedicated researchers whose efforts and ingenuity helped make the evaluation come to fruition. Although far too many individuals were involved to name here, this volume is dedicated to all of you. Especially helpful was the technical expertise provided by Lois Biener, Frank Chaloupka, Mike Cummings, Betsy Gilpin, Stan Glantz, Larry Kincaid, David Murray, John Pierce, Jon Samet, and Bill Trochim. Their insight and commitment were essential for completing this enormous undertaking. In addition, my statistical team—Anne Hartman and Barry Graubard—provided invaluable input. I also want to thank my co-editor for this volume, Carol Schmitt, who provided endless support through the development of this monograph.

The ASSIST evaluation would not have been possible without the support of former and current staff of the National Cancer Institute. Barbara Rimer, Bob Hiatt, and Bob Croyle recognized the contribution this project had to offer to advance understanding of population-level tobacco control efforts as well as how the ASSIST evaluation methods and measures could apply to the larger arena of cancer control.

Performing this evaluation was a difficult task. Many new approaches were necessary; many different challenges had to be overcome; and many opinions had to be satisfied. We are truly fortunate that much was learned and much was accomplished. For this I am sincerely grateful. Albert Einstein said, "In the middle of every difficulty lies opportunity." The ASSIST evaluation was such an opportunity, both intellectually and personally. Most of all, this evaluation was an opportunity to lend credibility to the ground-breaking work accomplished by all those involved in ASSIST.

Frances A. Stillman

October 2006

A Note from the Series Editor

With this volume, the National Cancer Institute (NCI) presents the 17th monograph of the Tobacco Control Monograph series.

This monograph documents the evaluation of a groundbreaking NCI program. The American Stop Smoking Intervention Study for Cancer Prevention, known as ASSIST, put into practice NCI's commitment to prevent and reduce tobacco use across all populations and age groups. ASSIST took evidenced-based interventions from controlled studies and implemented them in the larger community of 17 states. Its underlying rationale—that significant decreases in tobacco use could be realized only with interventions that changed the social environment such that smoking was non-normative—was a significant departure from previous tobacco control programs and in the vanguard of the "new" public health. Prior to ASSIST, few states addressed tobacco use at the population level. The ASSIST legacy remains today in the tobacco control professionals whose work continues to reduce the burden of disability and death caused by tobacco.

ASSIST raised significant conceptual and practical challenges for its evaluation team. These challenges included context-dependent implementation and the diffusion of ASSIST and ASSIST-like interventions into non-ASSIST states. In addition, the evaluation did not begin until several years after ASSIST was implemented, and its budget was limited. What had been envisioned as a simple evaluation of a demonstration project became a complex evaluation effort that engaged a diverse group of scientists and practitioners and required numerous sources of data. The resulting evaluation successfully documented the effectiveness of ASSIST. It also validated the causal pathway described in NCI's 1991 Smoking and Tobacco Control Monograph 1: *Strategies to Control Tobacco Use in the United States: A Blueprint for Public Health Action in the 1990's*—that comprehensive interventions can change the social environment of tobacco use and subsequently result in decreased tobacco use.

This monograph stands alone as a documentation of the ASSIST evaluation and describes the challenges met in evaluating a program that was influenced by numerous forces outside the program's control. However, this monograph may also be viewed as a companion to NCI Tobacco Control Monograph 16, which reviews the ASSIST program in detail. Together these two monographs provide a detailed history and evidence base that document the success of an NCI initiative that began with a series of research hypotheses, tested those hypotheses with community-based interventions, and ultimately fielded a demonstration program that fundamentally changed tobacco use prevention and control in the United States.

It has been seven years since ASSIST ended and all states became funded by the National Tobacco Control Program at the Centers for Disease Control and Prevention. At this writing, it is no longer considered normative for children to become smokers;

laws and policies that restrict smoking in public places protect more Americans each year; and state tax increases have resulted in cigarette prices that are high enough to reduce consumption and prevalence. We have come far, but there is more work to be done before tobacco use is no longer the leading cause of death and disability in the United States.

This volume and several future volumes in the Tobacco Control Monograph Series have important implications for research, practice, and policy in tobacco control as well as in other areas of public health. Lessons learned from tobacco prevention and control can be applied to a variety of public health issues, including physical activity, diet and nutrition, overweight and obesity, and substance abuse. NCI is committed to disseminating this cross-cutting knowledge to the widest possible audience so that others can benefit from the experience of the tobacco prevention and control community. By so doing, NCI is increasing the evidence base for effective public health interventions and improving the translation of research to practice and policy.

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Foreword

This monograph, like so many others in the National Cancer Institute's (NCI's) Tobacco Control Monograph series, is an important document. At a time when "Big Science" is being supported to advance knowledge of society's most pressing biomedical and public health problems, scientists are also being challenged to demonstrate what has been accomplished for the investment made. There are few guides as to how to evaluate large-scale science. This is one of them.

The American Stop Smoking Intervention Study for Cancer Prevention (ASSIST) was the first "demonstration" project that put into practice the ultimate phase of NCI's Five Phases of Cancer Control Research[*] advanced by Peter Greenwald (NCI's Director of the Division of Cancer Prevention and Control) and Joseph W. Cullen (Deputy Director of the same division) in 1984. The ASSIST program followed the orderly and sequential progression of tobacco control research in the earlier four phases from public education in the 1960s, to individual-level interventions, to community-level and then population-level interventions in the 1970s and 1980s. The Community Intervention Trial for Smoking Cessation (COMMIT; 1986–92), which immediately preceded ASSIST, was a model for the application of a randomized controlled trial to community research. ASSIST was the next logical step and a serious federal investment designed to apply the evidence gained from COMMIT and the large body of other previous research to policy interventions in 17 states. However, at ASSIST's outset, no evaluation was planned. Only after ASSIST was in progress did the need for some way to assess its impact become apparent. This monograph is a testament to the ingenuity and perseverance of the evaluation team that took on that challenge and saw the evaluation to its successful completion. Coincidently, like the number of states that had ASSIST contracts, this NCI monograph on the evaluation of ASSIST is number 17 in the Tobacco Control Monograph series.

The evaluation process is completely described in this monograph. It required the development of an overall design strategy that took into account the separate and unplanned impacts of other state-based initiatives supported by the Robert Wood Johnson Foundation and the Centers for Disease Control and Prevention (chapter 1). It required the development of metrics that assessed the power of state efforts in tobacco control as well as the countervailing efforts of the tobacco industry to negate these policy initiatives. The Strength of Tobacco Control Index (SoTC) was developed to answer this need after careful study of what information was available and reliable enough to be included in such an index (chapter 2). The evaluators also included metrics that captured changes in state and local clean indoor air laws (chapter 3) and developed metrics to repeatedly assess the initial and intermediate effects of the interventions (chapter 4). Finally, the evaluation took into account the differences among states in their tobacco

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*Greenwald, P. G., and J. W. Cullen. 1984. The scientific approach to cancer control. *CA-A Cancer Journal for Clinicians* 34 (6): 330–31.

growing and production practices due to concerns about the influence of regional commercial interests on receptivity to the ASSIST program (chapters 5 and 6).

All of these approaches to evaluation were novel and required a substantial amount of creativity on the part of the evaluation team and their technical advisors. At the time, the structure and implementation of the evaluation strategy were truly challenging, and painstaking effort was invested in testing and validation. In fact, the evaluation evolved over time. This process of evolution is covered as well as two aspects of the evaluation, the database of newspaper print media coverage (chapter 7) and the study of tobacco industry counter-measures (chapter 8), which did not figure in the final statistical analysis. The inclusion of these aspects in the monograph reflects the thoroughness of the team efforts to report on all aspects of this enormous undertaking, even the false starts.

The need for evaluation of other large-scale NCI-supported cancer research initiatives is now well recognized. These initiatives include the Transdisciplinary Tobacco Use Research Centers (TTURCs), the Centers for Excellence in Cancer Communication, and the Centers for Population Health and Health Disparities. None of these are state-based initiatives, yet each is a large and complex transdisciplinary research enterprise that has required a major public investment. The ASSIST evaluation stands at the vanguard of these efforts, and the reader will learn much about the critical role of such assessments in moving research into practice, in this case into practice against the nation's number one cause of premature death and disability.

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Preface

Capturing the scope of an ecological process such as the evaluation of the American Stop Smoking Intervention Study for Cancer Prevention (ASSIST) in monograph form presents a daunting task because the evaluation's scope and methodology were constantly evolving. Numerous challenges arose in the writing of this monograph: (1) Some factors and covariates in the evaluation analysis consisted of relatively simple measurements, whereas others required entire sections or chapters to describe in adequate detail. (2) Demonstration projects were undertaken, such as the creation of a print newspaper database of tobacco coverage, which were ultimately not included in the overall ASSIST evaluation analysis but still have relevance to future research efforts. (3) Fundamental assumptions of the original evaluation, such as original design of a direct comparison between ASSIST and non-ASSIST states, were changed as ASSIST-type interventions were introduced in other states.
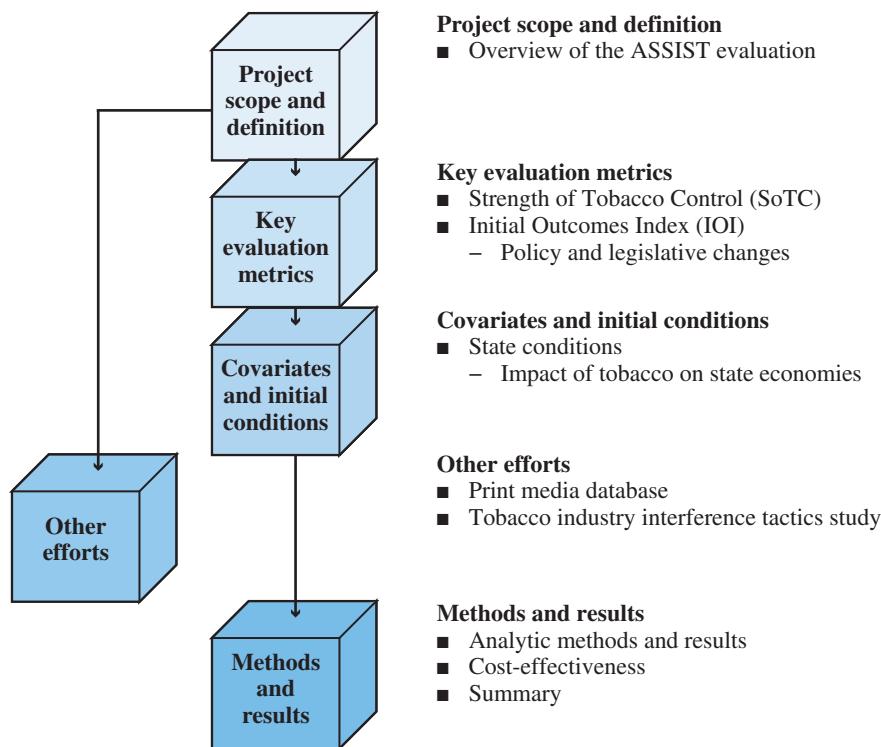
At the same time, the full story of the ASSIST evaluation is an important one to tell, because in the richness and complexity of its evolution, it serves as a guide for the future of evaluating large-scale population-level public health projects. Older evaluation methodologies were simply not adequate for a project of the scope of ASSIST and, in turn, the methods presented here will undoubtedly evolve further to meet the growing scope of future public health efforts.

Figure 1 outlines a framework for the content presented in this monograph. The monograph tells a procedural story rather than a chronological one, tracing the development of the ASSIST evaluation conceptual model, examining its assumptions in detail, discussing related projects, and finally reviewing the evaluation results in detail.

This framework provides a basis for presenting an overview of the ASSIST evaluation and its design, a detailed discussion of its evaluation components, a summary of related projects, and a discussion of the evaluation outcomes. The chapters are as follows:

Chapter 1. The ASSIST Evaluation Project: An Overview. This chapter presents an overview of the ASSIST evaluation and its historical context. It reviews the key points of the ASSIST project and describes the conceptual model that guided the ASSIST evaluation as well as the key constructs of the conceptual model, the rationales for their inclusion, and the research questions that established the linkages between these conceptual constructs.

Chapter 2. The Strength of Tobacco Control Index. The Strength of Tobacco Control index is a composite measure of the core components of a state-level tobacco control program, developed to assess which components of ASSIST or ASSIST-like programs might be related to a specified outcome or a trend of lower smoking prevalence or cigarette consumption. The Strength of Tobacco Control index assesses three major constructs: tobacco control resources, capacity, and program efforts focused on policy and environmental change. The Strength of Tobacco Control index was developed for the

Figure 1.   A Framework for the ASSIST Evaluation Monograph

Project scope and definition
- Overview of the ASSIST evaluation

Key evaluation metrics
- Strength of Tobacco Control (SoTC)
- Initial Outcomes Index (IOI)
  - Policy and legislative changes

Covariates and initial conditions
- State conditions
  - Impact of tobacco on state economies

Other efforts
- Print media database
- Tobacco industry interference tactics study

Methods and results
- Analytic methods and results
- Cost-effectiveness
- Summary

ASSIST evaluation but has demonstrated applicability for other evaluations, such as the Robert Wood Johnson Foundation's SmokeLess States National Tobacco Policy Initiative. The Strength of Tobacco Control index is now being used to compare tobacco control programs across the United States. This chapter describes the creation of the Strength of Tobacco Control index, details its descriptive characteristics, and provides examples of how it may be used to assess and improve state-based tobacco control programs.

Chapter 3. Measuring Policy and Legislative Changes. The implementation of legislative changes that would promote a tobacco-free social norm and environments was a critical objective of the ASSIST project. The ASSIST evaluation assessed changes in state and local clean indoor air laws as a component of the Initial Outcomes Index. This chapter describes the methods used to track and measure these legislative changes. A longitudinal comparison of clean indoor air legislation in ASSIST and non-ASSIST states is also provided.

Chapter 4. Initial Outcomes Index. Changes in policy occur and can be measured before changes in individual behavior. An Initial Outcomes Index was developed to assess the policy outcomes of the states' tobacco control efforts. This chapter describes the variables used in this index and the methods used to create it.

Chapter 5. State Facilitating Conditions and Barriers to Implementation of Tobacco Control Programs. Tobacco growing and production can profoundly affect the adoption of policy-based tobacco control interventions, as evidenced by substantial differences between tobacco-producing states and nonproducing states in areas such as tobacco taxes and the adoption of tobacco control policies. This chapter outlines the issues and assumptions leading to the development of a state-level variable representing the economic dependence of states on tobacco growing and manufacturing, for use as a covariate in the ASSIST evaluation regression analyses as part of the measures of state conditions.

Chapter 6. Measuring the Impact of Tobacco on State Economies. State differences in population demographics, and economic, political, social, cultural, and geographic factors can affect the likely acceptance, implementation, and outcomes of a state tobacco control program. This chapter describes these factors and how they might affect an evaluation of a tobacco control program, together with a discussion of which factors were used as part of the ASSIST evaluation. In addition, potential measurement techniques for other factors are suggested for use in future evaluations.

Chapter 7. The ASSIST Newspaper Tracking System. Media advocacy was one of the three principal interventions of the ASSIST model. An analysis of the amount and type of newspaper media coverage potentially attributable to media advocacy interventions was one approach used to evaluate their success. This chapter describes a state-level index to measure newspaper coverage of the four ASSIST priority policy areas— clean indoor air, restrictions on minors' access to tobacco, excise tax increases, and restrictions on tobacco advertising and promotion. Although this index was not used in the ASSIST evaluation, the chapter demonstrates its potential value for future analyses.

Chapter 8. Evaluating Tobacco Industry Tactics as a Counterforce to ASSIST. Tobacco industry efforts to counter tobacco control initiatives are not typically taken into account when tobacco control programs are evaluated, even though counterefforts constitute a strong force that impedes achievement of tobacco control intervention objectives. In this chapter, examples of tobacco industry efforts to counter ASSIST and other state tobacco control programs are provided from the peer-reviewed literature and tobacco industry documents. While the inherent difficulty of measuring these counter-efforts ultimately precluded their use in the ASSIST evaluation model, the chapter discusses the impediments to creating a tobacco industry effort measure and potential solutions for overcoming these impediments.

Chapter 9. Final Outcomes: Analytical Methods and Results. The final outcomes of the ASSIST evaluation are cigarette smoking prevalence and per capita cigarette consumption at the end of the intervention. This chapter describes the methodology and statistical techniques used to assess the final outcomes and discusses the evaluation results.

Chapter 10. Cost-effectiveness of ASSIST. This chapter uses standard econometric techniques to assess the cost-effectiveness of the ASSIST project. The standard

econometric techniques enable comparisons of the cost-effectiveness of ASSIST with other types of tobacco control interventions and with other large-scale public health initiatives.

Chapter 11. The ASSIST Evaluation: Contributions to Evaluation of Complex Public Health Initiatives. The closing chapter summarizes the major findings of the ASSIST study and discusses how this evaluation effort can serve as a model for evaluating large-scale, complex public health initiatives. The chapter discusses the broader issues in evaluation of large-scale initiatives, such as addressing complexity in public health projects and the need to go beyond existing "black box" approaches. It also discusses the programmatic and evaluation challenges, such as tobacco industry efforts to undermine or counter public health initiatives, and the potential for generalizing evaluation efforts such as ASSIST.

The ASSIST evaluation represents a successful attempt to measure the effectiveness of upstream tobacco control interventions in an environment where these interventions were widely adopted beyond the states funded by the National Cancer Institute. Using a rigorously developed and validated model, the evaluation shows a positive correlation between these interventions and a decline in tobacco usage and, more important, provides a model for how complex public health issues can be evaluated at broad levels of the population. In this sense, efforts such as the ASSIST evaluation represent part of the future of public health as this field moves beyond individuals and communities to address the fundamental sociopolitical issues that will reduce society's burden of disease and preventable death.

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The American Stop Smoking Intervention Study for Cancer Prevention (ASSIST)

This monograph, *Evaluating ASSIST: A Blueprint for Understanding State-level Tobacco Control* (NCI Tobacco Control Monograph 17), and the preceding one in this series, Monograph 16, *ASSIST: Shaping the Future of Tobacco Prevention and Control,* are designed as companion documents. Whereas Monograph 17 addresses the evaluation framework, the details of the ASSIST evaluation, and the results of this effort, Monograph 16 focuses on the processes and interventions used to implement ASSIST, lessons learned and insights, and the transition of ASSIST from a demonstration project to the National Tobacco Control Program supported by the Centers for Disease Control and Prevention. (Where appropriate, reference to Monograph 16 is provided; complete citation information for Monograph 16 can be found on page ii of this volume.) Following is a brief overview of Monograph 16, which was published in May 2005.

Monograph 16. *ASSIST: Shaping the Future of Tobacco Prevention and Control*

ASSIST was an 8-year, nonrandomized demonstration project for tobacco use prevention and control conducted by the National Cancer Institute, the American Cancer Society, and 17 state health departments. The goal of ASSIST was to change the social, cultural, economic, and environmental factors that promote tobacco use by using policy, mass media, and program services interventions. The four policy strategies were as follows:

- Raising excise taxes to increase the price of tobacco products
- Eliminating exposure to environmental tobacco smoke
- Limiting tobacco advertising and promotion
- Reducing minors' access to tobacco products

The strategies for ASSIST were developed and implemented by state and local tobacco control coalitions using population-based research, public health practices, policy development, and media advocacy. The concepts of building on a strong evidence base; designing interventions with broad population impacts; changing social norms in pursuit of greater justice; developing strong partnerships based on common goals and mutual respect; maintaining a determination not to be swayed or pushed off target by one's adversaries; and ensuring a serious commitment to evaluation, self-reflection, and midcourse correction were crucial components of ASSIST.

Monograph 16 provides in-depth descriptions of intervention processes, examples of materials and best practices, and resource lists and guidance for activities such as media advocacy campaigns. Numerous case studies are presented, not in the form of formal social research, but as stories and vignettes from state and local public health staff

and volunteers who describe their efforts, the barriers they encountered, the lessons they learned, and insights they gained. These case studies show ASSIST as it was experienced by the many committed and diverse people responsible for its success.

Below are the major topics addressed in Monograph 16:

- The historical context and conceptual framework of ASSIST
- The national partners and state agencies and their respective roles, and communication linkages among all the structural units that promoted collaborative decision making and were essential for the program to function
- National, state, and local capacity building by mobilizing communities, establishing coalitions, promoting participatory planning, and providing training and technical assistance
- Descriptions of strategies and intervention methods, insights, and lessons learned for the three ASSIST intervention channels—policy development, mass media and media advocacy, and program services
- The tobacco industry challenge to ASSIST and the ASSIST response
- Strategic planning for a national tobacco use prevention and control program
- The processes and challenges in maintaining capacity built by the ASSIST demonstration project, disseminating best practices, and building a comprehensive national tobacco use prevention and control program
- Contributions of ASSIST to tobacco use prevention and control and to other behavioral health programs

The insights and lessons learned from ASSIST have advanced our understanding of how research studies can be successfully translated and disseminated as demonstration projects, while illustrating how sustained funding builds effective tobacco use prevention and control programs. The ASSIST legacy endures in the infrastructure that continues to support tobacco use prevention and control interventions. As the first major public health intervention grounded in ecological theory, ASSIST remains an exemplar for modern systems-level public health programs.

Acronyms List

ACS	American Cancer Society
ANRF	American Nonsmokers' Rights Foundation
ASSIST	American Stop Smoking Intervention Study for Cancer Prevention
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
COMMIT	Community Intervention Trial for Smoking Cessation
CPS	Current Population Survey
DHHS	Department of Health and Human Services
ETS	environmental tobacco smoke
FDA	U.S. Food and Drug Administration
FOIA	Freedom of Information Act
GDP	gross domestic product
GSP	gross state domestic product
IMPACT	Initiatives to Mobilize for the Prevention and Control of Tobacco Use
IOI	Initial Outcomes Index
ISIS	Initiative for the Study and Implementation of Systems
MAV	media advocacy variable
MDS	multidimensional scaling
MSA	Master Settlement Agreement
NCI	National Cancer Institute
NIH	National Institutes of Health
NTCP	National Tobacco Control Program
PDV	present discounted value
PM	Philip Morris
QALYs	quality-adjusted life-years
RWJF	Robert Wood Johnson Foundation
SCLD	State Cancer Legislative Database
SoTC	Strength of Tobacco Control
TUS-CPS	Tobacco Use Supplement to the Current Population Survey
USDA	United States Department of Agriculture

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Chapter 11

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Finally, the editors would like to acknowledge the contributions of the editorial consultants and the current and former staff members of the American Institutes for Research, who provided technical and editorial assistance in the preparation of this monograph:

Margot Raphael and Paige Jackson,
  Project Managers
Richard S. Gallagher, Technical Editor
Elizabeth Bruce and Laurene Jackson,
  Editors
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Frances A. Stillman and Carol L. Schmitt

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1. The ASSIST Evaluation Project: An Overview

This chapter presents an overview of the American Stop Smoking Intervention Study for Cancer Prevention (ASSIST)* evaluation and its historical context. It reviews the key points of ASSIST and describes the conceptual framework that guided the ASSIST evaluation, as well as the key constructs of the conceptual framework, the rationale for their inclusion, and the research questions that established the linkages between these conceptual constructs.

ASSIST presented a unique challenge for evaluating tobacco control† program effectiveness. The ASSIST program guidelines included a focus on broad social and environmental change and recommended that interventions be delivered at the highest structural level (i.e., state or region) to ensure the greatest impact on tobacco use (see Monograph 16, chapter 2, pp. 21–23). As a result, one of the aims of the ASSIST evaluation was to show that this approach to tobacco control would reduce cigarette consumption and smoking prevalence. In the past, tobacco control interventions were often delivered in isolation or were aimed at specific groups and tested under controlled circumstances. In contrast, ASSIST was a demonstration project that combined capacity building and policy-focused interventions to change how tobacco control was delivered in 17 states. This focus on capacity development and policy interventions represented a more upstream approach to tobacco control, and evaluating it required identifying constructs or components and measures that went beyond those used to assess more traditional interventions that focused on changing individual behavior.

The ASSIST evaluation team developed a conceptual framework around a set of constructs including state tobacco control functioning, policy development, and state-level demographics and conditions that were used to help understand the process of change resulting from statewide tobacco control efforts. The initial outcomes were changes in policy, and the final outcomes were changes in smoking prevalence and cigarette consumption. Additional components of this model, such as tobacco industry interference tactics and print media coverage, were also studied. In some cases, measures were developed but were not ultimately included in the

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*The official name for ASSIST was the American Stop Smoking Intervention Study for Cancer Prevention. The title was often shortened to the American Stop Smoking Intervention Study, and it is this shortened form that is used in this monograph. For a more extensive description of the ASSIST conceptual framework, model, interventions, and case studies, and discussion of how ASSIST contributed to the development of a national tobacco control program, please see NCI Tobacco Control Monograph 16—*ASSIST: Shaping the Future of Tobacco Prevention and Control.*

†The phrase "tobacco use prevention and control" was emphasized in the development and dissemination of ASSIST materials. In this monograph, the phrase has frequently been shortened to "tobacco control."

final evaluation model. These measures are described in this monograph because they formed part of the knowledge base of population-level tobacco control that was developed for the overall ASSIST evaluation effort.

By developing and validating a conceptual framework that reflects the complexity inherent in tobacco control, and by developing measures that are strongly related to tobacco control outcomes, this effort serves as a model for evaluations of public health interventions with components that are diffused throughout an entire population. Moreover, such an approach fits a growing systems view of the world where the interrelationships and feedback across factors more closely mirror real-world behavior and outcomes.

Introduction

This chapter introduces the model used for the evaluation of ASSIST—one of the largest government-sponsored tobacco control initiatives ever undertaken. In addition, and perhaps more important, this chapter explores the historical context and trends that led to a unique and forward-thinking approach to evaluation. In this and subsequent chapters, the underlying theoretical perspective, the development and measurement of the evaluation components, and the analysis methods and outcomes are described.

While tobacco has played an important role in U.S. history, efforts to curtail its use have an equally long history. Thomas Jefferson noted that "[Tobacco] is a culture productive of infinite wretchedness. . . . The cultivation of wheat is the reverse in every circumstance."[1] However, the past half-century marks a unique period in which organized public health efforts, particularly at the policy level, have contributed to changes in social norms that have made cigarette smoking less socially acceptable to the public. This success is attributable to a complex and interdependent mosaic of interventions delivered through multiple channels.

Against this backdrop, ASSIST represented a major initiative to address tobacco use through high-level, policy-based interventions delivered at the state and community levels. Unlike prior efforts, ASSIST was a demonstration project and not a randomized trial, focusing instead on multiple interventions, many with indirect long-term outcomes, without the benefit of randomized control groups. Moreover, ASSIST implemented interventions at the level of a broad population group, through means such as capacity building, policy advocacy, legislative change, and media interventions, rather than measures such as individual smoking cessation assistance.

The challenge of evaluating ASSIST resulted in a sophisticated and statistically validated model, developed with multidisciplinary input. The evaluation assessed not only the effectiveness of the ASSIST intervention in the 17 intervention states but also overall tobacco control efforts across all U.S. states and the District of Columbia. The evaluation introduced a new and more ecological

approach, including an assessment of the upstream or more short-term indicators of tobacco control efforts and outcomes. The ultimate and long-term hypothesized outcomes were changes in smoking prevalence (the number of people who smoke) and per capita cigarette consumption. Change in prevalence across all states was assessed with multiple linear regression that adjusted for potential confounding factors. In addition, per capita consumption was examined using mixed effects linear modeling that accounted for the consumption rates in each state during the time when the ASSIST intervention began and incorporated the state factors associated with cigarette consumption and each state's seasonal pattern of consumption. The evaluation effort demonstrated that ASSIST was a success, and both this project and its evaluation can serve as models for how large-scale public health efforts must continue to evolve in the future.

The ASSIST Evaluation: A Historical Context

The ASSIST evaluation presented a unique challenge, formed by the confluence of numerous trends within both tobacco control and public health in general—trends toward more complex interventions that were aimed at broader population groups and took place in complex environments that were increasingly less amenable to randomized trials or controls.

To put the ASSIST evaluation in its proper context, one should first look at the broader trends in tobacco control that framed this project. Half a century ago, cigarette smoking was an ingrained

part of American culture, with an adult prevalence rate of nearly 60% for males and 44% overall, and a concomitant burden of premature disease and death.[2] By 2004, overall tobacco prevalence had declined by nearly a factor of two from these levels, ranking as one of the great success stories of public health.[3]
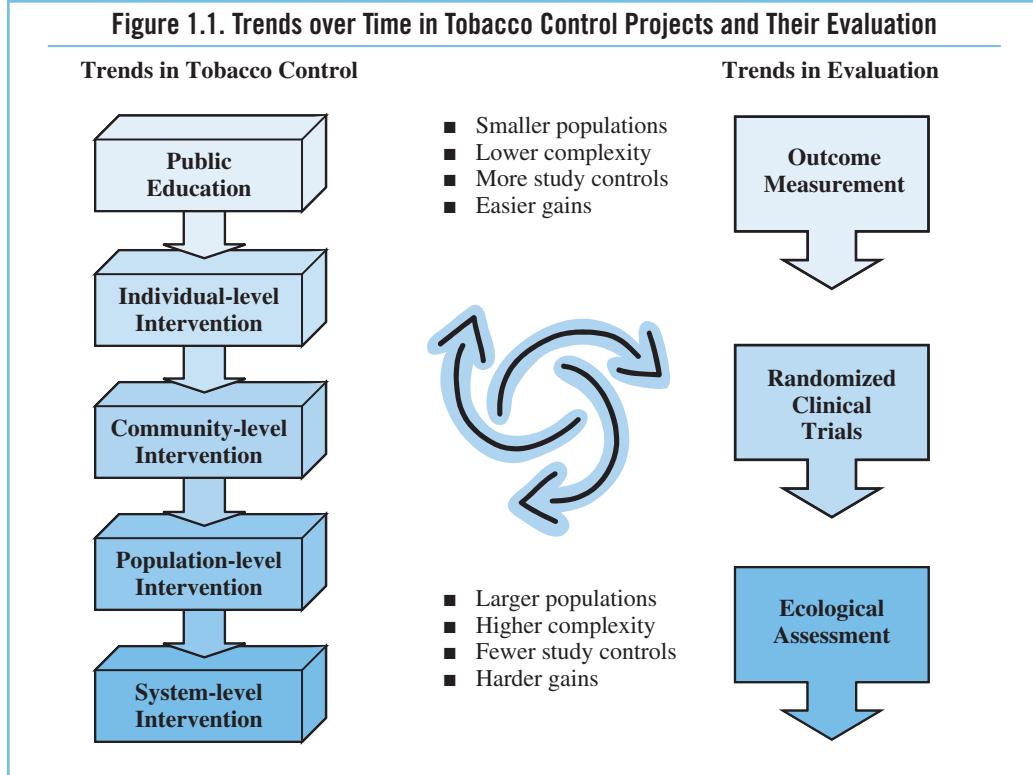
Figure 1.1 depicts the evolution of tobacco control interventions and evaluation of those interventions between 1964 and the ASSIST evaluation. The trajectory between these two points in time encompasses five general phases in the evolution of tobacco control efforts:

Phase 1: Education. The first surgeon general's report on smoking and health,[4] a massive school-based smoking prevention program, and extensive public service advertising and education about the dangers of smoking yielded a measurable reduction in tobacco prevalence and cigarette consumption. The first National Cancer Institute (NCI) tobacco control monograph, *Strategies to Control Tobacco Use in the United States: A Blueprint for Public Health Action in the 1990's,* notes that despite this initial drop, it quickly became clear that information alone would not be sufficient to effect major changes in tobacco use.[5(p ix)]

Phase 2: Individual-level Intervention. In the years following the mid-1960s, numerous resources became available to promote smoking cessation among individuals. These resources included clinics and classes to help smokers quit smoking, self-help and behavioral strategies for smoking cessation, and interventions to educate the general population about the dangers of smoking. Most

Figure 1.1. Trends over Time in Tobacco Control Projects and Their Evaluation

Trends in Tobacco Control

Public Education

Individual-level Intervention

Community-level Intervention

Population-level Intervention

System-level Intervention

■ Smaller populations
■ Lower complexity
■ More study controls
■ Easier gains

■ Larger populations
■ Higher complexity
■ Fewer study controls
■ Harder gains

Trends in Evaluation

Outcome Measurement

Randomized Clinical Trials

Ecological Assessment

cessation strategies focused on teaching individual smokers how to quit smoking. Other cessation approaches included physician advice and counseling, mass media campaigns, and the beginnings of on-demand resources such as telephone quit lines.[6]

Phase 3: Community-level Intervention. From the 1970s through the 1980s, an era in which early gains in smoking cessation began to plateau, there was a growing recognition that tobacco use was a public health problem with epidemiological implications. This recognition led to community-based interventions to address tobacco use. Early community-based intervention studies included the 1972 Stanford Three Community Study[7]

and the North Karelia demonstration project in Finland.[8] These interventions were followed by larger-scale projects such as the Community Intervention Trial for Smoking Cessation (COMMIT), funded by NCI from 1986 through 1992.[9–12] A randomized community trial comparing the effects of interventions in paired U.S. cities, COMMIT focused on areas such as cessation resources, education, and health-care interventions, and also on broader areas such as community mobilization and workplace smoking, laying the groundwork for a coalition model of tobacco control.

Phase 4: Population-level Intervention. Projects such as COMMIT began to sow the seeds of intervention through means

such as worksite smoking policies and community mobilization, which naturally led to efforts that addressed tobacco health issues through large-scale population-level interventions. By the close of the 1980s, numerous such initiatives took shape, ranging from efforts promoting clean air laws and increased taxation to media interventions—and social norms about smoking began to change. As a result of these early successes, the need for comprehensive approaches to tobacco control was recognized. A comprehensive approach required employing multiple channels and sectors, including political, economic, education, communication, health professional, and health voluntary sectors.[5(p52)] It was against this backdrop that the hypothesis behind ASSIST, that smoking behavior could be changed through sociopolitical means, was ultimately formed and tested.

Phase 5: System-level Intervention.
Today, the epidemiological model of tobacco control continues to evolve toward a broader systems view that incorporates the multiplicity of factors and stakeholder groups behind patterns of tobacco use and public health. Recent initiatives in tobacco control, such as the NCI-funded Initiative for the Study and Implementation of Systems[13] and the Global Tobacco Research Network,[14] are now exploring tobacco control issues at systems and network levels, while broader efforts, such as the Syndemics initiative funded by the Centers for Disease Control and Prevention (CDC),[15] show promise for examining the interrelationship of tobacco use prevention and control and other population-level health issues.
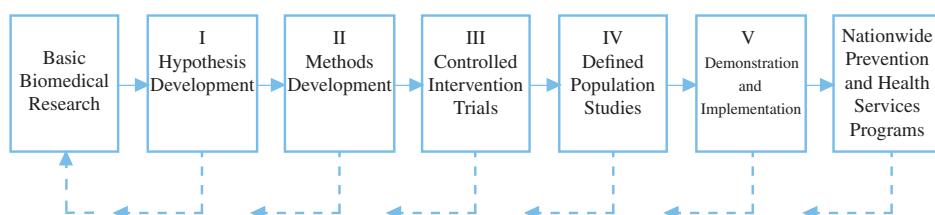
This progression represented more than just simple evolution—it was also part of a strategic objective on the part of NCI to implement population-level tobacco control on a framework of proven science. Figure 1.2 illustrates five phases of cancer control defined in the early 1980s under the leadership of Dr. Peter Greenwald and Dr. Joseph Cullen, Director and Deputy Director, respectively, of NCI's Division of Cancer Prevention and Control.

In practice, this framework helped guide the science from COMMIT, a randomized community trial aimed at

Figure 1.2. NCI's Five Phases of Cancer Control Research

| Basic Biomedical Research | I Hypothesis Development | II Methods Development | III Controlled Intervention Trials | IV Defined Population Studies | V Demonstration and Implementation | Nationwide Prevention and Health Services Programs |

Sources: Greenwald, P. G., and J. W. Cullen. 1984. The scientific approach to cancer control. *CA-A Cancer Journal for Clinicians* 34 (6): 328–332. National Cancer Institute. 1990. *Smoking, tobacco, and cancer program: 1985-1989 status report* (NIH publication no. 90-3107). Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health (p. vi).

defined community groups, to ASSIST, a demonstration project with much larger target groups and more complex interventions, while at the same time defining a clear trend toward larger-scale tobacco control efforts. This science-based model for tobacco control also helped lay the groundwork for a fundamental shift in tobacco control philosophy during the 1990s, which in turn led to equally fundamental changes in how society as a whole viewed the use of tobacco products.

The 1990s: A Turning Point for Tobacco Control

Through the beginning of the 1990s, the story of modern tobacco control in the United States was marked by a transition from public education to one of individual and community-level interventions. While these methods did achieve substantial reductions in tobacco use, at a broader social level these gains took place in a society in which smoking remained an accepted part of the fabric of life. Cigarette advertising, smoke-filled bars, and a doctrine of personal choice all remained part of the landscape of public life, as had been the case for decades before.

By comparison, the decade that followed marked a critical juncture in how society viewed tobacco. By the beginning of the new millennium, cigarettes had become an increasingly expensive, legislated, and socially unacceptable product—and tobacco manufacturers began to be held much more accountable for the health consequences of their products. This environment was a direct result of policy-level interventions promoted by a broad coalition of government, health-care, and community stakeholders—guided by a strong voice from the population itself, as expressed through their elected officials.

ASSIST. ASSIST, launched in 1991, was a major policy-level tobacco control initiative that became a vanguard of the tobacco use prevention and control efforts that followed. During the same period as the COMMIT intervention, NCI published its first monograph on tobacco control, which became known as the "blueprint."[5] The blueprint synthesized 40 years of research on effective tobacco control strategies. This document identified the need for comprehensive tobacco control interventions, primarily through policy-based approaches that could alter the sociopolitical environment of tobacco use. Along with the COMMIT findings, this document became the basis for ASSIST.

ASSIST was a macro-level policy approach to tobacco control.[16,17] NCI made the first substantial monetary investment to accomplish its stated tobacco control objectives by releasing a Request for Proposal to fund state tobacco control programs. In 1991, NCI partnered with the American Cancer Society to implement ASSIST through contracts to 17 state health departments; the contracts incorporated the recommendations that were in the blueprint. These 17 states were funded to implement upstream interventions in three core areas: policy, media, and program services, to be delivered across several population channels. (For a more extensive discussion of the ASSIST intervention areas, see Monograph 16, chapter 2, pp. 26–28.)

**NCI Tobacco Control
Monograph 16: ASSIST**

Tobacco Control Monograph 16, *ASSIST: Shaping the Future of Tobacco Prevention and Control,* is a companion volume to this monograph. Monograph 16 provides the background and history of ASSIST. This history includes not only the program components but also a detailed look at how the initiative was implemented. The case studies and detailed descriptions of the "complexities, politics, and outright opposition encountered by the ASSIST team"[a] afford the reader a better understanding of state-level tobacco control programs and a recognition of how far we have come since the 1950s, when tobacco use was a well-accepted social behavior. Monograph 16 also leaves the reader with an appreciation for the challenges faced by the ASSIST evaluation team.

[a]National Cancer Institute. 2005. *ASSIST: Shaping the future of tobacco prevention and control* (Tobacco control monograph no. 16, NIH pub. no. 05-5645). Bethesda, MD: National Cancer Institute (p. viii).

ASSIST was the first major federal investment in state tobacco control infrastructure, and its program standards formed the foundation of two other nationally-based programs, SmokeLess States and Initiatives to Mobilize for the Prevention and Control of Tobacco (IMPACT), during the 1990s.[18] As the largest public-private partnership in tobacco control ever implemented, ASSIST invested about $22.5 million per year in tobacco control programs. Although this amount was substantial, it represented only about 0.03% of the $5.7 billion that the tobacco industry spent on average per year to market its products each year during the same period (1991–99).

The NCI investment allowed states to establish strong infrastructures to support comprehensive state tobacco control programs. Moreover, ASSIST provided states with the guidance they needed to implement strong, evidence-based tobacco control practices.

SmokeLess States. During the same period, in 1993, the Robert Wood Johnson Foundation in partnership with the American Medical Association funded the SmokeLess States National Tobacco Policy Initiative.[19] This complementary private-sector initiative initially funded coalitions in 19 states and a youth-specific project in Tucson, Arizona. Two years later, additional funding brought in 13 new grantees, and by the time the program ended in 2004, almost all of the states had been funded.[20] Much like ASSIST, the SmokeLess States project focused on policy-level initiatives for tobacco control, concentrating on clean air ordinances, increasing tobacco taxes, and providing insurance coverage for tobacco dependence treatment. It also fostered a similar coalition model for the implementation of its interventions.

IMPACT. In 1994, through IMPACT, CDC funded the remaining 32 non-ASSIST states and the District of Columbia (California had its own well-developed tobacco control program and was not included in IMPACT) to implement tobacco control programs, providing technical assistance with limited funding support (average annual awards were $360,000) to build the states' capacity to sustain broad-based tobacco control programs. CDC provided technical assistance and training on planning, developing, implementing, and evaluating

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SmokeLess States Versus ASSIST

The SmokeLess States project differed from ASSIST in two important ways.

- First, SmokeLess States funding did not go through state health departments as did the funding for ASSIST. Therefore, SmokeLess States grantees, who were mainly health voluntary agencies and other coalition partners, did not have to contend with state governmental restrictions and bureaucratic limitations. They were freer to engage in media and policy advocacy to promote specific policy changes, which was severely limited under the government funding of ASSIST. Funding from the Robert Wood Johnson Foundation could be used for advocacy (educating policy makers and the public about tobacco-related policies) but not for lobbying. However, funds for lobbying were provided through partnerships with voluntary agencies (American Cancer Society, American Heart Association, American Lung Association), which did allow SmokeLess States grantees to advocate for specific legislation, an activity in which state health departments could not engage.[a]
- Second, while ASSIST was a demonstration project designed to employ policy interventions within 17 specific funded states, SmokeLess States eventually funded 42 state coalitions. Although there was no a priori evaluation plan for SmokeLess States, it is currently being evaluated using the ASSIST evaluation framework.

Projects such as SmokeLess States also benefited from the knowledge base that evolved from ASSIST. A unique component of ASSIST was the ASSIST Coordinating Center, which provided technical assistance to the ASSIST states but also helped diffuse ASSIST-like interventions to other states. This dissemination was done primarily through a national tobacco control conference to which all states, not just the 17 ASSIST states, were invited.

[a]Gerlach, K. K., and M. A. Larkin. 2005. The SmokeLess States Program. In *The Robert Wood Johnson Foundation anthology: To improve health and health care,* vol. 8, 29–46. San Francisco: Jossey-Bass. www.rwjf.org/files/publications/books/2005/chapter_02.pdf.

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tobacco control programs.[21] While SmokeLess States and IMPACT had very beneficial effects on national smoking policy, they also presented a challenge for the ASSIST evaluation: the ASSIST influence had now spread beyond the 17 states under study, necessitating a fresh approach to the ASSIST evaluation.

Individual States. Concurrently, the efforts of individual states in the 1990s began to demonstrate the potential impact of policy initiatives. In California, Proposition 99 raised over $150 million for tobacco control education and research via the imposition of an additional tax of 25¢ per pack, and the resulting advertising and outreach efforts helped reduce California's smoking prevalence from 26% to 18%.[22] In Massachusetts, successive 25¢ cigarette tax increases in 1992 and 1996 helped fund an aggressive campaign of advertising, education, and cessation resources within a coalition environment. As a result, smoking prevalence decreased from 23.5% to 19.4% during the 1990s, a decline almost four times the national average during this period.[23] The successes of state-level programs like these furthered the scientific support for larger-scale initiatives such as ASSIST and SmokeLess States.

Turning Point for the Tobacco Industry. The tobacco industry, whose marketing expenditures have always far outstripped the sums invested in tobacco control, responded to these measures with numerous counterefforts. These ranged from spending tens of millions of dollars on efforts to defeat policy initiatives such as the ones outlined above, to moments such as April 14, 1994, when the CEOs of seven major tobacco companies appeared before the U.S. House of Representatives Subcommittee on Health and the Environment chaired by Rep. Henry Waxman and claimed that nicotine was "not addictive."[24]

However, the tide of both public opinion and legislation turned substantially against the tobacco industry during the 1990s. In particular, a 1994 lawsuit by the state of Mississippi to recover the costs of treating sick smokers under Medicaid unleashed a flood of similar lawsuits from other states, culminating in settlements with four individual states and, ultimately, the $300+ billion Master Settlement Agreement between the tobacco industry and state attorneys general in 1998.[25] This settlement, which provided monetary payments to states as well as funding for numerous tobacco cessation resources, put the industry in the unique position of subsidizing tobacco control efforts at the same time it was aggressively marketing its products. Of equal importance, this agreement also negotiated the conditions under which internal tobacco industry documents that revealed the scope of industry efforts to promote its products and to counter tobacco control efforts should be made and remain accessible to the public.

All of these factors combined to create both great progress and great challenges in tobacco control by the end of the 1990s. Tobacco use in the United States is now lower than it has been in over half a century, and there is a strong and growing evidence base that shows that population-based strategies are effective. In the process, the public's perception of tobacco use has changed and is now viewed as a social as well as an individual problem.

Tobacco Control Today

On September 30, 1999, the ASSIST contracts ended and on October 1, 1999, CDC funding for the National Tobacco Control Program (NTCP) began. Chapter 10 in Monograph 16 describes the transition from ASSIST and IMPACT to NTCP. As of 2005, the field of tobacco control encompassed a broad mosaic of efforts spanning the entire spectrum from the individual, to the community, to national and even global populations. The evolution of those efforts over time points to a number of trends that have influenced the direction of the evaluation of ASSIST:

- **Increasing complexity.** A generation ago, tobacco control specialists looked at the effectiveness of individual interventions. Today, they are also likely to be examining interrelated social, political, and economic factors that relate to the root causes of tobacco use—interventions in which causes and effects must be quantified by increasingly sophisticated and often indirect means.
- **Larger sample sizes.** There is a clear trend toward interventions aimed at

larger populations, in keeping with a growing epidemiological and systems view of tobacco use and health issues. Factors behind this trend include the spread of policy interventions and dissemination of best practices to growing stakeholder networks. In a world where a highly competitive tobacco industry seeks growth in overseas markets and targets population groups, future efforts to reduce tobacco use will become global as well as national.

- **More stakeholders.** Tobacco control has evolved over the past several decades from an ancillary public health issue to a field unto itself. Today, stakeholders range from practitioners and activists at the community level, to an extensive and transdisciplinary network of researchers, to thought leaders and organizations at the highest levels of government.
- **Tougher gains over time.** As of 2004, adult smoking prevalence

rates over the preceding 15 years had declined at approximately half the rate of the 15 years following the release of the 1964 surgeon general's report.[26] While today's continuing rates of decline remain a positive trend, it is clear that further gains in tobacco-related health increasingly lie beyond simple interventions.

Trends such as these can be seen clearly by doing a side-by-side comparison of the two most recent large-scale government tobacco control efforts, COMMIT and ASSIST. Table 1.1 illustrates many of the factors that influenced the design of the ASSIST evaluation. (For a more extensive comparison of COMMIT and ASSIST, see Monograph 16, chapter 1, p. 10.)

These differences underscore the natural evolution that occurred in tobacco control and, by corollary, other issues in public health. As a result, the ASSIST evaluation represents an important first

Table 1.1. Comparison of COMMIT and ASSIST

COMMIT	ASSIST
Focus on community-level interventions	Focus on state- and community-level interventions
Interventions to directly change smoking behavior	Interventions to change the social and cultural environment and attitudes toward smoking. These environmental changes, in turn, create an environment that changes tobacco use behavior.
Clinical trial model, tracking a cohort within city pairs with and without intervention	Ecological model applied to statewide populations
Focus on developing intervention channels	Focus on policy change, program implementation, and capacity building
Focus on research and data collection with less funding to direct services or interventions	Demonstration project with less focus on research or evaluation and most funding directed toward interventions
Incorporated a community-level coalition model	Incorporated a state-level coalition model

step in how to assess future population-level efforts that address tobacco use and, potentially, other behaviors that cause preventable death and disease. It represents a fundamental change in evaluation methodology, as well as a base from which future public health and evaluation efforts will continue to evolve.

The ASSIST Evaluation

Because ASSIST was a demonstration project, the original evaluation plan was for a very limited assessment, based on a comparison of final outcomes (e.g., tobacco use) between ASSIST and non-ASSIST states. The rationale for this was that ASSIST interventions were based on known science, its influence was initially limited to specific states, and its focus was on implementation. However, as NCI efforts increasingly focused on identifying and disseminating *evidence-based approaches* into practice across the cancer control continuum to increase the likelihood of improved intervention outcomes,[27] it became clear that evaluating ASSIST was crucial.

- This project represented a rare opportunity to measure the effectiveness and cost-effectiveness of upstream interventions, particularly as they related to other accepted public health interventions (such as mammography, diet and exercise approaches to obesity prevention, and injury and violence prevention) and public education.
- ASSIST interventions were expanding to other states, amidst other modalities for tobacco control, and a mechanism

was needed to assess how effective these measures were at a population level.
- The science of evaluation itself needed to evolve beyond the bounds of randomized clinical trials and single disciplines toward methods and measures to evaluate complex public health initiatives.

Fundamental differences between COMMIT and ASSIST precluded adapting the COMMIT evaluation methodology to ASSIST. COMMIT was a randomized community trial, and its purpose was to test the effectiveness of an intervention and the dissemination of successful strategies through a demonstration project. The protocol for COMMIT was fixed across all sites, whereas the protocol for ASSIST varied across sites. In addition, COMMIT was implemented only in communities whose populations ranged in size from 50,000 to 170,000, whereas ASSIST was implemented across entire states whose mean population size was approximately four million.

Evaluating ASSIST, therefore, required a new approach. ASSIST was a large-scale, multisite demonstration project (Phase V) designed to reduce smoking prevalence through the development and implementation of a comprehensive tobacco prevention and control intervention. It was a natural experiment rather than a randomized experiment and was not comprehensive in the scope of its interventions, which meant that ASSIST was not amenable to a standard evaluation of processes or outcomes. Instead, this effort required an evaluation paradigm that could measure the impact of program interventions on public health

outcomes in an environment with substantial diffusion of these interventions.

What factors ultimately defined the methodology for evaluating ASSIST? Four key principles underscored the design and implementation of this evaluation:

Use an Ecological Approach. This evaluation was not a simple cause-and-effect study, but rather an observation of numerous factors interacting toward an outcome. There were multiple levels of activity; these levels interacted synergistically over time; and they formed elements of an overall approach in which the sum of the parts was expected to be greater in terms of success than each individual program component alone.

Measure the Impact of Social Rather Than Individual Change. The classic randomized experiment measures the effectiveness of a single intervention on a defined outcome. By comparison, ASSIST sought to change the social environment surrounding tobacco use and, in turn, effect long-term changes in individual behavior.

Seek to Measure Capacity for Change. In the clinical model, an intervention has a specific effect. In the ecological model, interventions create capacity (in the form of resources, coalitions, and policy) that, in turn, creates environmental change and continues to adapt to the conditions of this environment.

In tobacco control, growing evidence shows the impact capacity has to change behaviors and outcomes: for example, according to recent CDC best practices, recommended levels of funding could have substantial positive impact on tobacco sales;[28] however, successful implementation of these resources requires adequate infrastructure, such as numbers of staff and levels of staff experience, and the strength of agency and community coalitions.[29,30] That infrastructure was conceptualized and subsequently quantified as capacity, a concept for which there are multiple models in the extant literature (W. Trochim, F. Stillman, P. Clark, and C. Schmitt, 2003, "Empirically-Developed Conceptual Model," unpublished work).

Focus on Intermediary as well as Final Outcomes. The ASSIST evaluation focused not only on the long-term goals of a tobacco control program—namely, reduced tobacco prevalence and cigarette consumption levels—but also identified, assessed, and in some cases measured the relationship between the intervention, interim outcomes, and long-term outcomes. A formal measure of some of these outcomes, the Initial Outcomes Index, was part of the ASSIST evaluation analysis, based on measures of total cigarette price, a rating of local and state clean indoor air policies, and the percentage of workers covered by 100% smoke-free workplaces.

Before ASSIST, no evaluation methodology had been developed to measure the outcomes of such a complex program. The ASSIST evaluation was designed to determine if multiple, community-based, statewide efforts could accelerate the reduction of smoking prevalence; the evaluation was not designed to compare any single tobacco control intervention or combination of interventions. Measures of program effectiveness included individual-level outcomes (e.g., reductions in cigarette

consumption and smoking prevalence) as well as macro-level environmental changes (e.g., enactment of policies and legislation, and increase in the coverage of tobacco-related issues in the media). Because ASSIST was a demonstration project, the proportion of evaluation dollars to program dollars was quite low—less than 5%. The rationale behind this lack of investment in a comprehensive

evaluation of ASSIST was that as a Phase V project, ASSIST was supposed to implement strategies whose effectiveness had already been documented, not break new ground or test the effectiveness of new methods. Thus, the original plans to evaluate ASSIST relied on a very simple methodology that required little additional data collection—comparing tobacco use and environmental changes in ASSIST and non-ASSIST states.

However, the ASSIST evaluation evolved into an integrated and comprehensive analysis of ASSIST and of state-level tobacco control program effectiveness in general. The ASSIST evaluation compared changes in tobacco control policies, state per capita cigarette consumption, and adult smoking prevalence in ASSIST and non-ASSIST states and the District of Columbia. Smoking prevalence was obtained from adults interviewed in the NCI-sponsored Tobacco Use Supplement to the U.S. Census Bureau's Current Population Survey (TUS-CPS) in 1992–93 and 1998–99. Per capita cigarette consumption was calculated every two months for each state from sales data for the total number of cigarette packs moved from wholesale warehouses, divided by the state's adult population. This analysis represented a major advance in the evaluation of comprehensive state-level tobacco control programs and, by corollary, of complex multifactor public health interventions.

The development of the ASSIST evaluation conceptual framework helped redirect the evaluation effort to a more comprehensive look at overall tobacco control development and effectiveness.

On the basis of this model, a series of research questions were formulated to establish linkages between the complex program components and outcomes. In addition to examining whether the 17 ASSIST states achieved lower cigarette consumption and lower smoking prevalence than the other 33 states and the District of Columbia, the evaluation design provided for an in-depth evaluation of state tobacco control program components. The evaluation allowed a determination of whether states with more tobacco control resources and infrastructure and those that focused more effort on changing the policy environment produced greater change in tobacco-related policies (initial outcomes) and achieved lower tobacco prevalence and cigarette consumption rates (final outcomes).

Conceptual Design

ASSIST represents an ecological systems model (sometimes referred to as "the new public health")—an approach that focuses on changing the social, cultural, economic, and physical environmental factors that influence health behaviors.[31,32]

The ASSIST evaluation model is based on the assumption that cigarette smoking is driven by a complex set of environmental factors and that changes in smoking that result from tobacco control policy initiatives occur incrementally and at a modest pace. Testing these assumptions required multiple outcome points (initial, intermediate, and final) to track change as it occurred over the 8-year span of ASSIST. This span accommodated the expectation that a measurable reduction in smoking prevalence

would lag behind changes in policy and social norms and would also lag behind reductions in cigarette consumption. Therefore, early signs of change, such as change in policy for states (for example, the amount of tax or new clean indoor air legislation), could serve as an initial indicator that the intervention had an effect.

The ASSIST Evaluation Model

Evolution

In 1992, an evaluation group was convened to develop and implement an evaluation methodology for ASSIST, as originally designed—as a simple comparison of smoking prevalence between ASSIST and non-ASSIST states. An early plan also included matching ASSIST states with non-ASSIST states. However, this methodology lacked adequate statistical power to assess change.

Some components of the early evaluation design included

- Measures such as the TUS-CPS, an extensive tobacco use questionnaire, tied in with the U.S. Census and tobacco use information from the Behavioral Risk Factor Surveillance System (BRFSS) developed by NCI but implemented by the CDC.
- An ASSIST Coalition Assessment designed as a qualitative measure of state-level tobacco control coalitions, in areas such as environmental, structural, and functional characteristics. This assessment, a case study approach based on document reviews, one-on-one interviews, direct observations, and a written survey instrument, was

pilot tested but never implemented across all ASSIST states. Ultimately, the Strength of Tobacco Control (SoTC) measure, discussed in more detail in chapter 2, was developed and implemented to gather data on program components and functioning across all U.S. states.

■ A rating system for the ASSIST evaluation using the State Cancer Legislative Database.

In the second phase of the ASSIST evaluation, a Technical Expert Panel was convened and the final conceptual framework was developed. This section describes its key constructs, assessment techniques, and the analytical methods used for prevalence and consumption analyses.

The ASSIST evaluation ultimately compared changes in tobacco control policies, state per capita cigarette consumption, and adult smoking prevalence in the 17 ASSIST states with those in the 33 non-ASSIST states and the District of Columbia. The evaluation also analyzed the effect of program components and tobacco control policies on smoking prevalence and per capita cigarette consumption. The development of the ASSIST evaluation conceptual framework and the research questions that sought to establish linkages between the program components and program outcomes provided a more comprehensive assessment of ASSIST effectiveness and tobacco control functioning across the United States.

Key Constructs

Figure 1.3 presents the conceptual framework for the ASSIST evaluation,
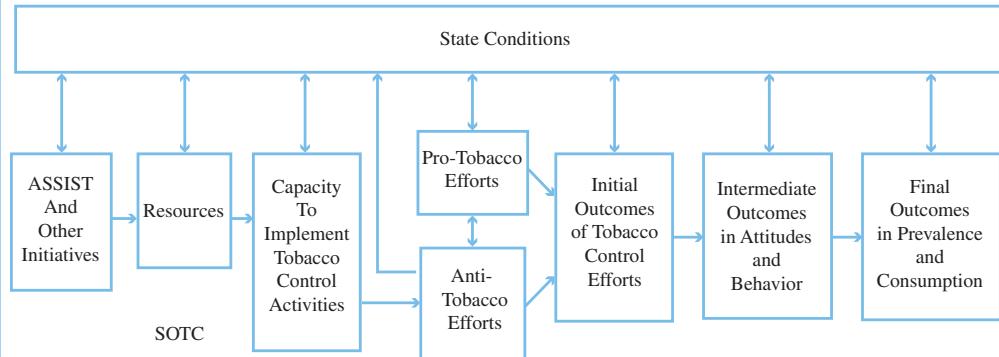
illustrating the sequential process of change resulting from statewide tobacco control efforts. The model consists of key constructs that may impede or promote progress toward the final outcomes of reducing cigarette consumption and smoking prevalence, expressed as groupings of related variables used to index or measure the more abstract concepts behind them.

Figure 1.4 shows the timeline for data collection in the ASSIST evaluation. Per capita cigarette consumption data were collected every two months for each state from sales data for the total number of cigarette packs moved from wholesale warehouses, divided by the state's adult population. Smoking prevalence was collected in the NCI-sponsored TUS-CPS in 1992–93 and 1998–99. For the ASSIST evaluation, only data from baseline (1992–93) and final (1998–99) collections were used. Data for the SoTC measure were collected only once, at the end of the intervention phase, whereas data for the Initial Outcomes Index (IOI) were collected throughout the study. The measurement and computation of indirect indices such as SoTC and IOI required more sophisticated efforts, described in detail in chapters 2 and 4, respectively, in this monograph. Table 1.2 delineates the key constructs and the variables that were proposed for the evaluation.

The Strength of Tobacco Control (SoTC) index was developed to measure the components of ASSIST or ASSIST-like programs. The index is a multi-element measure consisting of three major components:
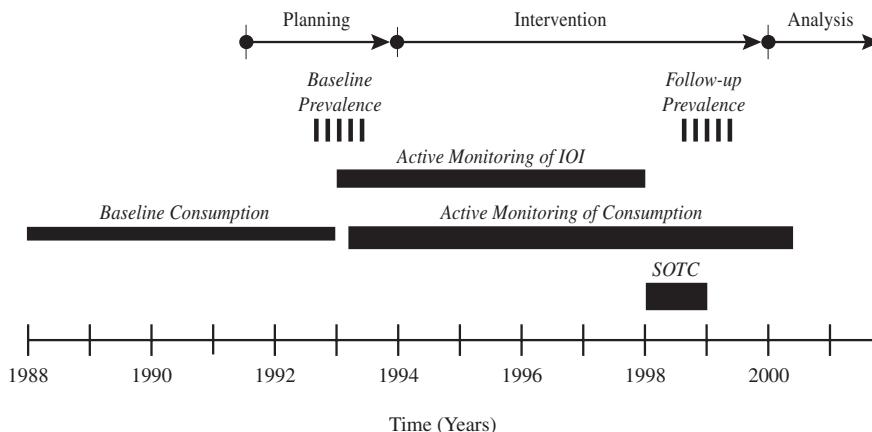
Figure 1.3. The ASSIST Evaluation Model

State Conditions

ASSIST And Other Initiatives → Resources → Capacity To Implement Tobacco Control Activities

SOTC

Pro-Tobacco Efforts

Anti-Tobacco Efforts

Initial Outcomes of Tobacco Control Efforts → Intermediate Outcomes in Attitudes and Behavior → Final Outcomes in Prevalence and Consumption

Source: Stillman, F. A., A. Hartman, B. Graubard, E. Gilpin, D. Chavis, J. Garcia, L. M. Wun, W. Lynn, and M. Manley. 1999. The American Stop Smoking Intervention Study: Conceptual framework and evaluation design. *Evaluation Review* 23 (3): 263. Used with permission.

Figure 1.4. ASSIST Evaluation Timeline

Planning | Intervention | Analysis

Baseline Prevalence

Follow-up Prevalence

Active Monitoring of IOI

Baseline Consumption

Active Monitoring of Consumption

SOTC

1988 1990 1992 1994 1996 1998 2000

Time (Years)

Source: Stillman, F. A., A. M. Hartman, B. I. Graubard, E. A. Gilpin, D. M. Murray, and J. T. Gibson. 2003. Evaluation of the American Stop Smoking Intervention Study (ASSIST): A report of outcomes. *Journal of the National Cancer Institute* 95 (22): 1682. Used by permission of Oxford University Press.

Table 1.2. Key Constructs and Variables Initially Proposed for the ASSIST Evaluation

Measure	Variable
Key constructs	
Resources[a]	■ Dollars expended for tobacco control
	■ Source of funds for tobacco control
Capacity to implement tobacco control activities[a]	■ Number of state-level tobacco control personnel
	■ Capability of state organization to provide surveillance, training, and technical assistance
	■ Number of state organizations involved in tobacco control
	■ Frequency and type of contact between organizations
	■ Linkages between state and local tobacco control
Antitobacco efforts[a]	■ Quality of state tobacco control plan
	■ Comprehensiveness of state tobacco control plan
	■ Type of tobacco control strategies
	■ Comprehensiveness of state tobacco control effort
Protobacco efforts	■ Advertising dollars
	■ Legislative activities
	■ Other activities
State conditions	■ Age, education, population size, poverty status, race/ethnicity, sex, urban/rural
	■ Economic value of tobacco from agricultural, manufacturing, and processing (% of gross state product)
Outcome measures	
Initial outcomes	■ Rating of local and state tobacco control policies
	■ Percentage of workers covered by clean indoor air policies and workplace smoking bans
	■ Media advocacy score
	■ Cigarette price/tax
Intermediate outcomes	■ Behavior change
	■ Attitudes
Final outcomes	■ Prevalence
	■ Consumption

Source: Stillman, F., A. Hartman, B. Graubard, E. Gilpin, D. Chavis, J. Garcia, L. M. Wun, W. Lynn, and M. Manley. 1999. The American Stop Smoking Intervention Study (ASSIST): Conceptual framework and evaluation design. *Evaluation Review* 23 (3): 264. Used with permission.

[a]Summarized to form the Strength of Tobacco Control (SoTC) index.

- The first component of SoTC is **resources** committed to state tobacco control efforts. This construct includes state budgetary expenditures for tobacco control and the number of personnel working on tobacco control.
- The second component is the **capacity** to implement tobacco control activities. This construct includes the number of state-level agencies and local coalitions committed to tobacco control. This capacity construct also measures the extent to which specific structures and linkages have developed among key state agencies, coalitions, and advocacy groups. Studies have demonstrated that these linkages can be measured with quantitative indicators.[33,34]
- The third component is tobacco control program **efforts**. This construct includes tobacco control program efforts that focus on socioenvironmental and policy interventions and efforts that focus on changing individual behavior.

These three variables (resources, capacity, and efforts) were summarized to form the overall exposure measure of tobacco control efforts at the state level—SoTC—which in turn served as an indirect measure of ASSIST.

Outcome Measures

Tobacco control efforts produce many types of change, as noted by the outcome measures listed in table 1.2. Initial outcomes could be measured at both the individual (micro) and state (macro) levels. For example, a workplace tobacco policy (a primary intervention objective) is an initial outcome. Workplace tobacco policies can be self-imposed by employers and measured by individuals responding to a survey, or they can be mandated by state or local legislation and measured by a rating of the state or local legislation. Intermediate outcomes include changes in smoking behavior (quit attempts) and changes in attitudes. Final outcomes include changes in consumption levels and prevalence rates as well as in initiation rates and quit ratios.

The analyses of multiple outcomes (e.g., cigarette consumption, quit ratios, initiation rates, delay in age of initiation, changes in workplace policies, and media exposure at their different levels—initial, intermediate, final—in addition to smoking prevalence outcomes) are critical to understanding the relationships and timing of the various components of the tobacco control model. From the California experience, it is apparent that changes in cigarette consumption can be seen sooner than changes in prevalence.[35] Changes in prevalence attributable to an intervention result from a complex mixture of changes in quitting and initiation, delays in the age of initiation, and changes in the ability to affect these in the entire population examined. Cigarette consumption may also change as a consequence of several factors, such as the number of people beginning to smoke, the number of people quitting completely, and the number of smokers cutting down the number of cigarettes smoked. However, cigarette consumption is a more sensitive measure of tobacco control outcomes than smoking prevalence because it is a continuous measure and is collected frequently over

time, resulting in many more measurements with a better basis for estimating trends in a time-trend analysis.[36]

Research Questions

The ASSIST evaluation was guided by a series of research questions that are summarized in table 1.3. The initial question was whether the 17 ASSIST states would achieve lower cigarette consumption rates and lower smoking prevalence than all other states.[37] However, the evaluation design included questions about the relationship between exposure to tobacco control efforts (i.e., as measured by SoTC) or initial outcomes and levels of cigarette consumption and prevalence across all 50 states and the District of Columbia. In other words, did states with higher SoTC scores or higher initial outcome scores have lower tobacco usage? The practices and approaches that were most likely associated with successful

implementation of state-level tobacco control programs were also identified.

Analytic Challenges

When ASSIST began in 1991, the initial plan for its evaluation was a simple ASSIST/non-ASSIST comparison using responses from the BRFSS. However, it was determined that data from the BRFSS were not comparable across states: not all states were using the BRFSS at the beginning of the project; in addition, states used different methodologies, specifically varying sampling strategies. The evaluation ultimately used the TUS-CPS, which was developed by NCI for the ASSIST evaluation and was conducted by the Bureau of the Census. Baseline (1992–93), mid-project (1995–96), and follow-up (1998–99) surveys of smoking and tobacco use prevalence were to be measured in all 50 states and the District of Columbia. The TUS-CPS

Table 1.3. Research Questions Guiding the ASSIST Evaluation

- What is the effect of ASSIST on cigarette consumption and smoking prevalence rates (final outcomes)?
- What is the relationship between ASSIST and the Strength of Tobacco Control index (SoTC: resources, capacity, and antitobacco efforts)?
- What is the relationship between SoTC and cigarette consumption and smoking prevalence rates?
- What is ASSIST's effect on initial outcomes (worksite smoking bans, legislative scores, media advocacy scores, cigarette prices)?
- How are the initial outcomes related to the final outcomes?
- What is the relationship between SoTC and the initial outcomes?
- Did ASSIST modify the effects of the initial outcomes and/or SoTC's effects on the final outcomes?

Source: Stillman, F., A. Hartman, B. Graubard, E. Gilpin, D. Chavis, J. Garcia, L. M. Wun, W. Lynn, and M. Manley. 1999. The American Stop Smoking Intervention Study (ASSIST): Conceptual framework and evaluation design. *Evaluation Review* 23 (3): 267. Used with permission.

provided state-specific estimates as well as overall data on the U.S. population at large.

The primary endpoint planned for ASSIST was the prevalence of cigarette smoking and other tobacco use in the intervention sites. Smoking prevalence in the ASSIST states was to be compared with smoking prevalence in non-ASSIST states. A simple comparison at that time seemed a rational approach because few state health departments had tobacco control programs and ASSIST was therefore relatively unique.

However, this simple evaluation plan could not be used. The size and complexity of this demonstration project resulted in a number of difficult analytic challenges, including diffusion of ASSIST-like activities to other states, variations in state conditions that could affect program implementation or outcomes, site selection bias, and statistical limitations related to the small number of observations (50 states plus the District of Columbia).

Diffusion, Contamination, and Secular Trends

ASSIST was designed as a catalyst for tobacco control efforts, and no effort was made throughout the project to inhibit or prevent the diffusion of tobacco control strategies from ASSIST to non-ASSIST sites. Within the first few years of the project, non-ASSIST states adopted ASSIST program elements. In fact, the spread of activities from ASSIST to non-ASSIST sites was considered a possible indicator of success, and substantial natural diffusion from parallel antitobacco

activities was expected to occur throughout ASSIST. ASSIST was considered a precursor to a national tobacco control program with "sustained funding for all states and territories,"[18(p446)] and wide diffusion of ASSIST practice standards would make this transition easier. (As discussed previously, two key initiatives that helped spread the concepts of many ASSIST interventions to other states were the SmokeLess States National Tobacco Policy Initiative and the CDC IMPACT program.)

As a result, at the midpoint of the ASSIST intervention, all states had tobacco control programs. This situation was desirable from a public health perspective, but it made it difficult to characterize non-ASSIST states as control or no-treatment states. In addition, it was expected that it would take an extended period of time for the program to affect consumption and prevalence, making it difficult to separate secular trends in tobacco use from program effects.

Competing Factors and Forces

The evaluation was further complicated by the fact that ASSIST activities were not conducted in a vacuum. State conditions such as demographics (specifically, sex, age, race/ethnicity, poverty status, education, urban/rural, population size) and economic dependence on tobacco (the relative contribution of tobacco growing and manufacturing to each state's economy) were expected to influence the success of tobacco control efforts. In addition, ASSIST represented a considerable economic threat to profits from sales of tobacco. Tobacco industry internal documents reveal that in 1989,

immediately upon announcement of the ASSIST Request for Proposal, the industry began to develop a strategy to counter tobacco control activities in the ASSIST states (see Monograph 16, chapter 8, for more extensive discussion and details of the activities of the tobacco industry in countering ASSIST). The billions of dollars that the tobacco industry spent promoting their products each year between 1991 and 1999 (from over $4 billion in 1991 to over $8 billion in 1999)[38] far exceeded the funding that states received in their contracts from NCI and the American Cancer Society.

State Selection Bias

Because ASSIST was a demonstration project and not a research study, the award of contracts was not based on random assignment but rather on other considerations that included the competitiveness of the states' proposals.[39,40] All 50 states and the District of Columbia were eligible to compete for the contracts; 35 states applied, and 23 states were deemed eligible for funding based on published selection criteria.[39] In addition, an attempt was made to include states that were unlikely to be able to develop their own tobacco control programs and that were unlikely to reach the prevalence goals set without considerable assistance. Therefore, although the states chosen for ASSIST funding represented a wide range in ability and experience in developing and implementing tobacco control programs, they were a purposeful, not a randomly selected, sample.

At baseline, the average prevalence of adult smoking for ASSIST states was only slightly higher than for non-ASSIST states (25.2% and 24.4%, respectively, $p = .35$). Among the ASSIST states, there were wide variations in state conditions, pre-intervention levels of tobacco control activities, and tobacco control policies. This meant that the evaluation would have to use covariates to control for the nonrandomization and baseline differences of the states and to reduce the variability of estimates. These differences are displayed and discussed in chapter 5 of this monograph.

Limited Number of Available Observations

Since the state was the basis of the ASSIST programs, the unit of analysis was the state. Many constructs in the tobacco control evaluation model were measured only at the state level. However, this provides a maximum of only 50 states and the District of Columbia. As a result, quantitative analyses, such as regression models, were limited to relatively few variables in each analytic model. With only 51 observations, even a modest degree of random variation severely limits the power of the analysis to detect an effect.

Final Conceptual Framework

By the end of ASSIST, its evaluation director had streamlined the conceptual framework discussed earlier in this chapter and finalized the actual variables that would be used to measure all of the constructs. The final conceptual framework for the evaluation, as shown in figure 1.5, aggregated the state-level tobacco control efforts into a single SoTC measure and sought to create a similar measure for the strength of tobacco industry
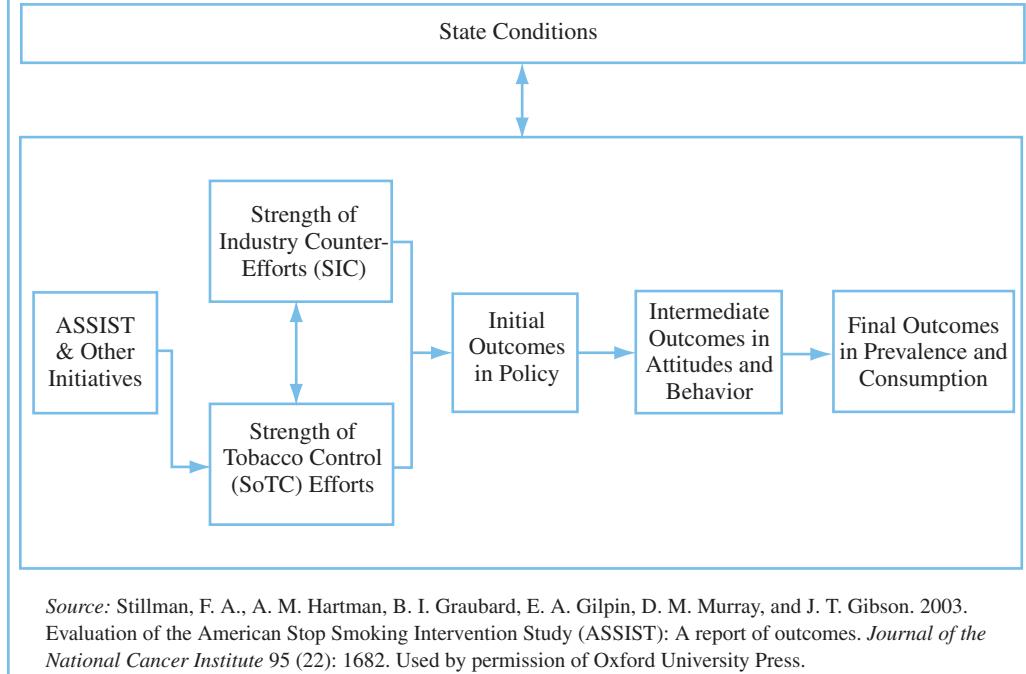
counterefforts. Other measures tracked initial outcomes in policy, intermediate outcomes in attitudes and behavior, and final outcomes in tobacco prevalence and per capita consumption, subsequent to the implementation of ASSIST interventions.

Table 1.4 outlines the actual evaluation measures and variables resulting from this final conceptual framework. Compared with the original constructs and variables outlined in table 1.2, table 1.4 reflects considerably greater aggregation of tobacco control measures, as well as a much broader range of state conditions that served as covariates and/or demographic criteria for the evaluation analyses.

Summary

The remainder of this monograph documents the component parts of the ASSIST evaluation project, starting with its core metrics, SoTC and IOI, as well as a detailed chapter examining policy and legislative changes that helped contribute to IOI. The monograph then discusses the state conditions that were covariates in the analysis, and state economic dependence on tobacco. Next, two ancillary efforts are discussed that did not yield evaluation metrics but provided valuable insights for future work: a database of print media coverage on tobacco and a study of tobacco industry countertactics. Finally, the evaluation

Figure 1.5. Final Conceptual Framework Used for ASSIST Evaluation

State Conditions

Strength of Industry Counter-Efforts (SIC)

ASSIST & Other Initiatives

Strength of Tobacco Control (SoTC) Efforts

Initial Outcomes in Policy

Intermediate Outcomes in Attitudes and Behavior

Final Outcomes in Prevalence and Consumption

Source: Stillman, F. A., A. M. Hartman, B. I. Graubard, E. A. Gilpin, D. M. Murray, and J. T. Gibson. 2003. Evaluation of the American Stop Smoking Intervention Study (ASSIST): A report of outcomes. *Journal of the National Cancer Institute* 95 (22): 1682. Used by permission of Oxford University Press.

Table 1.4. Final Constructs and Variables Used for the ASSIST Evaluation

Measure	Variables
Intervention measures	
ASSIST indicator	■ Identification of states as either ASSIST or non-ASSIST
Strength of Tobacco Control (SoTC) index	■ Resources committed to tobacco control (staff and funds)
	■ Capacity to deliver state-level tobacco control (infrastructure)
	■ Program efforts focused on policy and socioenvironmental change
State conditions (controlled factors)	■ Age: 18–29, 30–49, 50–64, 65 years or older
Person-level (demographic factors)	■ Sex: male, female
	■ Education: less than 9th grade, 9th–12th (no high school diploma), high school diploma, some college or associate's degree, 4-year college degree or higher
	■ Family income: in dollars
	■ Race/ethnicity: black–non-Hispanic, Hispanic, white non-Hispanic, other
	■ Household size: number of residents
	■ Census region: Midwest, West, South, Northeast
	■ Employment status: employed, unemployed
State-level (sociodemographic factors)	■ Sex: % female
	■ Education: % above high school degree
	■ Income: % below poverty level
	■ Race/ethnicity: % black–non-Hispanic, % Hispanic
	■ Metropolitan residency: % living in metropolitan area
	■ Census region: Midwest, West, South, Northeast
	■ State population: 18 years of age or older
	■ Economic value of tobacco: fraction of gross state product from growing, manufacturing, and processing tobacco
Outcome measures	
Initial Outcomes Index (IOI)	■ % of workers covered by 100% smoke-free workplace
	■ Cigarette price (including tax)
	■ Rating of local and state clean indoor air policies
Final outcomes	■ Adult smoking prevalence (18 years of age or older)
	■ Per capita cigarette consumption

Source: Stillman, F. A., A. M. Hartman, B. I. Graubard, E. A. Gilpin, D. M. Murray, and J. T. Gibson. 2003. Evaluation of the American Stop Smoking Intervention Study (ASSIST): A report of outcomes. *Journal of the National Cancer Institute* 95 (22): 1683. Used by permission of Oxford University Press.

and cost-effectiveness of ASSIST are discussed.

The evaluation of ASSIST was an opportunity to generate invaluable information about the delivery and impact of the largest federal tobacco control initiative at that time. It was also a unique research opportunity to investigate the complex relationships inherent in a large-scale public health intervention. The new indices, databases, and analytical methods developed to address the challenges of the evaluation yielded a new model for state-level tobacco control evaluation. The lessons learned can be used to enhance tobacco control program development, as well as other initiatives that seek to change health behavior through a macro-level systems approach.

Conclusions

1. ASSIST was an ambitious public health effort to control tobacco use by building a sustainable, professional infrastructure for tobacco control and by implementing upstream, policy-level interventions. It was the natural extension of earlier interventions at the individual and community levels: an environmental approach to tobacco control that targeted the smoking behavior of populations.

2. The ASSIST evaluation created a conceptual framework that documented the fundamental components of the ASSIST environmental approach to tobacco control. This conceptual framework was used to develop new measures and methods that were used to document the outcomes of this project.

3. Key components of the ASSIST evaluation included intervention measures including the state-level Strength of Tobacco Control metric and demographic factors, and outcome measures including the Initial Outcomes Index, tobacco use prevalence, and per capita cigarette consumption.

4. The ASSIST evaluation faced numerous challenges, including the diffusion of its interventions to other states, competing factors such as demographics and the economic impact of tobacco on states, and limited state-level samples. Addressing these challenges ultimately led to a unique evaluation methodology with lessons for future efforts involving widely diffused, population-level public health interventions. Many population-based health interventions raise similar challenges to evaluation. Because the ASSIST evaluation successfully met those challenges, it remains an exemplar for future evaluations.

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2. The Strength of Tobacco Control Index

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Appendices

2. The Strength of Tobacco Control Index

The Strength of Tobacco Control (SoTC) index was created to measure the program effects of the American Stop Smoking Intervention Study (ASSIST) and to serve as an overall measure of tobacco control intensity at the state level. The measure comprises three constructs (resources, capacity, and efforts) that constitute the multiple facets and components of tobacco control. This chapter describes four key stages of the evolution and use of SoTC:

- *Development of the SoTC index around the three constructs (resources, capacity for state-level tobacco control, and program efforts focused on policy and social-environmental change); development of a survey methodology for measuring these constructs; and determination of how the level of these constructs in a specific state constitutes the SoTC for that state;*

- *Collection and analysis of the SoTC data and validation of the SoTC heuristic map using factor analysis and structural equation modeling;*

- *Results of SoTC, including comparison of SoTC results across states and analysis of how SoTC relates to intermediate and final outcome measures;*

- *Use of SoTC to evaluate individual state programs: beyond ASSIST program evaluation, the SoTC measure is useful as a means for states to conduct a process analysis of their tobacco control programs.*

Introduction

This chapter discusses the development and implementation of the SoTC index—a state-level measure of tobacco control interventions—and provides the SoTC score and its component constructs for each state. Based on three key constructs—resources, capacity, and efforts—the SoTC index represents a "dose-level" measurement of ASSIST interventions for the 17 states within the project and other states that benefited from the diffusion of these interventions through other initiatives.

The success of the ASSIST evaluation depended on identifying accurate metrics for assessing state-level performance in tobacco control outcomes. Moreover, this project set out to measure the impact of interventions that were being used far beyond the states originally funded by the ASSIST project. The SoTC index represents an indirect measure of state-level tobacco control performance, using aggregated results derived from its three constructs and their supporting data sources. The development process for the SoTC index serves as an example of participatory design, validation of real-world factors, and collection and analysis of data from multiple sources. Its values were correlated significantly with other constructs such as legislative policy scores and, as discussed in more detail in chapter 9 of this monograph, ultimately correlated with tobacco control outcomes at the state level.

Development of the Strength of Tobacco Control Index

The ASSIST evaluation presented a unique challenge with implications for the future of evidence-based public health. The challenge was to develop a measure that (1) could be used outside the bounds of a controlled trial and (2) could be related to public health outcomes. The SoTC index is a metric that measures the magnitude of a state's tobacco control program. The index was based on a heuristic model that was internally and externally validated and was subsequently used to evaluate the effects of ASSIST interventions. Further, SoTC holds promise as a process evaluation measure that states can use to assess their tobacco control programs.

As described in chapter 1, ASSIST was implemented during a period when state-level tobacco control programs were instituted in all 50 states and the District of Columbia. State, federal, and foundation initiatives built varying levels of tobacco control infrastructures, and at the close of the twentieth century this infrastructure received additional funding from settlements of lawsuits against the tobacco industry. By the time of the ASSIST evaluation, every state had a functioning tobacco control program, and the ASSIST effects could not be easily disentangled from the effects of other initiatives. This meant that ASSIST could not be evaluated by simply comparing ASSIST states with non-ASSIST states. The ASSIST evaluation team agreed that an index quantifying each state's tobacco control program was required for the evaluation statistical models and that this

index should include a measure of program components (activities) and a measure of how tobacco control programs are organized to deliver those components (inputs). SoTC was developed to be this standard measure of state-level tobacco control programs.

The major challenge in constructing this metric was to develop and test a measure that adequately described the intensity of a state's tobacco control program. In addition, coalition building was a core component of ASSIST, and a state's tobacco control program could not be adequately measured unless all the organizations delivering tobacco control in that state were identified and their contributions measured. These challenges were addressed in the construction of the SoTC survey instruments, in the identification of respondents, and, subsequently, in the data-reduction strategy that produced the SoTC scores.

This chapter examines the development, validation, results, and future applicability of SoTC as a metric, both for the ASSIST program and for the future evaluation of state-based tobacco control programs.

Defining State-level Tobacco Control Programs and Development of the Heuristic Map

Within the ASSIST evaluation model,[1] the SoTC index quantifies the state's tobacco control program. The state tobacco control program includes the inputs (resources and capacity) that a state has available for tobacco control and the tobacco control activities (efforts) it performs. Another component

of the overall evaluation framework, the Initial Outcomes Index, measured the initial policy outcomes produced by the program (see chapter 4). The components of the SoTC index were defined, constructed, and implemented in a logical and scientifically defensible manner. Potential index components were identified in an extensive literature review and analyzed for their parsimony, scientific support, and feasibility. A heuristic map for SoTC was developed. This heuristic map was used to develop the survey instrument, the data collection process, and the subsequent analytic plan.

An expert panel, the SoTC Workgroup, was convened to determine the components that constituted SoTC and to assess how those components could be validly and reliably measured. The workgroup began by reviewing the extant literature on state tobacco control programs and consulting tobacco control experts. On the basis of its initial review, the workgroup determined that a quality tobacco control program was based on the following three constructs:

- **Resources:** assets for tobacco control
- **Capacity:** ability (including infrastructure) to implement tobacco control activities, given sufficient resources
- **Efforts:** the comprehensiveness of tobacco control activities, from policy-focused activities to program services

The workgroup subsequently identified 27 variables that they considered measures of these constructs. Each of the proposed 27 variables was then rated on the following criteria:

- *Parsimony* was defined as the degree to which the variable centrally and simply described an ASSIST-like intervention expected to affect changes in policy and media, based on descriptions of ASSIST.[2,3] Each variable was rated for parsimony on a scale ranging from 1 (no expected relationship to the ASSIST evaluation conceptual framework) to 5 (the strongest expected relationship to the ASSIST evaluation conceptual framework).
- *Scientific support* was defined as demonstrated reliability and validity in peer-reviewed journals and other scientific publications. Scientific support was rated on a scale ranging from 1 (measure may have face validity, but operational definitions in the literature do not support construct validity or reliability), to 3 (an accepted measure used in several publications that have used a common measurement approach with slight variations), to 5 (a standardized measure with demonstrated reliability and validity that has been used in several different studies).
- *Feasibility* was defined as data that could be collected within the allocated time frame (during 1999 to coincide with the Current Population Survey data collection)[4] and at a reasonable cost. Feasibility was rated on a scale ranging from 1 (feasibility undetermined), to 3 (feasibility established and data for variable must be collected), to 5 (data are currently collected and available).

Two members of the workgroup reviewed the evidence on each variable.

For cases in which the raters did not agree, the entire workgroup discussed the variable under consideration until they reached consensus. Variables with high ratings on all three criteria were retained. Variables that received low ratings on scientific support were retained only if they were deemed central to measuring a component of SoTC, and variables rated low on feasibility were eliminated. At the end of this process, 14 variables remained in the SoTC index. For each variable selected, the workgroup provided sample items from the extant scientific literature and suggested potential informants or archival data sources. The original list of proposed indicators, their ratings, and recommendations for inclusion are included in appendix 2.A, and a list of the 14 variables with sample items and information sources is included as appendix 2.B.

Subsequently, a second workgroup was convened to examine whether the variables identified adequately and validly represented the three constructs (resources, capacity, and efforts). This workgroup examined the applicability of the variables to evaluating state-level tobacco control programs and corroborated these measures against applicable research literature. This expanded group included members with additional skill sets—psychometricians (to address validity and data-reduction considerations), evaluation researchers, multilevel analysts, tobacco epidemiologists, and survey researchers, along with several members of the original expert panel. In addition to refining and validating the criteria behind SoTC, this group helped to develop and refine the data-collection
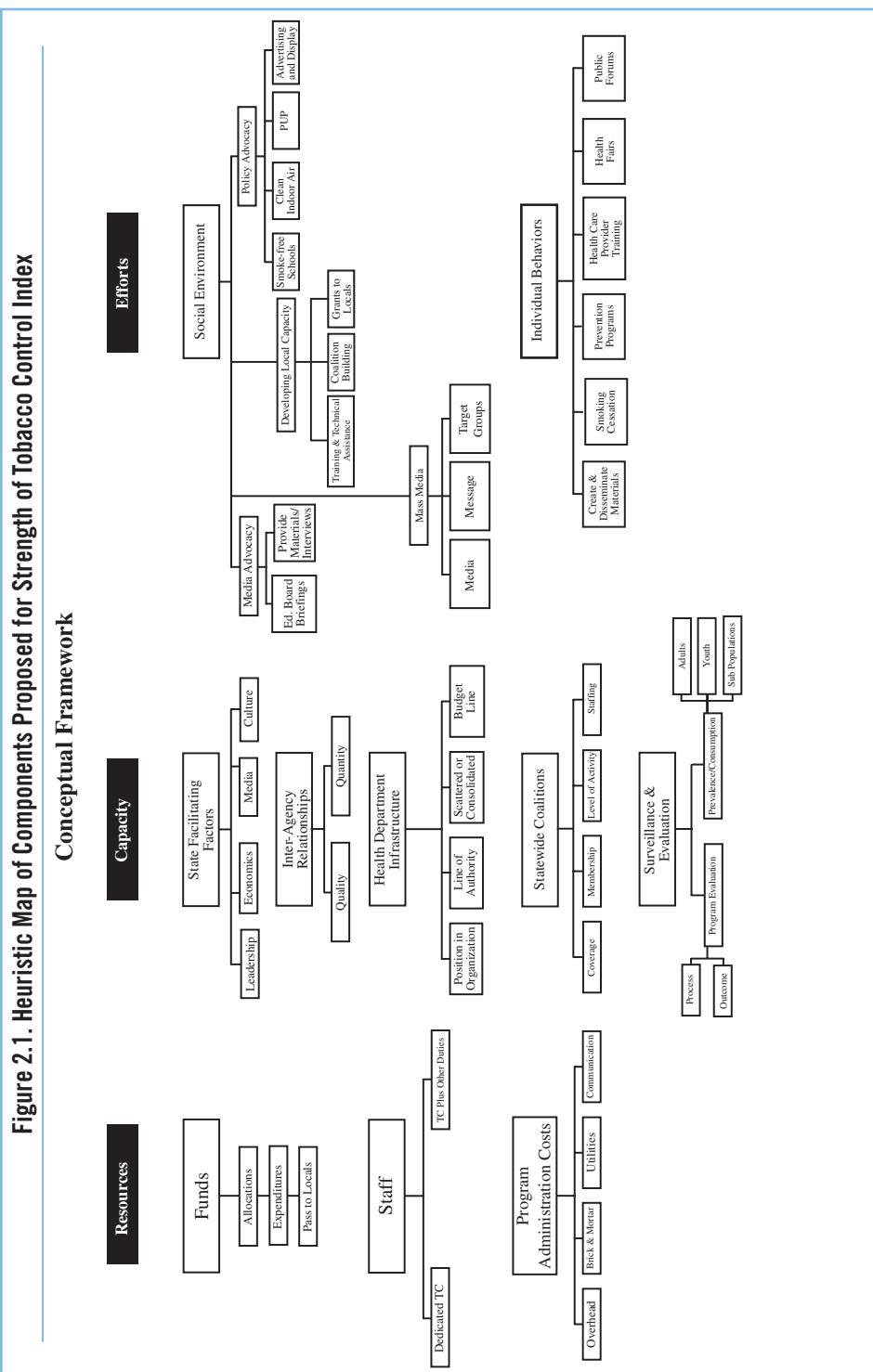
instruments behind the three SoTC constructs into their final form.

This process also resulted in a heuristic map (figure 2.1) that depicts a hierarchy of all components in the proposed SoTC index. As may be seen in this map, the SoTC index is composed of three constructs at the highest level: resources, capacity, and efforts. In turn, these constructs comprise several domains.

Description of the Constructs and Domains

The heuristic map was used to generate survey items from which an SoTC index score could be generated and to subsequently guide the analysis and interpretation of the data. Table 2.1 presents the constructs, indicators (domains), and associated measures. As the survey items were generated, a fuller description of the three constructs emerged.

- The *resources* construct may be described as the "raw materials" a state needs to engage in tobacco control. The resources construct was defined as the amount of money allocated for a state's tobacco control program and the number of full-time equivalent staff assigned to tobacco control in a state.
- The *capacity* construct may be described as the "engine" or the potential ability a state has to perform tobacco control activities. This construct was originally defined by state leadership support for tobacco control, the character of relationships between state tobacco control agencies, the independence and power of the health department

Figure 2.1. Heuristic Map of Components Proposed for Strength of Tobacco Control Index

Conceptual Framework

Table 2.1. The Constructs, Domains, and Measures of the Strength of Tobacco Control (SoTC) Index

Construct/Domain	Description of measures
Resources	
Staff	▪ Number of full-time staff dedicated to tobacco control
Funding	▪ Amount of money received by the state health department and major agencies
Capacity	
Leadership	▪ Support of governor for tobacco control ▪ Support of state representatives for tobacco control ▪ Support of state senate for tobacco control ▪ Support of state attorney general for tobacco control ▪ Support of the chief health officer for tobacco control
Interagency relationships	▪ Interaction with state health department as viewed by all other agencies ▪ Frequency of contact with state health department as viewed by all other agencies ▪ Perceived quality of interactions between all agencies BUT state health department as viewed by all other agencies ▪ Perceived quantity of interactions between all agencies BUT state health department as viewed by all other agencies
Health department infrastructure	▪ Level of involvement in deciding which tobacco-related programs the agency participates in ▪ Level of involvement related to hiring decisions ▪ Distance (inclusive) between the chief tobacco control person and the state's chief health officer
Statewide coalitions	▪ Does your coalition have any paid staff? ▪ Proportion of state that is covered by local coalitions
Staff experience	▪ Months at agency ▪ Months in current position ▪ Months involved with tobacco control
Efforts	
Media advocacy	▪ Does agency hold media editorial board briefings? ▪ Does agency give press background information on smoking issues? ▪ Does agency give interviews? ▪ Has agency included media reps in tobacco control activities?
Mass media	▪ Specific mass media (e.g., TV, radio) used by organizations ▪ Specific targets of antitobacco message (e.g., demographics) ▪ Was message used in mass media efforts focused on tobacco industry tactics?
Developing local capacity	▪ Specific training and technical assistance activities an agency is performing at the local level ▪ Specific coalition-building activities an agency is performing at the local level ▪ Does agency give grants/contracts to local agencies?
Policy advocacy	▪ Does agency do policy advocacy on smoke-free schools? ▪ Does agency do policy advocacy on clean indoor air? ▪ Does agency do policy advocacy to repeal or fight preemption laws? ▪ Does agency do policy advocacy to restrict tobacco ads and displays? ▪ Does agency do policy advocacy to increase tobacco taxes? ▪ Does agency do policy advocacy to increase youth possession penalties?
Individual behaviors	▪ Does agency disseminate materials for general public? ▪ Does agency do cessation focused on specified target groups? ▪ Does agency do school/youth prevention? ▪ Does agency do health provider training? ▪ Does agency do health fairs? ▪ Does agency do public forums?

tobacco control program director, the composition and character of the state-level tobacco control coalition(s), and the experience level of state tobacco control professionals.

- The *efforts* construct described the tobacco control activities that the state tobacco control program engaged in.[*] These efforts were categorized into activities that focused on changing the social climate of tobacco use (e.g., media advocacy efforts to gain antitobacco coverage and an antitobacco editorial slant) and activities that focused on individual behavior change (e.g., education programs and cessation services).

Development of the Data Collection Instruments and Analytic Plan

The SoTC index measures were collected with two data-collection instruments:

1. **A self-administered questionnaire (worksheet).** The original SoTC workgroup recognized that some data collection could not be completed easily by telephone. For example, it might have been difficult for respondents to provide information accurately about funding amounts without consulting records or co-workers. The self-administered questionnaire asked respondents to list the amount of funding

they received from such sources as the National Cancer Institute, Robert Wood Johnson Foundation, Centers for Disease Control and Prevention, and state-level sources, and to list the number of full-time equivalent staff members dedicated to tobacco control in their organizations. In addition, respondents estimated the percentages of time and money they spent on interventions aimed at changing the social environment, on interventions aimed at changing individual behaviors, and on administrative functions. This instrument is included as appendix 2.C.

2. **A computer-assisted telephone interview.** The remaining data were collected by telephone interview. This instrument is included as appendix 2.D.

Both instruments were tested in cognitive interviews in a laboratory environment. The interviews resulted in minor modifications in wording, particularly for item instructions and formatting of the self-administered questionnaire.

The original SoTC workgroup plan included an analytic strategy for the SoTC survey to be aggregated into an index using standard scaling techniques, including the use of *z*-score sums and principal components analysis. Once the survey instruments were tested, an expert panel was convened to finalize the analytic plan.

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[*]A state tobacco control program was defined as the state health department and its state-level tobacco control partners. At the minimum, that partnership included the state health department, the three voluntary agencies (American Cancer Society, American Heart Association, American Lung Association), and any state-level tobacco control coalition(s).

Collection, Analysis, and Validation of SoTC Data

Once the conceptual model for the SoTC index was defined, its implementation involved a three-step process:

- **Collection:** Participants were identified and data were collected using the survey instruments described in the previous section.
- **Analysis:** Single SoTC scores for each state were derived from these data, using a heuristic map as a basis for interpreting and aggregating data for each of the three constructs, which were subsequently combined to form the single SoTC score.
- **Validation:** Factor analysis and structural equation modeling were performed to assess the internal consistency of the original heuristic model. SoTC constructs were correlated with ratings from expert opinions to assess the construct validity of the overall index and its components.

The next sections describe the details of these three processes.

Data Collection

The data collection phase began with the identification of stakeholders in each state's tobacco control community. Each person interviewed was asked to identify additional tobacco control professionals in their states—that is, a snowball sample of respondents. U.S. Office of Management and Budget clearance was obtained for this process. The responses to these interviews were used to calculate the SoTC index values for each state.

During ASSIST, NCI formed a strategic alliance with the American Cancer Society (ACS), which had already partnered with the American Lung Association (ALA) and American Heart Association (AHA) to form the Coalition on Smoking OR Health in 1982. This partnership allowed ASSIST to build on the ACS national structure. In addition, "as a nongovernmental organization, ACS could advocate for public policies and speak out against the tobacco industry in ways that a government agency was precluded from doing."[5(p48)] Moreover, states were directed to form tobacco control coalitions that included voluntary agencies, advocacy groups, minority groups, and business leaders. These groups and organizations were to be recruited for a cohesive and comprehensive coalition that could work collaboratively and implement strategies and interventions that would promote strong tobacco control, including legislative and policy approaches.

The initial fixed-list respondents of the SoTC survey were defined as staff members of state health departments, statewide tobacco control coalitions, and state-level components of all three voluntary health organizations (American Cancer Society, American Lung Association, and American Heart Association). The exception was the District of Columbia, where the respondents were from city-level agencies and organizations. The degree to which other state-level organizations participated in tobacco control varied widely. Therefore, these organizations were identified through the snowball sample procedure.

The initial respondent list was compiled from several sources. The program offices for ASSIST (National Cancer Institute [NCI]), Initiatives to Mobilize for the Prevention and Control of Tobacco Use (IMPACT—CDC), and SmokeLess States (Robert Wood Johnson Foundation) provided lists of their state grantees, which included all state health departments and some voluntary agencies. Additional voluntary agency contacts were identified by their national offices and through searches of their Internet sites, telephone calls to state offices, or a combination of these strategies.

To develop the snowball sample, each fixed-list respondent was asked to identify other state-level entities that conducted tobacco control activities. Before they were interviewed, snowball-identified entities were screened (either by telephone or, if available, via the Internet) to ensure that they were state-level agencies active in tobacco control and that their organization had not previously completed this survey. Once interviewed, these respondents became an additional source of referrals. A state's sample was considered complete when there were no new nominations from within that state. In a few cases, health department contacts were called to verify that the list of respondents interviewed in their state was inclusive.

All respondents answered the computer-assisted telephone interview. In addition, a subset of respondents completed the self-administered questionnaire.

The unit of measurement in the survey was the agency or organization. Only one computer-assisted telephone interview per entity was conducted, although more than one person in an agency could contribute to the interview. The instruments were constructed as modules, and lead-in screening items were constructed for each module. To complete a module, a respondent had to have self-referred into the module via the screening items. Self-referral thereby became the criterion for identifying the appropriate individual as the respondent for an entity.

SoTC Respondents

Staff from 372 agencies and organizations in 50 states and the District of Columbia completed the computer-assisted telephone interview. This represented 100% of health departments, voluntary agencies, and state-level coalitions in each state, plus organizations identified through snowball sampling. Self-administered questionnaires were completed by all 139 agencies that directly received federal, state, or foundation funds, or who had received funds from state lawsuits against the tobacco industry. The original data-collection plan included self-administered questionnaire completion by all respondents. Despite follow-up telephone calls, however, the overall response rate for these questionnaires did not exceed 55%. The decision was then made to target questionnaire return from those agencies with identifiable and stable funding sources. These respondents included all state health department representatives (both ASSIST and IMPACT states), SmokeLess States grantees (identified by the SmokeLess States office), and recipients of tobacco industry settlement funds outside the

Master Settlement Agreement (these respondents were identified by the health department respondents in those states). All self-administered questionnaires were obtained from these agencies.

Data Analysis

The objective of the data analysis was to derive a single SoTC score for each state as well as a score for each of the three major constructs (resources, capacity, and efforts). This goal was accomplished by using the heuristic map to sequentially assess each of the hierarchical groupings and subsequently combine the assessments. Figure 2.1 illustrates the hierarchical groupings of the SoTC construct, moving from domain and subdomains to the single SoTC rating. A later section of this chapter addresses the comparative importance of individual construct scores and the overall composite measure.

The utility of single performance scores has recently been questioned. The balanced scorecard approach is perhaps the best-known "dose measure" derived performance metric currently used in private industry. Performance on this metric requires that a program be assessed on four categories—financial, customer, internal business process, and innovation and learning. The criticisms of this approach are that unlike the SoTC index, the balanced scorecard is not based on a theoretical perspective and it does not

Examples of the Self-referral Process

Interrelationships between state agencies module. This module required a respondent within each state agency who was most likely to have worked directly with other state-level organizations. If the fixed-list respondent was not the person directly in contact with the other agencies and organizations, that person's subjective evaluation of the working relationship between the respondent's agency and other entities could be misleading. To prevent this potential problem, each agency respondent was screened as follows: "We would like to ask some questions about the interrelationships of tobacco control organizations in your state. Are you the person in your organization who has the most contact with other tobacco control organizations?"

If the response was "yes," the relationship module was completed by that person. If the response was "no," an intra-agency snowball referral to the appropriate person was obtained, that part of the process was ended, and the rest of the interview was continued. The appropriate person within that agency was then contacted, and the screening question was asked again. The module would then be completed by that respondent only if he or she self-identified through the screening item.

Health department infrastructure module. Because the state health department was the recipient of ASSIST and most other state-level tobacco control funding, the way in which the state health department was organized to implement tobacco control programs was an important element of the SoTC index. Only the highest-level tobacco control officer in the state health department answered the questions in the health department infrastructure module. The respondent was asked, "Would you describe yourself as the highest-level tobacco control specialist in your organization?"

If the response was "yes," the infrastructure module was completed. If the response was "no," the respondent was asked, "Who would you say is the highest-level tobacco control specialist in your organization?" The named official was then contacted, and the screening process was repeated until someone self-identified into the module.

incorporate stakeholder input.[6] While the SoTC measure underwent an extensive validation process and was associated with lower cigarette consumption, analyses of specific state programs show a complex interplay among these construct values that is not completely reflected in the single score.

To ensure that all variables combined had the same measurement scale, all variables were standardized before being combined at any level of that hierarchy (e.g., survey question, subdomain, domain, or construct). The goal of the SoTC index was to provide a single measure that both explained strength of tobacco control at the state level and also captured the maximum variability in those survey measures that were consistent with the conceptual model. By using a hierarchical principal components approach to combine the survey variables at each level of hierarchy within the conceptual model (using weights from the first eigenvector), the maximum amount of variability among the questionnaire responses was captured. The model validation described in the next section (and detailed in appendix 2.E) suggested that the SoTC score better discriminated between states when several domains were omitted. Therefore, the final SoTC scores were based on this "reduced" model.

For example, respondents answered a series of questions about the use of mass media in their tobacco control efforts; these questions constitute the mass media subdomain. Each respondent's answer to the survey questions in the mass media subdomain was standardized.

Those scores were then entered into a principal components analysis. The principal components equation for that set of standardized scores was then solved, yielding one mass media subdomain score for each respondent. At the subdomain level, a mean state score was calculated from the principal components score. Subsequently, the mass media subdomain score was combined with the other subdomains (e.g., media advocacy, policy advocacy, developing local capacity) to compose the social environment domain, which is focused on changing the social environment of tobacco use. The social environment domain was then combined with the individual behavior efforts domain (e.g., efforts aimed at changing individual behaviors) to form the efforts construct.

Finally, the three constructs—resources, capacity, and efforts—were combined using the same analytic technique (hierarchical principal components analysis). This process resulted in a single aggregate SoTC score for each state.

Validation of the Conceptual Model

Additional analyses explored whether the data supported the structure of relationships hypothesized by the analytic map—for example:

- Did the data show that the efforts variable was truly made up of the individual behaviors and social environment domains?
- Did the data show that these domains were more related to the efforts construct than to the capacity or resources constructs?

Factor analysis and structural equation modeling were used to answer these questions. These analyses indicated that the domains making up the efforts construct were significantly related to each other and not to domains within the resources or capacity constructs (appendix 2.E). Likewise, the domains making up the resources construct were significantly related to each other and not to domains within the capacity or efforts constructs.

The relationship between the domains in the capacity construct was not as clear-cut, and additional analyses were performed to determine which domains yielded the best SoTC index model. When all 12 domains were included in the model, that model accounted for 50% of the variability in the correlation matrix. However, after removing three domains within the capacity construct—leadership, health department infrastructure, and staff experience—the model accounted for 60% of the variability in the correlation matrix. The SoTC index scores used in the ASSIST evaluation therefore consisted of these nine domains. The model validation analysis and justification for the reduced model are described in more detail in appendix 2.E, and the participatory approach used to validate the SoTC criteria is described in appendix 2.F.

Results of SoTC

Table 2.2 shows the SoTC index scores and the three construct scores (resources, efforts, and capacity) for the 50 states and the District of Columbia, and figures 2.2 through 2.5 show maps of these results by state. ASSIST states did not differ significantly from non-ASSIST states on overall SoTC score or on any of the three constructs.

The Relationship between SoTC Scores and Other Indicators

The SoTC scores for all states and the District of Columbia were compared with the legislative score (described in chapter 3). The legislative score, a component of the Initial Outcomes Index, measures the strength of a state's policies on clean indoor air and youth access to tobacco. Since these two policy areas were part of the focus of the ASSIST program, it was expected that a strong tobacco control program (as measured by the SoTC index) would be associated with higher levels of tobacco control policy. Table 2.3 shows the results of this analysis. The overall SoTC index score was significantly correlated with the legislative score and with the efforts construct.

The SoTC scores for all states and the District of Columbia were also compared with the prevalence of tobacco use measured at the state level in the Tobacco Use Supplement of the Current Population Survey.[7] Table 2.4 shows the results of the analyses of state SoTC scores and construct scores for 1999, and the prevalence of tobacco use by state for 2000.

Prevalence of tobacco use was significantly correlated with the SoTC index score as well as the resources and capacity constructs but was not significantly correlated with the efforts construct. In addition, per capita adult cigarette consumption levels showed a correlation with both the SoTC index and its capacity construct.

Table 2.2. Standardized Strength of Tobacco Control (SoTC) Index and Construct Scores, 1999–2000, by State, Sorted by SoTC Scores

(Shading indicates ASSIST states.)

State	SoTC Index Score	Resources	Efforts	Capacity
AZ	4.03	4.85	1.13	1.76
CA	3.73	4.13	1.31	1.80
MN	1.74	3.54	−0.46	−0.11
FL	1.70	1.38	0.12	1.75
MS	1.28	1.83	1.63	−0.75
NJ	1.12	−0.11	0.87	1.68
RI	1.09	−0.54	2.35	0.95
MD	0.97	−0.36	2.42	0.46
HI	0.96	−0.27	1.22	1.27
MI	0.90	−0.17	1.37	0.93
OR	0.90	0.05	0.63	1.25
OK	0.84	−0.47	1.20	1.26
NY	0.69	−0.17	1.18	0.64
KS	0.47	−0.44	−0.21	1.59
MA	0.46	1.12	−0.30	−0.10
IA	0.41	−0.36	−0.16	1.33
CT	0.37	−0.50	1.43	0.18
GA	0.39	−0.39	0.89	0.41
AK	0.30	−0.44	1.69	−0.22
WA	0.23	−0.19	−1.35	1.71
ID	0.13	−0.55	0.01	0.85
AR	0.08	−0.20	−0.75	0.96
VA	0.07	−0.38	0.73	−0.01
WI	−0.04	−0.21	−0.18	0.29
NC	−0.14	−0.13	−0.52	0.26
AL	−0.18	−0.14	1.07	−1.02
KY	−0.19	−0.47	1.88	−1.30
UT	−0.29	−0.38	−0.43	0.18
NE	−0.31	−0.48	−1.16	0.80
CO	−0.40	−0.12	−0.40	−0.36
NH	−0.45	−0.50	1.23	−1.28
SC	−0.48	−0.51	−1.82	1.02
NM	−0.53	−0.40	−0.92	0.11
WV	−0.53	−0.29	0.36	−1.01
TX	−0.61	−0.11	−0.79	−0.49
PA	−0.68	−0.33	0.15	−1.10
IL	−0.71	−0.45	0.36	−1.19
MO	−0.79	−0.37	0.78	−1.75
DC	−0.87	−0.47	0.17	−1.32
WY	−0.92	−0.53	−2.44	0.63
ND	−0.93	−0.61	−1.90	0.30
OH	−1.05	−0.32	−0.26	−1.52
DE	−1.07	−0.52	−0.63	−1.05
IN	−1.08	−0.29	−1.24	−0.88
SD	−1.20	−0.50	−0.69	−1.30
ME	−1.24	−0.32	−0.73	−1.56
TN	−1.28	−0.61	−2.98	0.43
NV	−1.42	−0.59	−2.56	−0.20
VT	−1.50	−0.58	−0.43	−2.00
MT	−1.60	−0.61	−1.27	−1.52
LA	−2.30	−0.50	−1.59	−2.77
Overall				
Mean	0.0	0.0	0.0	0.0
SD	1.20	1.58	1.26	1.60
ASSIST				
Mean	.11	.026	−.017	.24
SD	.78	.97	1.11	1.10
Non-ASSIST				
Mean	−.05	−.01	.01	−.12
SD	1.32	1.25	1.35	1.29

Figure 2.2. Strength of Tobacco Control Scores by State

Legend:
- <-0.5
- -0.5 to 0.0
- 0.0 to 0.5
- >0.5
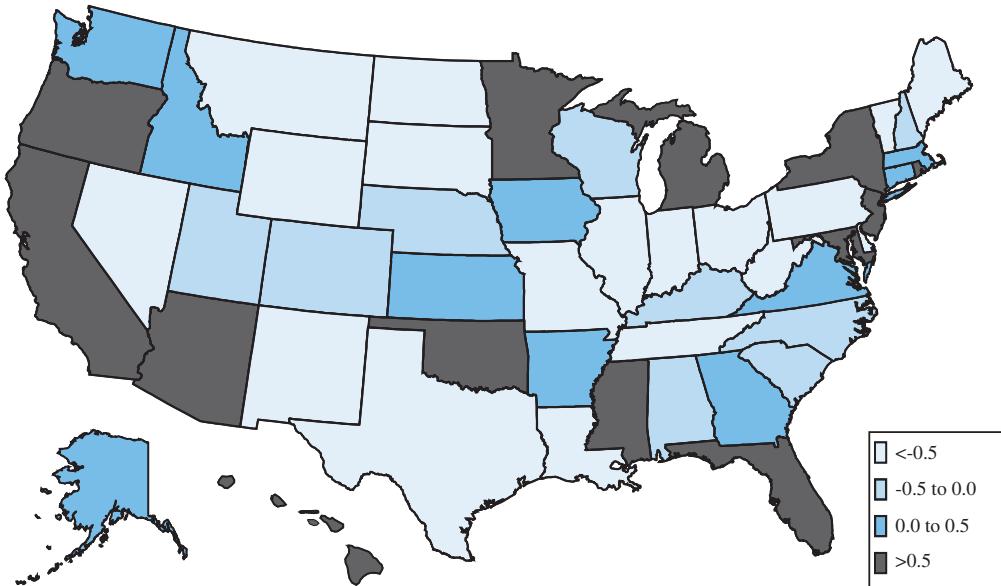
Figure 2.3. Resources Construct Scores by State

Legend:
- <-0.5
- -0.5 to 0.0
- 0.0 to 0.5
- >0.5
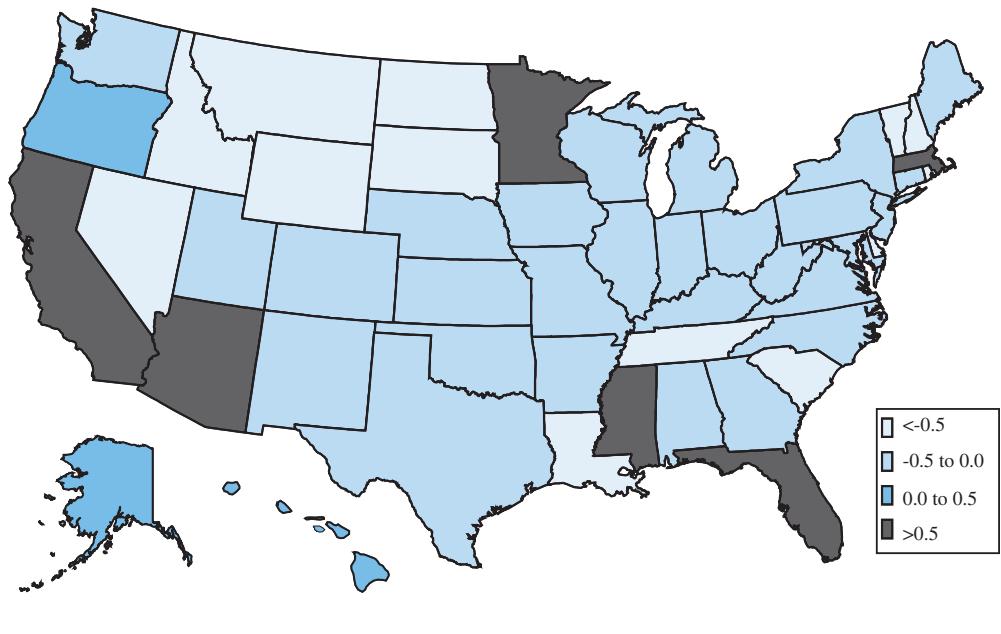
Figure 2.4. Efforts Construct Scores by State

Legend:
- <-0.5
- -0.5 to 0.0
- 0.0 to 0.5
- >0.5
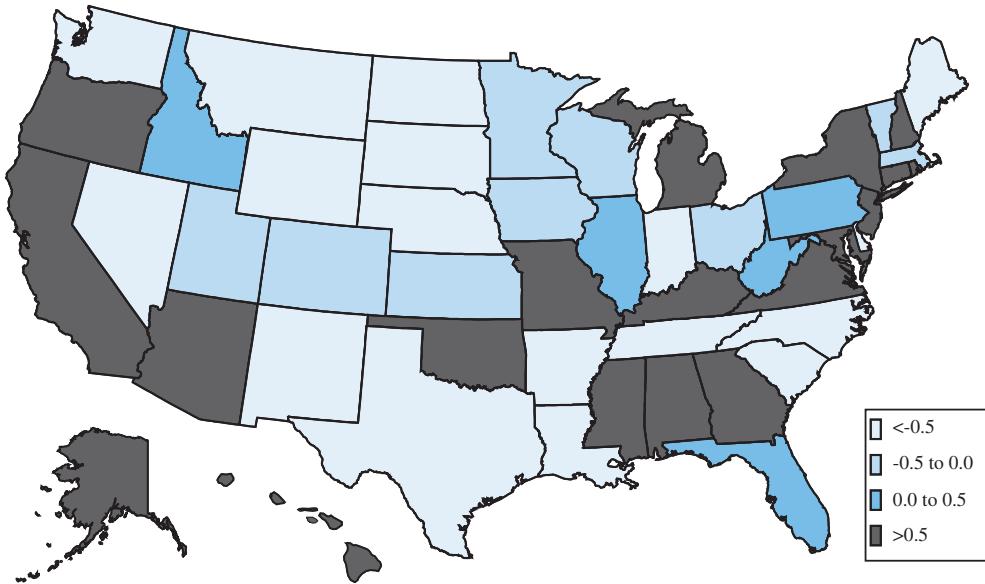
Figure 2.5. Capacity Construct Scores by State

Legend:
- <-0.5
- -0.5 to 0.0
- 0.0 to 0.5
- >0.5
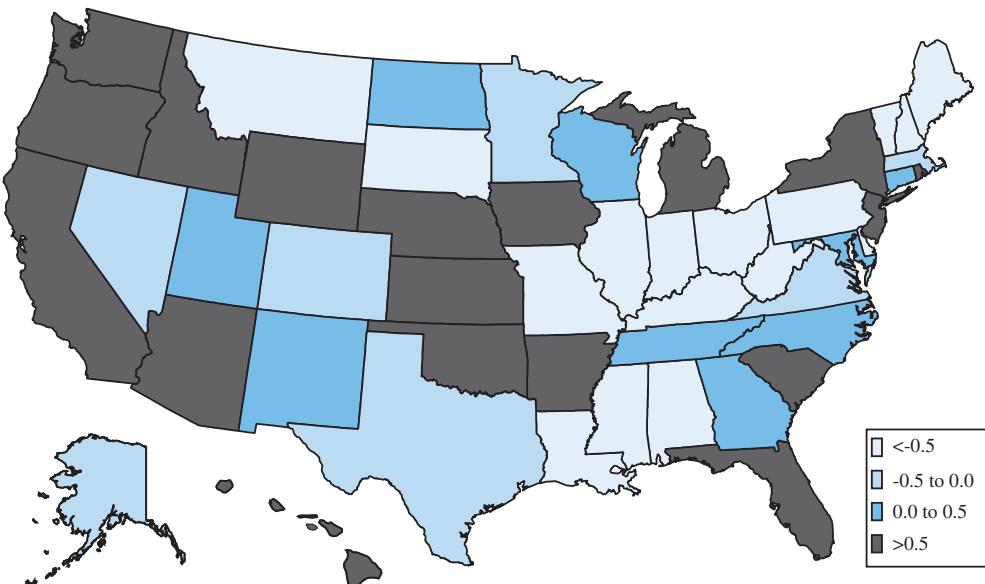
Table 2.3. Correlation of Legislative Scores (1999) with SoTC Scores (1999)

Correlation/ Significance	SoTC	Resources	Capacity	Efforts
Pearson *r*	.318	.129	.068	.336
p	.023	.366	.633	.016

Table 2.4. Correlation of Tobacco Use Prevalence (2000) with SoTC Scores (1999)

Correlation/ Significance	SoTC	Resources	Capacity	Efforts
Pearson *r*	−.404	−.323	−.313	−.180
p	.003	.021	.025	.207

Although these correlations were statistically significant, one must interpret them with caution. The ASSIST states were not randomly selected, and the baseline prevalence of tobacco use was different in each. Baseline differences and other covariates had to be accounted for in the analyses. The degree to which SoTC index values related to these results is more fully explained in chapter 9, including a discussion of multivariate models that include the SoTC.

Limitations of the SoTC Index

The resultant SoTC scores performed well in the evaluation analyses. However, as with any measure, limitations in the conceptualization, measurement, and data-reduction strategies may have biased some individual state scores. For example, the heuristic model is based on the assumption that a high-scoring tobacco control program will have all the inputs and engage in all the activities measured. The heuristic model and subsequent survey may not have been comprehensive enough to capture all

the components necessary to produce an effective tobacco control program. In addition, while the SoTC index captured whether a specific tobacco control activity was performed in a state, the "dose" of that activity was not measured. An organization that held one editorial board briefing in a year received the same score on that item as an organization that held weekly editorial board briefings, and this bias was included in the aggregate state score.

Other potential biases resulted from the respondents interviewed. Although great care was taken to ensure that all organizations engaged in tobacco control in a state were interviewed, some organizations may have been omitted. Each organization's contribution to tobacco control was equally weighted, and this equal weighting may have yielded an inaccurate picture of an individual state tobacco control program. For example, while the health department may have received the bulk of money for tobacco control in a state, its activities did not carry greater weight within the SoTC

construct than did the activities of any other agency. These challenges and limitations should be acknowledged, and individual states can address them in light of their own environmental context. But for the purpose of the ASSIST evaluation, the aggregate scores were found to provide a valid measure of the program inputs and activities.

Use of the SoTC to Evaluate Individual State Programs

The first sections of this chapter describe why the SoTC index was needed for the ASSIST evaluation and how the index was constructed and tested, in addition to providing individual state scores and some of the index's univariate relationships with other index scores in the evaluation. Chapter 9 reports a significant multivariate relationship between the SoTC index and tobacco consumption. In addition, while other researchers have reported a relationship between tobacco control outcomes and funding,[8] the ASSIST evaluation demonstrated the relationship between another component of tobacco control—program capacity—and outcomes.

This section examines the domain-level indicators within each of the three main constructs of SoTC at the state level. While the aggregate measures of SoTC and the three major constructs are well suited to between-state comparisons, the domain-level indicators are measures that may be more important for understanding how individual states meet unique environmental challenges. For example, in a state with high tobacco

taxes, tobacco control advocates may be less likely to focus on legislation to increase them further. Alternatively, a state with a strong tobacco industry presence may expend high levels of effort without concomitant gains in tobacco control legislation. As such, the domain scores and their component measures may be better used as part of a state process evaluation that incorporates contextual factors such as state political climate and tobacco industry activities.

Inputs: Resources and Capacity
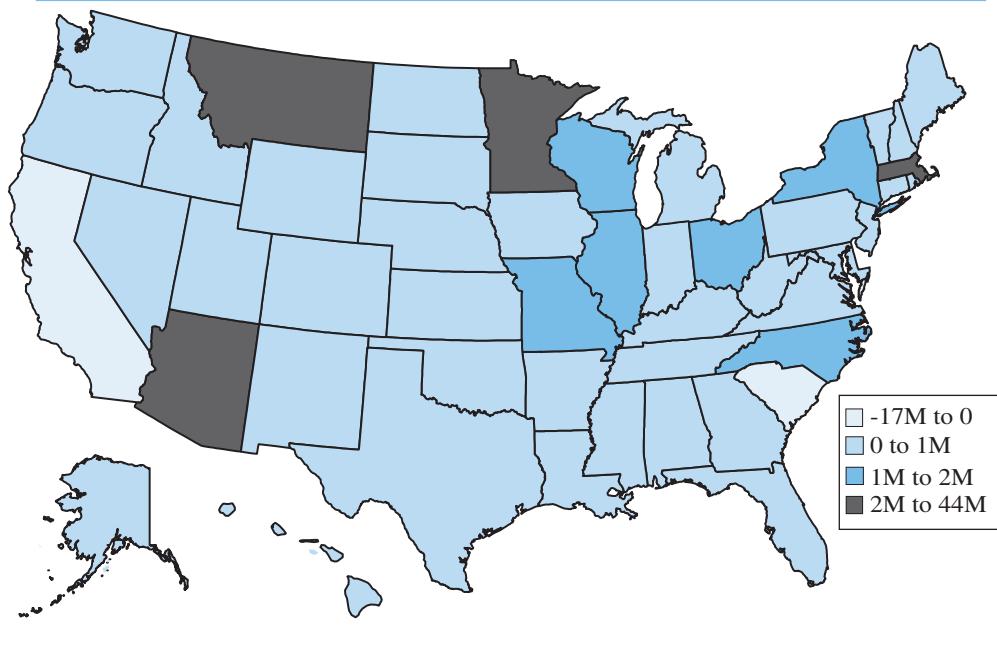
Funds allocated for tobacco control varied widely by states during the 1990s. Table 5.2 in chapter 5 shows per capita funding by state throughout the decade and provides an overview of the change in absolute state funding for tobacco control during this period. This information provides some context for understanding why some states had more well-established tobacco control programs than others.

Table 2.5 shows the component domain scores for the resources and capacity constructs. This table is sorted by funds allocated to states for tobacco control. The resource construct of SoTC revolves significantly around funding, and many of the ASSIST states received tobacco control funding for the first time during the program. Figure 2.6 shows the level of increased tobacco control funding during this period. However, while well-funded tobacco control programs, such as those in Massachusetts and California, have yielded significant decreases in smoking prevalence,[9,10] one of the more important findings of this study was that funding alone was a necessary

Table 2.5. Inputs: Resources and Capacity, Sorted by Funds
(Shading indicates ASSIST states.)

| State | Resources | | Capacity | | | | |
	Funds	Staff	Leadership	Interagency relationships	Health dept. infrastructure	Coalition	Staff experience
CA	4.74	1.06	1.34	1.36	0.52	1.45	−0.32
MN	4.16	0.19	1.83	−0.43	−0.89	0.20	−0.89
MS	1.90	0.25	0.18	−0.62	−0.26	−0.56	0.70
FL	1.08	0.74	0.38	1.28	−0.89	1.45	−0.86
MA	1.07	1.52	1.78	−0.70	1.35	0.45	3.06
AZ	0.34	6.42	1.12	1.29	0.65	1.45	−0.75
OR	−0.01	0.11	−0.75	0.42	−0.19	1.45	−1.61
NY	−0.04	−0.37	−1.84	−0.02	−0.26	0.95	−0.37
ME	−0.19	−0.25	2.53	−0.82	−0.05	−1.56	−1.34
MI	−0.21	0.53	−2.59	1.66	−0.89	−0.05	2.60
WI	−0.24	−0.23	−0.85	−0.03	0.45	0.45	−1.54
NJ	−0.25	−0.04	0.51	1.16	0.52	1.45	0.95
WA	−0.25	−0.08	1.95	1.82	−0.26	0.95	−0.45
MD	−0.26	−0.25	−0.14	0.26	2.06	0.45	−1.30
NC	−0.28	−0.18	−1.16	0.50	−1.66	−0.06	0.54
UT	−0.28	−0.32	−1.14	0.98	2.06	−0.56	−0.39
CO	−0.30	−0.23	−1.19	−0.55	0.65	−0.06	−1.71
IL	−0.30	−0.16	−0.93	−1.08	−0.96	−0.81	0.07
IN	−0.30	−0.24	0.31	−1.45	1.35	−0.06	1.84
MO	−0.31	−0.21	−0.78	−1.75	−0.96	−1.06	−0.76
NM	−0.31	0.07	−0.22	0.26	1.35	−0.06	1.13
RI	−0.31	−0.35	0.89	2.00	−1.02	−0.30	0.34
SC	−0.31	−0.24	−0.29	0.62	1.35	0.95	0.48
VA	−0.31	−0.32	−1.14	0.64	2.06	−0.56	0.45
WV	−0.31	−0.08	−0.83	−1.67	0.52	−0.06	−0.20
AK	−0.32	−0.41	−0.23	2.08	−0.26	−2.06	−0.98
AL	−0.32	−0.07	0.30	0.10	0.58	−1.56	5.17
DE	−0.32	−0.39	1.41	0.66	−0.26	−2.06	−1.71
HI	−0.32	−0.18	2.01	0.46	−0.96	1.45	1.71
ID	−0.32	−0.31	0.16	0.93	−0.89	0.45	0.33
KY	−0.32	−0.31	−0.73	−1.58	−0.12	−0.56	0.03
OH	−0.32	−0.29	0.26	−1.06	1.35	−1.31	1.16
PA	−0.32	−0.12	−1.18	−1.54	−0.26	−0.31	−0.18
TX	−0.32	0.18	0.01	0.43	1.35	−1.06	−0.38
CT	−0.33	−0.39	−1.99	−1.42	1.22	1.45	0.49
DC	−0.33	−0.31	2.55	−1.02	−1.66	−1.06	−1.80
GA	−0.33	−0.27	−0.93	1.37	1.35	−0.56	−0.63
IA	−0.33	−0.17	−1.34	0.56	0.65	1.45	1.84
KS	−0.33	−0.44	−2.14	1.60	−1.66	0.95	1.49
MT	−0.33	−0.46	0.82	−1.96	−0.89	−0.56	−1.38
NE	−0.33	−0.36	0.01	0.25	−0.19	0.95	0.14
NH	−0.33	−0.27	1.26	−1.53	−0.83	−0.56	−1.09
OK	−0.33	−0.31	0.22	0.43	−0.05	1.45	0.30
VT	−0.33	−0.43	3.28	−0.99	−1.66	−2.06	−0.51
AR	−0.34	0.60	3.01	1.12	−0.26	0.45	−1.38
LA	−0.34	−0.35	0.43	−3.50	−0.19	−1.06	0.81
ND	−0.34	−0.50	−3.07	0.57	−0.96	−0.05	0.61
NV	−0.34	−0.46	−0.47	−0.28	−0.05	−0.05	−0.41
SD	−0.34	−0.46	−2.71	−1.57	−3.14	−0.56	−1.54
TN	−0.34	−0.50	−1.67	0.21	0.65	0.45	−1.71
WY	−0.34	−0.35	1.75	0.55	0.52	0.45	−0.06
ASSIST							
Mean	1.80	−0.03	−0.06	0.07	0.21	0.09	0.24
SD	1.10	0.46	1.46	1.17	1.07	0.75	1.38
Non-ASSIST							
Mean	0.04	0.02	0.03	−0.04	−0.11	−0.05	0.12
SD	0.96	1.19	1.53	1.25	1.12	1.14	1.38

Figure 2.6. Change in Tobacco Control Funding (in Dollars), 1991–98

Legend:
- -17M to 0
- 0 to 1M
- 1M to 2M
- 2M to 44M

but not a sufficient factor for public health outcomes in tobacco control.

Funding has built capacity to deliver tobacco control in many states—particularly those states with longstanding programs—and capacity can be used to gain more funding. For example, table 2.5 shows that most states had similar funds for tobacco control at the end of the ASSIST period. The only outlier states were those with well-established tobacco control programs (California and Massachusetts) in addition to states that had recently received lawsuit settlement funds from the tobacco industry (such as Minnesota, Mississippi, and Florida). Table 2.5 also illustrates the fact that states had different strengths in capacity. For instance, while some states had their highest scores in health department capacity, others had their highest

scores in interagency relationships or coalitions. These data can be incorporated with information about a state's environmental context as part of a process evaluation. In this way, state program staff can better understand how best to use the resources they have to build capacity and how that capacity enables or hinders their ability to perform tobacco control activities.

Activities

The components of the SoTC efforts construct allow individual states to measure their program activity focus. Table 2.6 presents the component domain scores for the efforts construct. As this table illustrates, states concentrated their efforts in different domain areas, presumably reflecting such factors as

Table 2.6. Components of the Efforts Construct, Sorted by Efforts Score
(Shading indicates ASSIST states.)

State	Overall	Social environment				Individual behavior
		Media advocacy	Mass media	Policy advocacy	Local capacity	
MD	3.02	2.01	2.59	0.91	3.06	2.21
KY	2.98	2.34	1.66	2.16	2.36	1.06
AK	2.72	1.64	2.57	1.70	1.84	0.91
RI	2.19	0.55	2.49	2.09	1.05	2.92
NH	2.11	1.87	1.44	1.85	0.94	0.51
NY	2.09	1.34	1.93	2.03	0.69	0.44
HI	1.58	0.77	0.27	2.39	1.06	1.05
OK	1.56	1.81	0.48	0.73	1.50	1.03
CA	1.55	1.07	1.55	1.39	0.46	1.29
MI	1.25	2.46	0.37	0.36	0.58	1.71
OR	1.14	2.84	0.19	−0.53	0.99	0.20
GA	1.07	−1.28	1.71	1.23	1.15	0.86
CT	1.01	0.80	1.75	−0.16	0.51	2.10
NJ	0.94	0.15	−0.71	2.18	0.98	0.95
CO	0.88	−0.50	2.03	0.95	−0.05	−1.81
WI	0.76	1.01	1.30	−0.81	0.72	−1.20
VA	0.64	1.09	−0.31	−0.40	1.46	0.94
IL	0.58	0.39	1.86	−0.51	−0.07	0.20
WV	0.53	0.69	−0.30	1.38	−0.19	0.24
PA	0.48	0.70	−1.57	0.83	1.40	−0.16
DC	0.35	−1.22	1.35	0.88	−0.15	0.00
MO	0.33	1.00	−0.40	−0.74	1.14	1.37
MS	0.20	0.30	1.05	0.63	−1.32	3.39
NE	0.12	−0.07	−0.38	1.26	−0.44	−2.70
KS	−0.09	−0.13	−0.48	0.14	0.19	−0.37
ID	−0.11	−1.16	−0.65	0.46	0.88	0.14
AL	−0.16	−1.04	0.65	0.27	−0.42	2.51
MN	−0.17	0.92	−0.85	−0.75	0.29	−0.85
AZ	−0.20	−0.73	−1.26	0.44	0.86	2.70
ME	−0.24	0.86	−1.40	1.55	−1.52	−1.36
OH	−0.25	−0.36	0.22	−0.37	−0.22	−0.32
IA	−0.27	−0.44	−0.72	0.46	−0.09	−0.07
FL	−0.28	−1.15	1.18	−2.02	1.01	0.56
VT	−0.52	−1.43	−0.04	0.41	−0.55	−0.40
NM	−0.56	−3.53	1.44	0.70	−0.55	−1.45
UT	−0.61	−1.06	0.63	−1.46	0.04	−0.32
AR	−0.67	1.42	−2.35	0.27	−1.01	−0.96
MA	−1.08	0.16	−0.96	0.20	−2.32	0.46
TX	−1.14	−1.68	0.33	−1.02	−0.98	−0.57
DE	−1.32	0.12	−0.54	−0.53	−2.62	−0.02
WY	−1.35	−1.18	−1.12	0.64	−2.16	−3.98
SD	−1.35	0.16	−0.95	−3.17	0.16	−0.11
LA	−1.41	−1.42	−0.60	−1.21	−0.86	−2.06
NC	−1.43	−1.30	−1.56	−0.96	−0.34	0.35
IN	−1.61	−0.82	−2.68	−1.52	0.40	−1.06
WA	−1.62	−0.42	−1.75	−1.02	−1.36	−1.29
ND	−1.77	1.81	−1.32	−1.61	−3.48	−2.36
MT	−2.64	−2.30	−2.03	−3.74	0.38	−0.06
SC	−2.97	−2.72	−0.72	−2.30	−2.77	−0.94
TN	−3.03	−0.97	−3.08	−2.52	−1.96	−3.43
NV	−3.24	−3.36	−2.29	−3.14	−0.66	−2.28
ASSIST						
Mean	0.00	0.05	−0.12	0.17	−0.10	−0.03
SD	1.40	1.50	1.49	1.37	1.24	1.34
Non-ASSIST						
Mean	0.00	−0.03	0.06	−0.09	0.05	0.02
SD	1.57	1.46	1.45	1.50	1.38	1.68

The Future of SoTC: Tracking Trends over Time

The SoTC data were collected at only one time point for the ASSIST evaluation and were used to create a single measure of exposure to tobacco control at the state level. However, the SoTC surveys generated rich descriptive information that has not yet been fully mined. The survey was repeated in 2002 and again in early 2004 as part of the SmokeLess States evaluation and will continue to be collected in 2006 and 2008 through funding by the Robert Wood Johnson Foundation. With this trend, data factors that emerged as being important for ASSIST can be examined from the perspective of how they have evolved over time. Moreover, initial analyses suggest that these data can be used to document changes in state tobacco control programs. Still, many questions remain—for example:

- The distribution of SoTC scores suggests that while a few states were functioning at a high level and a few states were functioning at a low level, most were functioning at about the same level. In this case their relative rankings may not be particularly meaningful.

- Until the ASSIST evaluation, the components of SoTC were not consistently measured for all states. Therefore, there is no way to document how state tobacco control programs evolved from mostly voluntary efforts to maintenance of effective programs in state health departments with capacity for continued effect on tobacco use.

- Funds for tobacco control have recently decreased. The SoTC data collected for and after the ASSIST evaluation may be combined with case studies to document how these funding cuts have affected state tobacco control programs.

The SoTC is now available as a tool for states to use in measuring their own resources, capacity, and efforts. A baseline (1999–2000) measure for each state is available for measuring change over time, identifying strengths and weaknesses, and adapting efforts to regional conditions. By using these data as a basis for comparison over time, SoTC will be useful to tobacco control practitioners as they develop strategies to reduce the epidemic of tobacco-related addiction, disease, and death.

state support for tobacco control, tobacco industry activities, populations with unique needs, and tobacco control staff strengths and interests.

Domain-level scores can provide a more nuanced picture of tobacco control programs in individual states, as they show areas where states focused their efforts. For instance, in 1998–99 Rhode Island's scores suggest that their focus was on mass media (2.49) and policy advocacy (2.09) efforts with a lower effort score in media advocacy (0.55). In contrast, Michigan's scores suggest that their major focus was on media advocacy efforts (2.46) and that they focused a lesser amount of effort on mass media (0.37) and policy advocacy (0.58).

Maryland's highest effort score was in building local capacity (3.06), followed by mass media (2.59) and media advocacy (2.01). Maryland's lowest effort score was policy advocacy (0.91). Where a state tobacco control program focuses its efforts and the degree to which these efforts yield intermediate and long-term outcomes are determined by whether the state has the funding to build and sustain a basic tobacco control infrastructure and by each state's unique economic, political, and other contextual factors.

While the overall SoTC index and constructs (resources, efforts, and capacity) have been validated and are correlated with several important measures used in the ASSIST evaluation model, a deeper

examination of these data at the state level suggests questions for planning and evaluating state tobacco control programs:

- How does a state with high resources (e.g., funding) and lower capacity compare with a state with low resources and higher capacity, even though both have similar SoTC index scores?
- Do extremes in one specific construct—or its subfactors—affect the overall effectiveness of SoTC as an evaluation metric for state programs?
- What can we learn from "outlier" states (such as California) that have disproportionate levels of funding relative to outcomes, as well as other factors such as the maturity of those states' existing tobacco control programs?

Questions like these represent promising areas for further study. Although a validated, composite metric represents an important step in program evaluation, these state results suggest that the SoTC data could help individual states identify their strengths and weaknesses and subsequently help them better adapt to the challenges they face.

Summary

Public health programs are implemented and evaluated at the state level, and this limits the number of observations available for statistical comparisons to 50 (or 51 if the District of Columbia is included). An analysis using only 50 observations in turn severely restricts how many factors can be included in a statistical analysis. Therefore, the construction of highly aggregated measures (such as the SoTC index) is required.

Many critical public health issues do not lend themselves to solutions through randomized clinical trials as used for therapeutic agents. It is not possible to selectively deny a public health intervention to specific population groups (as a control group) or to hold other co-morbid social or environmental factors constant between them. While ASSIST was in progress, its interventions spread from ASSIST to non-ASSIST states. This meant that the ASSIST evaluation had no control states to which ASSIST states could be compared. Instead, the SoTC measure was constructed to assess the relative strength of ASSIST-like programs in every state, and this measure was subsequently correlated to outcomes.

Public health interventions are influenced by and interact with the multiple facets of their environment in a dynamic and complex fashion. Aggregate indexes such as SoTC allow analysis of the interrelationship between the multiple factors that affect a tobacco control program and the outcomes the program influences. Such an analysis promotes rigorous and valid process and outcome evaluations of what is an inherently multivariate system.

Conclusions

1. The Strength of Tobacco Control index measures a state's overall tobacco control program. Survey instruments were constructed, tested, and applied with respondents from

entities engaging in state-level tobacco control. Data analysis showed that its three latent variables constitute a valid map of what Strength of Tobacco Control can measure with good internal coherence.

2. The Strength of Tobacco Control index was derived from component metrics in the areas of resources, capacity, and efforts. The resource component addressed both financial and manpower assets devoted to tobacco control. Capacity addressed areas such as legislative support, coalitions, and public health infrastructure. Efforts incorporated areas of comprehensive activity such as policy-focused initiatives, education, and mass media.

3. State Strength of Tobacco Control values were correlated significantly with other data sources such as legislative policy scores and tobacco use prevalence. In addition, the Strength of Tobacco control index performed well in the evaluation analyses detailed in the final outcomes.

4. The Strength of Tobacco Control model can serve as a guide for future evaluations of state tobacco control programs and is a basis for identifying optimal practices for tobacco control. In addition, it represents an example of a "dose-level" measure that can be used for evaluating the effectiveness of future complex population-level public health interventions.

5. The tracking of trends in Strength of Tobacco Control results over time represents a promising area for research in evaluating the long-term effectiveness of tobacco control programs.

Appendix 2.A. Assessment Rating of Variables

Variable	Parsimony	Scientific support	Feasibility	Recommendation
Resources				
Per capita dollars expended for tobacco control efforts	3	3	5	Y
Number of state-level personnel				
Full Time Equivalents working on tobacco control	3	3	3	Y
Capacity				
Organizational capacities of each of top 5–6 state-level tobacco control organizations	3	1	2	Y
Frequency of contact among top 5–6 state-level tobacco control organizations	5	3	3	Y
Type of contact among top 5–6 state-level tobacco control organizations	5	3	3	Y
Total number of state organizations involved in tobacco control	5	3	3	Y
Percentage of organizations that actively participate in state coalition	5	3	3	Y
Number of local coalitions and tobacco control organizations	5	3	3	Y
Percentage of state covered by local coalitions	5	3	1	N
Perceived capacities of local coalitions/communities	3	1	2	Y
Dose strength of training and technical assistance provided from state-level organizations to local levels	3	3	2	Y
Antitobacco efforts				
Quality of state tobacco control plan	5	3	4	Y
Percentage of efforts devoted to policy and media advocacy	5	3	4	Y
Comprehensiveness of tobacco control efforts (i.e., number of different strategies in "typology")	3	3	4	Y
Focus of strategy of implementation (i.e., level at which funds are expended)	3	2	3	Y
Perceived potency of state policy change efforts	1	3	2	N
Perceived potency of private policy change efforts	1	3	2	N
Perceived potency of media change efforts	1	3	2	N

Appendix 2.B. Key Elements of Strength of Tobacco Control Efforts

Resources: Mobilization of resources committed to antitobacco efforts

Indicators[a,b]	Variables	Sample items[c]	Feasibility[d]
The amount, types, and sources of money	Per capita dollars expended for tobacco control efforts	▪ Does your organization receive any federal funds? If yes, how much do you receive from (name of federal source) in 1999? What are the funds used for? Does your organization spend this money itself or pass it to other organizations through sub-grants? ▪ Does your organization receive any state funds? If yes, how much do you receive from (name of state source) in 1999? What are the funds used for? Does your organization spend this money itself or pass it to other organizations through sub-grants?	May be collected from ▪ Key informants at state level ▪ Program records of – federal and state government – voluntary associations – national and state foundations

[a]Downey, L.E., and J. Gardiner. 1996. *Youth access to tobacco: A partial inventory of state initiatives.* Chicago: University of Illinois at Chicago, Office of Social Science Research.

[b]Association of State and Territorial Health Officials. 1991. State tobacco prevention and control activities: Results of the 1989–1990 Association of State and Territorial Health Officials (ASTHO) survey. Final report. *Morbidity and Mortality Weekly Report* 40 (RR-11): 1–41.

[c]Gardiner, J. 1998. *Strength of state tobacco control efforts.* Final report to the National Cancer Institute ASSIST program. University of Illinois at Chicago, Office of Social Science Research.

[d]Gold, M., L. Burnbauer, and K. Chu. 1995/96. How adequate are state data to support health reform or monitor health system change? *Inquiry* 32:468–75.

Appendix 2.B. (continued)

Capacity: Knowledge, skills, and infrastructure for implementing antitobacco efforts

Indicators[e]	Variables	Sample items[f]	Feasibility[g]
Personnel	Number of state-level personnel	How many people in your organization work on tobacco control and counting all the people, what would be the full-time equivalent?	May be collected from • Key informant interviews
State-level organizational capacity for tobacco control	Organizational capacities of each of top 5–6 state-level tobacco control organizations in: • Financial management • Training and technical assistance for local level • Implementation of tobacco control programs • Policy and media advocacy • Institutionalizing programs • Surveillance and evaluation	For measuring surveillance and evaluation: • Does your organization conduct an annual survey on tobacco use? • Does your organization monitor tobacco control legislation/policies? • Does your organization have designated staff responsible for maintaining tobacco control related data? • Does your organization have designated staff responsible for evaluation of tobacco control efforts?	• Key informant interviews
State-level interorganizational collaboration	• Frequency of contact among top 5–6 state-level tobacco control organizations • Type of contact among top 5–6 state-level tobacco control organizations	During the last 12 months, what have you been doing concerning tobacco control activities with personnel from (name appropriate state-level organization) Code for highest level: 0 = no contact 1 = networking (exchanging information for mutual benefit) 2 = coordinating (exchanging information and altering activities for mutual benefit and a common purpose) 3 = cooperating (exchanging information, altering activities, and sharing resources for mutual benefit and a common purpose) 4 = collaborating (exchanging information, altering activities, sharing resources, and enhancing each other's capacity for mutual benefit and a common purpose)	• Key informant interviews (network analysis)

[e]Meissner, H. I., L. Bergner, and K. M. Marconi. 1992. Developing cancer control capacity in state and local public health agencies. *Public Health Reports* 107:15–23.

[f]Himmelman, A., M. Luxenberg, and C. Schmitz. 1995. *Consortium Activities Diagnostic Survey: A tool to understand the ways that groups work together.* Minneapolis: University of Minnesota, Center for Urban and Regional Affairs.

[g]Calloway, M., J. Morrisey, and R. Paulson. 1993. Accuracy and reliability of self-reported data in interorganizational networks. *Social Networks* 15:377–98.

Appendix 2.B. (continued)

Capacity: Knowledge, skills, and infrastructure for implementing antitobacco efforts

Indicators[h,i]	Variables	Sample items[j]	Feasibility
State-level coalition capacity	▪ Total number of state organizations involved in tobacco control ▪ Percent of organizations that actively participate in state coalition	▪ Questions to key informants representing state coalitions: – How many organizations currently belong to your state-level tobacco control coalition? – What is the number of regularly attended meetings in your coalition during the past 12 months? ▪ Review of coalition records for membership lists and meeting attendance	▪ Key informant interviews ▪ ASSIST, IMPACT, SmokeLess States progress reports ▪ Coalition records
Local community capacity	▪ Number of local coalitions and tobacco control organizations ▪ Perceived capacities of local coalitions/communities	When you think of all the counties across your state, in approximately how many of these counties are there: a. organized tobacco control efforts b. tobacco control efforts that have successfully mobilized diverse constituencies c. efforts that have developed strategic plans for tobacco control d. efforts that have marshaled their own local resources for tobacco control e. policy advocacy efforts for tobacco control on the local level f. efforts that have been successful in changing local policies Response format: none, just a few, about half, most, all, don't know	▪ National organization databases (e.g., Americans for Nonsmokers' Rights, ASSIST Coordinating Center) ▪ Key informant interviews
Supportive linkages between state and local levels	Dose strength of training and technical assistance provided from state-level organizations to local levels	Please indicate whether, in the past 12 months, (name of organization) has provided none, a little, some, or a lot of training and TA to local tobacco control efforts in each of the following areas: a. How to mobilize (recruiting members/organizations) b. How to structure a local coalition c. Building members' knowledge and skills d. How to collaborate with other organizations or local coalitions Response format: none, a little, some, a lot, don't know	▪ Key informant interviews

[h] Schwartz, R., C. Smith, M. A. Speers, L. J. Dusenbury, F. Bright, S. Hedlund, F. Wheeler, and T. L. Schmid. 1993. Capacity building and resource needs of state health agencies to implement community-based cardiovascular disease programs. *Journal of Public Health Policy* 14 (4): 480–94.

[i] Goodman, R., A. Steckler, and M. Alciati. 1997. A process evaluation of the National Cancer Institute's Data-based Intervention Research Program: A study of organizational capacity building. *Health Education Research: Theory and Practice* 12:101–17.

[j] Goodman, R., M. Speers, et al. in press. An attempt to identify and define the dimensions of community capacity to provide a basis for measurement. *Health Education & Behavior.*

Appendix 2.B. (continued)

Antitobacco efforts: The quality of planning and the array of programs, policies, and practices used in tobacco control

Indicators[k,l]	Variables	Sample items[m,n]	Feasibility
Quality of state plan for antitobacco strategies	Quality of state plan composed of expert rating for ■ Overall logic model described/implied ■ Clarity and specificity of objectives ■ Duration and intensity of activities ■ Feasibility of activities ■ Innovativeness ■ Overall quality ■ Comprehensiveness of plan	Clarity and specificity of information about Objectives: 1 = vague, grandiose terms (e.g., "promote cessation") with little detail 3 = goals stated with enough clarity so that at least half of them could be quantified (e.g., "promote city ordinances banning cigarette vending machines") 5 = all or almost all goals have quantifiable levels of outcome specified (e.g., "increase the percentage of workplaces with smoke-free policies by 20%")	May be collected from ■ State tobacco control plans
Typology of antitobacco strategies	■ Percentage of efforts devoted to policy and media advocacy ■ Comprehensiveness of tobacco control efforts (i.e., number of different strategies in typology) ■ Focus of strategy implementation (i.e., the level [state, local] at which funds are expended)	Considering all the funds you receive from federal, state, and nongovernmental sources, can you estimate what percentage of funds currently goes into the following types of tobacco control programs? ■ Enforcement and inspections ■ Individual-oriented cessation and treatment programs ■ School-based prevention programs ■ Public education/media campaigns ■ Community-based approaches, including advocacy and coalition building ■ Evaluation, surveillance, and research ■ Other tobacco control activities, including program administration	■ ASSIST, IMPACT, and SmokeLess States progress reports ■ Key informants

[k]Center for Substance Abuse Prevention. 1995. *National Evaluation of the Community Partnership Demonstration Grant Program: Executive Summary of the Fourth Annual Report.* Rockville, MD: Department of Health and Human Services, Substance Abuse and Mental Health Services Administration.

[l]Kegler, M. C., A. Steckler, K. McLeroy, and S. H. Malek. 1998. Factors that contribute to effective community health promotion coalitions: A study of 10 project ASSIST coalitions in North Carolina. *Health Education & Behavior* 25 (3): 338–53.

[m]Butterfoss, F., R. Goodman, A. Wandersman, R. Valois, and M. Chinman. 1996. The Plan Quality Index: An empowerment evaluation tool for measuring and improving quality of plans. In *Empowerment evaluation*, ed. D. Fetterman, S. Kaftarian, and A. Wandersman. Thousand Oaks, CA: Sage Publications.

[n]Mitchell, R., J. Stevenson, and P. Florin. 1996. A typology of prevention activities: Applications to community coalitions. *Journal of Primary Prevention* 16(4): 413–36.

Appendix 2.C. Agency Worksheet

Strength of Tobacco Control

Agency Worksheet

Conducted by:
Battelle Centers for Public Health Research and Evaluation

Conducted for:
The National Cancer Institute

1999–2000

1. What is your organization's fiscal year cycle? Please ✓ one box.

❑ Calendar year
❑ July 1 – June 30
❑ Oct. 1 – Sept. 30
❑ Other: ☐☐☐☐ to ☐☐☐☐
    month day   month day

2. What is your most recent completed fiscal year? Please ✓ one box.

❑ FY1997
❑ FY1998
❑ FY1999

3. Please fill in the chart below, describing your agency's funding for tobacco control for the most recent fiscal year and for fiscal years 1996 and 1993.

Source of Funding	Most Recent Fiscal Year				*FY 1996*	*FY 1993*
	Amount of Funding Received for Tobacco Control	**Amount Spent on Tobacco Control**	**Amount Paid to Contractors Who Performed Statewide Tobacco Control Activities**	**Amount Awarded for Local Programs**	**Amount of Funding Received for Tobacco Control in FY 1996**	**Amount of Funding Received for Tobacco Control in FY 1993**
National Cancer Institute (NCI) ASSIST	$ _____	$ _____	$ _____	$ _____	$ _____	$ _____
Centers for Disease Control (CDC) IMPACT	$ _____	$ _____	$ _____	$ _____	$ _____	$ _____
Robert Wood Johnson Foundation Smokeless States	$ _____	$ _____	$ _____	$ _____	$ _____	$ _____
State General Fund	$ _____	$ _____	$ _____	$ _____	$ _____	$ _____
State tobacco excise tax	$ _____	$ _____	$ _____	$ _____	$ _____	$ _____
FDA	$ _____	$ _____	$ _____	$ _____	$ _____	$ _____
Synar Surveillance Funds	$ _____	$ _____	$ _____	$ _____	$ _____	$ _____
Other: _____	$ _____	$ _____	$ _____	$ _____	$ _____	$ _____
Other: _____	$ _____	$ _____	$ _____	$ _____	$ _____	$ _____
Other: _____	$ _____	$ _____	$ _____	$ _____	$ _____	$ _____

Appendix 2.C. (continued)

4. **During the most recent fiscal year, what proportion of your agency's tobacco control <u>staff time</u> (Column A) and <u>dollars</u> (Column B) were spent in the broad activity areas listed? Please feel free to approximate the percentage of dollars and time. <u>Each column should add up to 100%.</u>**

If you have difficulty classifying a program activity, please either call Carol Schmitt or Pamela Clark at (800) 777-6115 for assistance, or describe the program in the space labeled "Other activity" and we will classify it for you.

ACTIVITY	A. % of *Time*	B. % of *Dollars*
Programs targeted at individuals. Such as prevention and/or cessation for children or pregnant women, cessation programs for current smokers, programs delivered through work sites or healthcare facilities, health care provider training, teacher training, school-based prevention/cessation programs, and health fairs.	_____ %	_____ %
Programs intended to change the social climate of tobacco use. Such as advocating for work and school site policy initiatives (e.g., clean indoor air policies), working to pass laws or ordinances (local or state), media advocacy (e.g., editorial broad briefings, responding to requests from the media for interviews or information, or providing background materials for the media), doing retailer tobacco sales age restriction compliance checks, and giving technical assistance to local coalitions or other groups to do these community-level activities.	_____ %	_____ %
Programs intended to educate the public. Such as using mass media (billboard campaigns, radio spots, television, or Web pages) or holding public education programs.	_____ %	_____ %
Building and strengthening coalitions. Such as holding organizational meetings and joint conferences, providing technical assistance on how to build membership in coalitions, and assisting with communication channels within coalitions, newsletters, Web sites, e-mail and other mailing services, or other technical assistance for building or strengthening coalitions.	_____ %	_____ %
Developing and/or implementing surveys, funding or doing research. Such as surveillance of smoking prevalence rates, public opinion surveys, and program evaluations, or other research evaluation.	_____ %	_____ %
Program administration. Such as facilities rental, utilities, communication costs, and other overhead.	_____ %	_____ %
Other activity:	_____ %	_____ %
Other activity:	_____ %	_____ %
TOTAL	**100 %**	**100 %**

Appendix 2.C. (continued)

	In Most Recent FY	In FY1996	In FY1993
5. How many staff members were dedicated 100% to tobacco control activities?	⊔⊔	⊔⊔	⊔⊔
	↓	↓	↓
A. How many full-time equivalent (FTE) staff does that number represent?	⊔⊔⊔⊔.⊔ FTE	⊔⊔⊔⊔.⊔ FTE	⊔⊔⊔⊔.⊔ FTE
6. Not considering any staff represented in Item 5, how many <u>additional</u> staff spent <u>at least</u> 25% of their time on tobacco-related activities in the most recent fiscal year?	⊔⊔⊔⊔.⊔ FTE		

7. Battelle Centers for Public Health Research and Evaluation will be calling you in the next few weeks to ask you to participate in a telephone interview.

What is the best time to reach you?   Day and Time: _____

What is the best phone number to use to reach you at this time?   Phone: ⊔⊔⊔ / ⊔⊔⊔ - ⊔⊔⊔⊔

What is another good time to reach you?   Day and Time: _____

What is the best phone number to use to reach you at this time?   Phone: ⊔⊔⊔ / ⊔⊔⊔ - ⊔⊔⊔⊔

8. Please list names and telephone numbers of others in your organization who helped provide information for this worksheet.

Name 1): _____   *Position*: _____

Phone: ⊔⊔⊔ / ⊔⊔⊔ - ⊔⊔⊔⊔

Name 2): _____   *Position*: _____

Phone: ⊔⊔⊔ / ⊔⊔⊔ - ⊔⊔⊔⊔

Name 3): _____   *Position*: _____

Phone: ⊔⊔⊔ / ⊔⊔⊔ - ⊔⊔⊔⊔

Appendix 2.C. (continued)

9. **What other organizations are involved with statewide tobacco control in your state? Please provide us with a contact name within the agency.**

    Agency: _____ **Name:** _____

    Address: _____
                                    Street

    _____
      City   *State*   *Zip*

    Phone: ⎵⎵⎵ / ⎵⎵⎵ - ⎵⎵⎵⎵   **Email Address:** _____

    Agency: _____ **Name:** _____

    Address: _____
                                    Street

    _____
      City   *State*   *Zip*

    Phone: ⎵⎵⎵ / ⎵⎵⎵ - ⎵⎵⎵⎵   **Email Address:** _____

    Agency: _____ **Name:** _____

    Address: _____
                                    Street

    _____
      City   *State*   *Zip*

    Phone: ⎵⎵⎵ / ⎵⎵⎵ - ⎵⎵⎵⎵   **Email Address:** _____

10. **We would like to express our appreciation for your help with this project. May we send a note of appreciation to your supervisor?** ☐ Yes   ☐ No

    Supervisor's Name: _____ **Position:** _____

    Address: _____
                                    Street

    _____
      City   *State*   *Zip*

Thank you for your assistance with this important project.
Please use the envelope provided to return the completed worksheet.

Battelle CPHRE
6115 Falls Road, Suite 200
Baltimore, MD 21209

Appendix 2.D. Survey 2

Survey 2

Conducted by:
Battelle Centers for Public Health Research and Evaluation

Conducted for:
The National Cancer Institute

1999–2000

OMB #: 0925-0471
EXP DATE: 8/31/2002

PROGRAMMER NOTE: DK=8, RF=9.

START TIME.. ⬚⬚ : ⬚⬚

MODULE A: UNIVERSAL

A1. In the past two years, has your organization participated in building, enhancing or maintaining local coalitions in your state? By local, we mean a coalition that is formed to serve the needs of a region, county, or municipality within your state, but is not a statewide coalition.

YES...1
NO.................................. (SKIP TO A2) 2

   A. In the past two years, has your organization provided any formal training for local coalitions?

YES...1
NO...2

   B. In the past two years, have you assisted local coalitions in building or improving their capacity to communicate with their memberships?

YES...1
NO...2

   C. In the past two years, has your organization assisted local coalitions to build their memberships?

YES...1
NO...2

   D. In the past two years, has your organization assisted local coalitions to conduct needs assessments?

YES...1
NO...2

   E. In the past two years, has your organization helped local coalitions to evaluate their programs?

YES...1
NO...2

   F. In the past two years, has your organization helped local coalitions to mobilize diverse constituencies, such as different ethnic or socioeconomic groups?

YES...1
NO...2

   G. In the past two years, has your organization helped local coalitions to generate local resources for tobacco control activities?

YES...1
NO...2

   H. In the past two years, has your organization provided staffing for local coalitions?

YES...1
NO...2

   I. In the past two years, has your organization supplied any other technical assistance to local coalitions?

YES................................ (SPECIFY) 1
NO...2

     SPECIFY: _____

⬚⬚

Appendix 2.D. (continued)

Strength of Tobacco Control Survey 2   Page 2

A2.   In the past two years, has your organization sponsored or participated in any activity designed to assist tobacco users to quit?

YES..1
NO..................................(SKIP TO A3)................................2

     A.   Who were the focus of your tobacco use cessation activities? Were they (READ OPTIONS)?

	YES	NO
1. Adults in general?	1	2
2. Youth?...	1	2
3. Pregnant women?...	1	2
4. Any other special groups?	1 (SPECIFY UP TO 3)	2

GROUP 1: _____

GROUP 2: _____

GROUP 3: _____

A3.   In the past two years, has your organization disseminated materials for use by the general public, such as pamphlets, videos, or radio spots?

YES..1
NO..2

A4.   In the past two years, has your organization created or produced your own pamphlets containing tobacco-related materials?

YES..1
NO..2

A5.   In the past two years, has your organization created or produced your own videos or radio spots on tobacco-related issues?

YES..1
NO..2

A6.   In the past two years, has your organization participated in any health fairs?

YES..1
NO..2

A7.   In the past two years, has your organization provided or sponsored a telephone or internet help line for those who want to quit?

YES..1
NO..2

A8.   In the past two years, has your organization provided tobacco use prevention programs for schools or youth groups?

YES..1
NO..2

A9.   In the past two years, has your organization provided training for health care professionals about tobacco issues?

YES..1
NO..2

A10.   In the past two years, has your organization participated in any public forum, such as seminars or workshops to educate the public about tobacco-related issues?

YES..1
NO..2

Appendix 2.D. (continued)

A11. In the past two years, has your organization purchased mass media, or had in-kind donations of mass media, to inform the public about tobacco-related issues?

YES........1
NO.................. (SKIP TO A12)........2

A. We would like to ask a few questions about your purchase or donation of mass media. What media did you use? Did you use (READ OPTIONS)?

	YES	NO
1. Newspapers	1	2
2. Billboards	1	2
3. Radio	1	2
4. Television	1	2
5. Other (SPECIFY)	1	2

SPECIFY: _____

B. When you used media, what groups did you specifically target with your messages Did you target (READ OPTIONS)?

	YES	NO
1. Youth	1	2
2. Adults in general	1	2
3. Policy makers	1	2
4. Minority groups (SPECIFY)	1	2

GROUP 1: _____
GROUP 2: _____
GROUP 3: _____

C. In the past two years, did you purchase media coverage that focused on tobacco industry efforts or tactics?

YES........1
NO........2

A12. In the past two years, has your organization participated in media advocacy activities? By media advocacy, we mean activities that are intended to get influential media representatives to understand and agree with anti-tobacco positions and policies.

YES........1
NO.................. (SKIP TO A13)........2

A. We would like to ask a few questions about your advocacy activities. In the past two years, has anyone from your organization attended a newspaper or magazine editorial board briefing?

YES........1
NO........2

B. In the past two years, has anyone from your organization provided the press with background materials on smoking issues?

YES........1
NO........2

C. In the past two years, has anyone from your organization responded to interview requests by the media?

YES........1
NO........2

Appendix 2.D. (continued)

D. In the past two years, has your organization involved media representatives in your tobacco control activities?

YES...1
NO..2

A13. In the past two years, has your organization participated in policy advocacy activities, such as working to change laws or policies regarding tobacco use, sales, or display in your state?

YES...1
NO...............................(SKIP TO A14) 2

A. We are interested in which public policy areas you have been involved with. In the last two years, has your agency worked to promote clean indoor air?

YES...1
NO..2

B. In the past two years, has your agency worked to initiate or increase penalties for youth tobacco possession, use, or purchase?

YES...1
NO..2

C. What about working to prevent or repeal penalties for youth tobacco possession, use or purchase?

YES...1
NO..2

D. In the past two years, has your organization worked to increase taxes on tobacco?

YES...1
NO..2

E. What about working to prevent or repeal preemption laws?

YES...1
NO..2

F. What about working on policies to limit how tobacco can be sold or displayed?

YES...1
NO..2

G. And what about work to change policy regarding tobacco use on school property or during school sponsored events?

YES...1
NO..2

A14. Does your organization have a designated legislative liaison for tobacco control policy to your state legislature?

YES...1
NO..2

A15. In the past two years, has any organization done a survey of tobacco use in your state?

YES...1
NO...............................(SKIP TO A16) 2
DK................................(SKIP TO A16) 8

A. Did your agency sponsor or participate in this assessment?

YES...1
NO...............................(SKIP TO A16) 2

1. Did you survey tobacco use among youth?

YES...1
NO...............................(SKIP TO A15 A2)..............2

a. Did you do the Youth Risk Behavior Survey?

YES...1
NO..2

b. Did you do the Youth Tobacco Survey?

YES...1
NO..2

c. Did you do a different survey?

YES................................(SPECIFY) 1
NO..2

SPECIFY SURVEY 1: _____

SPECIFY SURVEY 2: _____

Appendix 2.D. (continued)

Strength of Tobacco Control Survey 2   Page 5

2.   Did you survey tobacco use among adults?
YES...1
NO...............................(SKIP TO A15 A3)............................2

     a.   Did you do the Behavioral Risk Factor Survey?
YES...1
NO...2

     b.   Did you do any other surveys?
YES................................. (SPECIFY) 1
NO...2

SPECIFY SURVEY 1: _____

SPECIFY SURVEY 2: _____

3.   (Was/Were) your survey(s) designed to provide estimates of tobacco use among any minority groups?
YES................................. (SPECIFY) 1
NO...2

SPECIFY GROUP 1: _____

SPECIFY GROUP 2: _____

SPECIFY GROUP 3 _____

A16.   In the past 2 years, has your organization formally evaluated the implementation and effectiveness of your tobacco control efforts?
YES...1
NO...............................(SKIP TO A17) 2

     A.   Does your organization have a system to continually or periodically monitor your program effectiveness?
YES...1
NO...2

A17.   Does your organization have a routine mechanism for updating best practices regarding tobacco control?
YES...1
NO...2

A18.   In the past two years, has your organization awarded grants or contracts for tobacco control activities?
YES...1
NO...............................(SKIP TO A19) 2

     A.   Does your organization require budget reports from the recipient organizations?
YES...1
NO...2

     B.   Does your organization monitor the expenditure of funds and the use of resources by the recipient organizations?
YES...1
NO...2

A19.   Has your organization ever asked for a legal opinion from your State Attorney General's Office on a tobacco-related issue?
YES...1
NO.................................(SKIP TO A20) 2
DK .... (SKIP TO A20) 8

     A.   Did the office supply an opinion in a timely fashion?
YES...1
NO...2

A20.   Does your State Attorney General's Office have a designated tobacco specialist?
YES...1
NO.................................(SKIP TO A21) 2
DK .... (SKIP TO A21) 8

     A.   Has that tobacco specialist, to the best of your knowledge, publicly campaigned in support of a tobacco control issue?
YES...1
NO...2

2. The Strength of Tobacco Control Index

Appendix 2.D. (continued)

B. Has that tobacco specialist ever taken the lead on or initiated a tobacco control activity or program within your state?

YES...1
NO...2

A21. In the past two years, has your organization participated in a state-level tobacco control coalition?

YES...1
NO.................................(SKIP TO INSTRUCTION BOX).......2

A. We would like to ask a few questions about the structure and activities of the state level coalition. These questions are best answered by the staff person who is responsible for running the coalition. Are you the best person to ask, or is there someone else, either in your agency or in a different agency or organization that we should talk to?

SELF ....(DO COALITION MODULE B) ...1

SOMEONE ELSE IN SAME AGENCY
                    (GET INTRA-AGENCY REFERRAL) ...2

SOMEONE IN ANOTHER AGENCY
                    (GET INTER-AGENCY REFERRAL) ...3

IF HEALTH DEPARTMENT RESPONDENT, DO HEALTH DEPARTMENT CAPACITY *MODULE C.*

IF NOT HEALTH DEPARTMENT, DO SUPPORT *MODULE D.*

ALL RESPONDENTS DO INTERAGENCY RELATIONSHIPS *MODULE E.*

A22. In addition to the American Heart Association, the American Lung Association, The American Cancer Society, and your State Health Department, are there other state level organizations that you can refer us to that play a significant role in tobacco control in your state?

YES.....................................(ASK A)...1
NO......................(SKIP TO INSTRUCTION BOX) 2

A. Please tell me the agency and the name and telephone number of a contact person there.

AGENCY #1: _____

CONTACT PERSON: _____

PHONE NUMBER: |__|__|__| - |__|__|__| - |__|__|__|__|

AGENCY #2: _____

CONTACT PERSON: _____

PHONE NUMBER: |__|__|__| - |__|__|__| - |__|__|__|__|

AGENCY #3: _____

CONTACT PERSON: _____

PHONE NUMBER: |__|__|__| - |__|__|__| - |__|__|__|__|

INSTRUCTION BOX

SKIP TO MODULE F: DEMOGRAPHICS

END TIME...|__|__| : |__|__|

Appendix 2.D. (continued)

MODULE B: COALITION

B1.   What is the name of your coalition? _____ ☐☐

B2.   What is your position within the coalition? Are you (READ CATEGORIES)? CODE ONLY ONE.

A staff member providing support for the coalition 1
The president or chair of the coalition 2
Another elected or appointed leader of the
 coalition..3
A representative of a member organization...................4
Other position..................(SPECIFY) 5

SPECIFY: _____ ☐☐

B3.   What is the largest geopolitical boundary of your coalition's responsibility? Would you say (READ CATEGORIES)? CODE ONLY ONE.

A city, town or county 1
A region within the state...2
The state 3
A region encompassing more than one state 4

B4.   How large is your coalition in terms of member organizations?

OF ORGANIZATIONS ....☐☐☐

  A.   How many individual members?

OF INDIVIDUALS ....☐☐☐

B5.   In what year was your coalition formed?

YEAR FORMED.......................................19 ☐☐

B6.   Does your coalition have any paid staff?

YES.. 1
NO......................................(SKIP TO B7).............................. 2

  A.   What is the source or sources of the staffs' salary?

    SOURCE #1: _____ ☐☐

    SOURCE #2: _____ ☐☐

    SOURCE #3: _____ ☐☐

B7.   Which of the following have any representation in your coalition?

		YES	NO
a.	Are voluntary health organizations represented?.........	1	2
b.	Is the Parent Teacher Association represented?	1	2
c.	Are schools of medicine, public health or nursing represented?..	1	2
d.	Are other colleges or universities represented?	1	2
e.	Are law enforcement agencies represented?	1	2
f	Are prosecutors or district attorneys represented?	1	2
g.	Are judges or magistrates represented?	1	2
h.	Are retail tobacco outlets represented?........................	1	2
i.	Are public health officials represented?	1	2
j.	Is the state medical society represented?	1	2
k.	Is the state dental society represented?.......................	1	2
l.	Are religious organizations or faith groups represented?..	1	2

Appendix 2.D. (continued)

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B8.   Which statement best describes the nature of your coalition's activities? READ CATEGORIES AND CODE ONLY ONE..

Primarily information-sharing...1

Primarily active participation in tobacco control activities 2

Both information-sharing and participation in tobacco control activities 3

B9.   In the past year, has your coalition sponsored or taken a lead role in any of the following activities?

	YES	NO
a. Policy advocacy activities, such as working to change laws or policies concerning tobacco use, sale, or display in your state?	1	2
b. Individual tobacco cessation programs, such as quit smoking classes or smokers' hot lines?	1	2
c. Using mass media, such as television or radio spots or billboards, to promote anti-tobacco positions?.........	1	2
d. Media advocacy activities, such as making editorial board visits or producing background materials for the press?	1	2

B10. In addition to your statewide coalition, can you estimate the proportion of your state that is covered by local coalitions? Would you say less than 10%, about a quarter, about half, about three fourths, or about all?

<10%... 1
ABOUT A QUARTER... 2
ABOUT HALF 3
ABOUT THREE QUARTERS 4
ABOUT ALL 5

B11. About how many local coalitions are there in your state?

LOCAL COALITIONS .... |___|___|___|

Appendix 2.D. (continued)

Strength of Tobacco Control Survey 2   Page 9

MODULE C: HEALTH DEPARTMENT CAPACITY

PROGRAMMER NOTE: This module is asked only if the respondent represents the State Health Department.

C1.	Would you describe yourself as the highest level tobacco control specialist in your organization?	YES..1 NO................(GET INTRA-AGENCY REFERRAL AND TERMINATE MODULE).....................2

    A.   Who would you say is the highest level tobacco control specialist in your organization?
         SPECIFY: _____

C2.	Which statement best describes your level of involvement in deciding which tobacco-related programs your agency participates in? CODE ONLY ONE.	I have very little input into decisions about which programs we participate in 1
		I make recommendations regarding programmatic priorities that require a supervisor's approval 2
		I have nearly complete autonomy in deciding my organization's tobacco program priorities.....................3

C3.	What about hiring decision? If a tobacco control position were to be created in your organization, which of the following statements best describes your involvement in choosing whom to hire?	I have very little input into hiring decisions 1
		I make recommendations regarding hiring decisions that require a supervisor's approval 2
		I have nearly complete autonomy in making hiring decisions 3

C4.	Which of the following two statements best describes how tobacco control is organized in your agency?	There is a designated tobacco control unit with a person or person who do tobacco control activities as their major function in the organization.....................(END) 1
		There is no designated tobacco control unit; the activities are done within other functioning units 2

    A.   How many other units would you say are involved with tobacco control activities?

         # UNITS ....|__|__|

    B.   Do any of these units which are doing tobacco control have a separate budget line for tobacco control efforts?

         YES..1
         NO...2

Appendix 2.D. (continued)

MODULE D: SUPPORT

PROGRAMMER NOTE: This module is asked of all respondents **except** Health Department.

D1.   I am going to read the names of several entities. I would like your opinion about how supportive each of the following has been regarding your tobacco control agenda over the past two years. For each entity, please tell me if in your opinion they have been not at all supportive, fairly supportive, quite a bit supportive, or extremely supportive.

		NOT AT ALL SUPPORTIVE	FAIRLY SUPPORTIVE	QUITE A BIT SUPPORTIVE	EXTREMELY SUPPORTIVE
a.	The Governor...	1	2	3	4
b.	The State House of Representatives........................	1	2	3	4
c.	The State Senate..	1	2	3	4
d.	The media..	1	2	3	4
e.	The State Attorney General......................................	1	2	3	4
f.	The Chief Health Officer...	1	2	3	4

Appendix 2.D. (continued)

MODULE E: INTERAGENCY RELATIONSHIPS

E1. We would like to ask some questions about the inter-relationships of tobacco control organizations in your state. Are you the person in your organization who has the most contact with other tobacco control organizations?

YES... 1
NO.............(GET INTRA-AGENCY REFERRAL AND TERMINATE MODULE)................. 2

E2. Now I am going to ask you about several organizations in your state. Which of the following four statements best describes your organization's interaction with the (READ ITEM)? Would you say you have had no contact, have tended to work at cross purposes (or had turf wars), have shared information with each other, have developed a plan to share responsibilities and to coordinate efforts, or have actually shared funding or staff?

E3. During the past two years, how frequently did you have contact with (READ ITEMS)? Would you say you had rare contact, occasional contact, or extensive contact?

	Had no contact	Tended to work at cross purposes / turf wars	Shared information	We have a plan to coordinate efforts and share responsibilities	Actually shared funding or staff	RARE CONTACT	OCCASIONAL CONTACT	EXTENSIVE CONTACT
			ASK E3					
A. Department of Health	1	2	3	4	5	1	2	3
B. American Cancer Society	1	2	3	4	5	1	2	3
C. American Lung Association	1	2	3	4	5	1	2	3
D. American Heart Association	1	2	3	4	5	1	2	3
E. State Tobacco Control Coalition	1	2	3	4	5	1	2	3
F. State Attorney General's Office	1	2	3	4	5	1	2	3
G. State Medical Society	1	2	3	4	5	1	2	3
H. Date Dental Society	1	2	3	4	5	1	2	3
I. Tobacco Control Researchers in your state	1	2	3	4	5	1	2	3

PROGRAMMER NOTE: EXCLUDE FROM A-I RESPONDENT'S OWN AGENCY.

Appendix 2.D. (continued)

Strength of Tobacco Control Survey 2

MODULE F: DEMOGRAPHICS

F1.   We would like to ask a few questions about you. What   TITLE: _____
        is your job title?

F2.   How long have you worked for your present   YEARS ....
        organization or agency?   MONTHS ....

F3.   How long have you been in your current position?   YEARS ....
                                                                     MONTHS ....

F4.   How long have you been involved in tobacco control?   YEARS ....
                                                                     MONTHS ....

            Thank you very much for your time. We appreciate your expertise.

Appendix 2.E. Validation of the Strength of Tobacco Control Model

This appendix discusses the analysis methods used to validate the SoTC model and the justification for using a reduced model in the calculation of the SoTC index score.

Validation of the Heuristic Model

The SoTC model was validated using principal components analysis, factor analysis, and structural equation modeling. The results of the structural equation modeling provided a measure of statistical significance associated with each pathway in the conceptual model and provided the estimated appropriate weighting factor (with error bounds) for combining the subdomains, domains, and constructs to summarize SoTC.

Correlation Analysis

A correlation analysis was performed across each variable in the SoTC hierarchy (subdomain) of the conceptual model as an exploratory tool. The purpose of this exercise was to determine how well the various different variables within the hierarchy interrelated. The expectation was that domain and subdomain variables from within the same construct would have stronger correlation coefficients than those that came from different constructs. The degree to which this could be established is the basis for the validation of the conceptual model.

Principal Components Analysis

The next step in analyzing each within-method correlation matrix was to perform a principal components analysis on a correlation matrix including all of the averaged variables at the subdomain and domain levels but not at the construct or SoTC levels. The purpose of this exercise was to demonstrate that a significant portion (greater than 50%) of the variability in the 12-variable correlation matrix could be explained within the first three vectors of factor loadings. The measure of the amount of variability explained by each factor loading was summarized as a proportion by the eigenvalue associated with each vector of factor loadings. It was presumed that these first three vectors were associated with the three latent constructs (resources, capacity, and efforts) depicted in the conceptual model. This presumption was verified using a factor analysis as described below.

Factor Analysis. Factor analysis can be considered as an extension of principal components analysis. The goal of factor analysis is to describe the structure of a correlation matrix for a set of response variables by using a smaller number of factors (or latent variables). The idea is to separate the response variables into groups, such that variables within a group are highly correlated with each other but not correlated as much with variables in other groups, with an implicit goal that each group of variables represents a single underlying construct, or factor, that is responsible for the observed correlations.

After an exploratory data analysis and the principal components analysis, it appeared as though the response variables in the correlation matrix could be separated into three groups that, in turn, were associated with one of the constructs in the conceptual model (resources, capacity, and efforts).

Essentially, the factor analysis allowed for use of an orthogonal transformation of the principal components analysis results to better visualize the separation between the three main constructs. Two algorithms for estimation were explored—principal components and maximum likelihood—and the results were summarized by plotting the resulting first three factor loadings in a three-dimensional plot to demonstrate how the different constructs separate from each other in describing SoTC. This plot was generated for the factor loadings before and after the orthogonal transformation was applied.

Structural Equations Model. A structural equations model was used to compare the relationships between observed variables from the SoTC survey and latent variables from the conceptual model, resulting in a covariance matrix with a certain structure that corresponded with the SoTC conceptual model. The model contains parameters that describe the contribution of each domain to its corresponding constructs and each construct to the overall measure of SoTC. These parameters were estimated with a structural equations model, using the covariance matrix of observed data as input to the model.

The results of the structural equations model provide a measure of statistical significance associated with each pathway in the conceptual model and the estimated appropriate weighting factor (with error bounds) for combining the subdomains, domains, and constructs to summarize SoTC. These weighting factors, quite naturally, are consistent with the eigenvalues from the principal components analysis conducted at each level of hierarchy within the conceptual model. The level of significance associated with each pathway within the structural equation model was then used to reduce and verify the conceptual model.

Results

Within-method Correlation Analysis

Within-method correlation matrices among domain-level variables are presented in table 2.E.1. The 12 × 12 domain-level correlation matrix or the reduced 9 × 9 correlation matrix that eliminates three of the variables related to the capacity construct, as appropriate, becomes the basis for all the remaining analyses (principal components analysis, factor analysis, and structural equations models). Subdomain variables from within the same construct were more highly correlated than variables that came from different constructs, exceptions being the leadership, health department infrastructure, and staff experience domains that contribute to the capacity construct. This supported the observed separation between the variables that contributed to the capacity construct in factor analysis figures.

Table 2.E.1. Within-method Correlation Analysis of Domain-level Strength of Tobacco Control Variables

Variables	Staff	Funds	Leadership	Interagency relationships	Health dept. infrastructure	Statewide coalition	Staff experience	Media advocacy	Mass media	Developing local capacity	Policy advocacy	Individual behaviors
Staff	1.00	.34	.18	.21	.11	.29	-.03	-.01	-.07	.11	.08	.33
Funds	.34	1.00	.25	.09	-.02	.22	-.03	.14	.09	.00	.05	.18
Leadership	.18	.25	1.00	-.00	-.04	-.14	-.12	-.14	-.11	-.14	.24	-.02
Interagency relationships	.21	.09	-.00	1.00	.11	.34	.07	.06	.12	.02	.19	.14
Health dept. infrastructure	.11	-.02	-.04	.11	1.00	.13	.18	-.13	.10	-.01	.07	-.01
Statewide coalition	.29	.22	-.14	.34	.13	1.00	.08	.12	-.09	.14	.06	.01
Staff experience	-.03	-.03	-.12	.07	.18	.08	1.00	-.09	-.04	-.10	.15	.25
Media advocacy	-.01	.14	-.14	.06	-.13	.12	-.09	1.00	.29	.39	.45	.36
Mass media	-.07	.09	-.11	.12	.10	-.09	-.04	.29	1.00	.48	.53	.50
Developing local capacity	.11	.00	-.14	.02	-.01	.14	-.10	.39	.48	1.00	.37	.55
Policy advocacy	.08	.05	.24	.19	.07	.06	.15	.45	.53	.37	1.00	.37
Individual behaviors	.33	.18	-.02	.14	-.01	.01	.25	.36	.50	.55	.37	1.00

Tables 2.E.2 and 2.E.3 provide the correlation matrices among construct-level variables. As seen from these tables, each of the three main construct-level variables appeared to summarize different information, since none of them are highly correlated with each other. However, all three of these constructs make a significant contribution to the overall summary measure of SoTC.

Principal Components Analysis

Table 2.E.4 provides the summary of the amount of variability explained within the first three principal components, when analyzing the 12×12 correlation matrix among the domain-level variables included in the SoTC conceptual model and a reduced 9×9 correlation matrix that eliminates three of the five domains related to capacity construct. As demonstrated in the table, approximately 50% of the variability in the 12×12 (full model) correlation matrix and 60% of the variability in the 9×9 correlation matrix (reduced model) could be explained by the first three factor loadings.

Factor Analysis

Figure 2.E.1 summarizes the factor analysis that essentially rotates the first three principal components, allowing for graphic grouping of the "like" variables that contribute to each of the three main constructs. This analysis demonstrates that it is possible to group the variables in a manner that clearly separates them into the three construct groups. The figure also demonstrates that there was substantial separation

Table 2.E.2. Within-method Correlation Analysis among Three Constructs and Overall Strength of Tobacco Control (SoTC) for Full Model

Variables	Resources	Capacity	Efforts	SoTC
Resources	1.00	.18	.22	.72
Capacity	.18	1.00	.14	.62
Efforts	.22	.14	1.00	.67
SoTC	.72	.62	.67	1.00

Note: Full model consists of all 12 domain-level variables.

Table 2.E.3. Within-method Correlation Analysis among Three Constructs and Overall Strength of Tobacco Control (SoTC) for Reduced Model
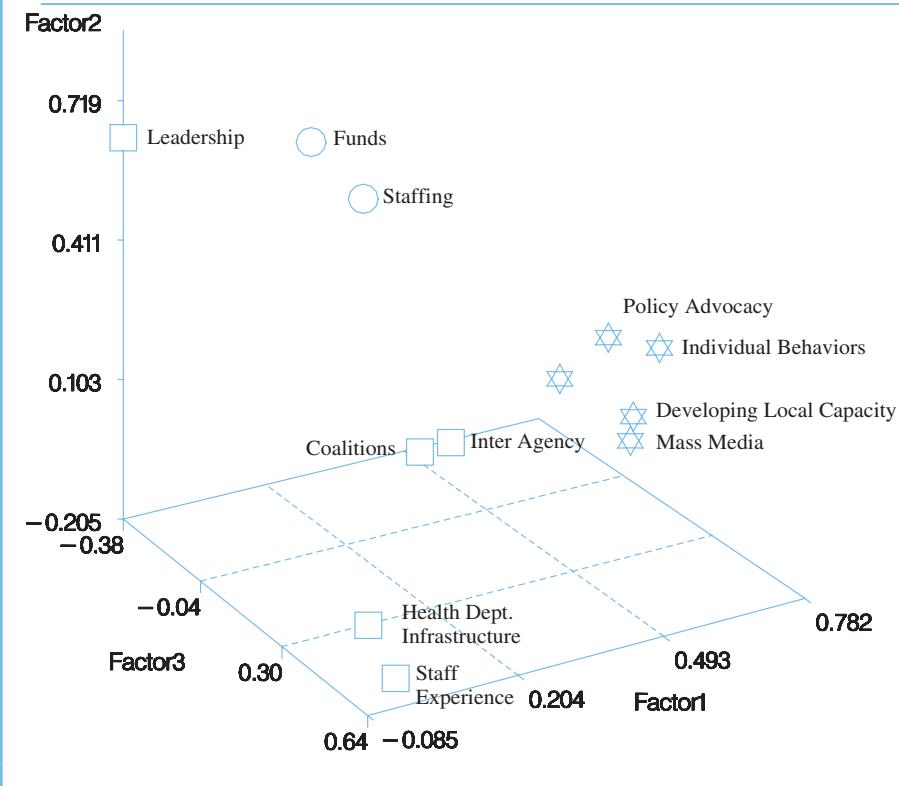
Variables	Resources	Capacity	Efforts	SoTC
Resources	1.00	.30	.22	.78
Capacity	.30	1.00	.12	.70
Efforts	.22	.12	1.00	.59
SoTC	.78	.70	.59	1.00

Note: Reduced model consists of only 9 of the 12 domain-level variables, eliminating 3 of the 5 variables related to capacity construct, based on the results of the structural equation model.

Table 2.E.4. Amount of Variability Explained by First Three Factor Loadings in Principal Components Analysis

Model	Factor loadings	Cumulative eigenvalues
Full[a]	1	0.24
	2	0.38
	3	0.50
Reduced[b]	1	0.32
	2	0.50
	3	0.62

[a]Full model consists of all 12 domain-level variables. [b]Reduced model consists of only 9 of the 12 domain-level variables, eliminating 3 of the 5 variables related to capacity construct, based on the results of structural equation models.

Figure 2.E.1. Factor Analysis for Full Model

between the five original variables that contributed to the capacity construct if viewed at the first three eigenvectors and suggests that reduced models should be investigated. The next section describes the results of the structural equation modeling analysis that was performed to accomplish this.
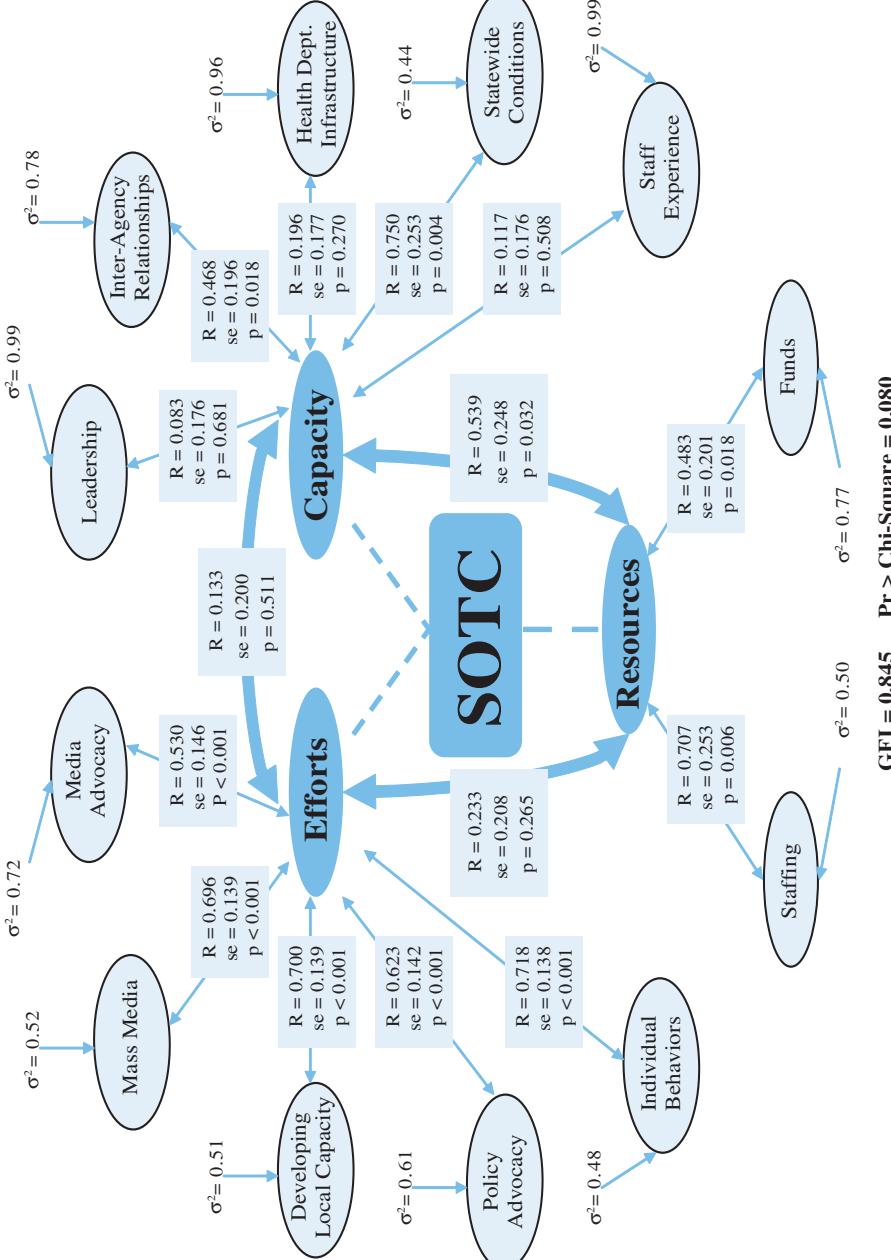
Structural Equation Modeling

The results of a structural equation model fit to the full conceptual model, in which all 12 domain-level variables were entered as manifest variables in the analysis, are summarized in figures 2.E.2 and 2.E.3 for full and reduced models.

Each of these 12 variables contributed to one of three latent variables (constructs) in the SoTC conceptual model. The strength of these relationships is provided along the arrows (with correlation coefficients, associated standard errors, and p values). The error left unexplained is also provided ($\Phi2$), and since this analysis was based on the analysis of a correlation matrix, R-squared for each structural relationship can be calculated as 1–variance. In addition, the p values for an overall model chi-square test and goodness-of-fit index statistic are also provided.
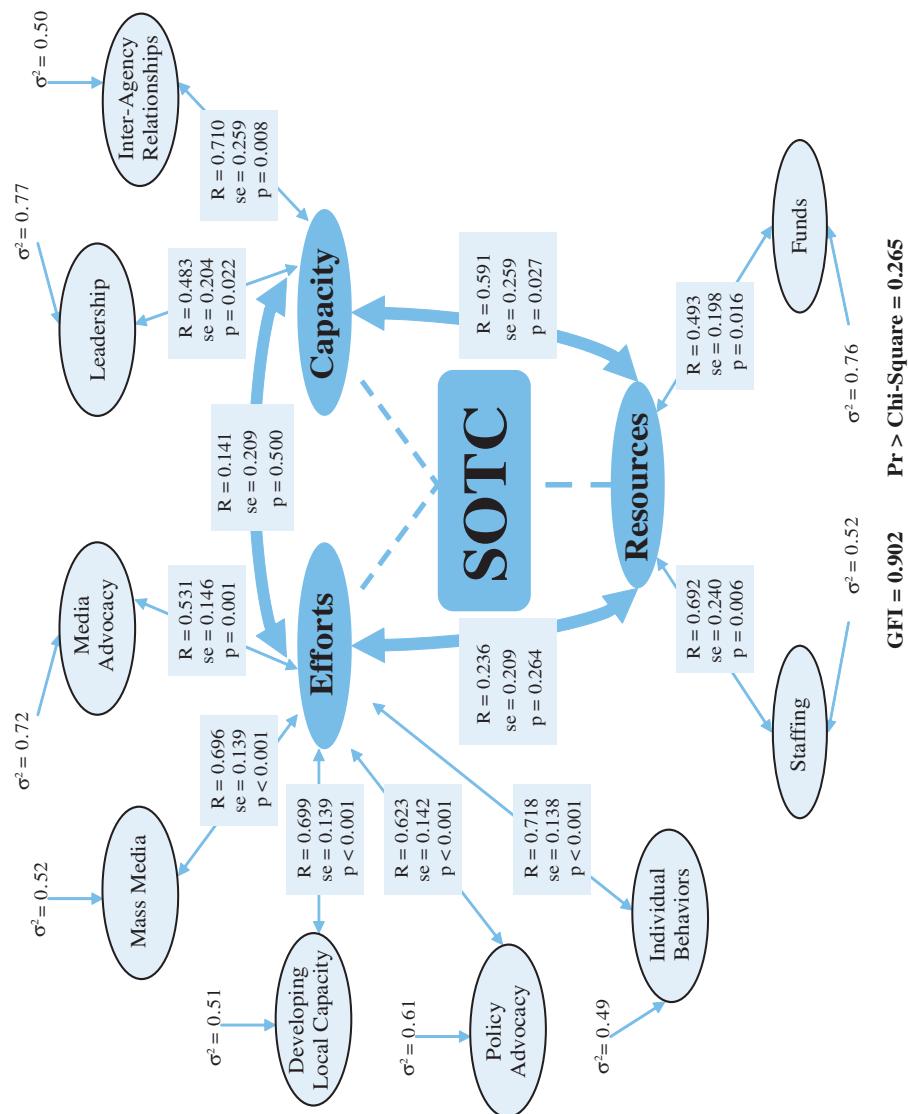
Note that in 9 of the 12 cases a significant amount of the variability was explained by the pathways in the conceptual model, the exceptions being the leadership, health department infrastructure, and staff experience domains that contribute to the capacity construct. Correlations between the three latent variables (at the construct level) are provided in these figures as well.

The model itself (as fitted) was not particularly well suited to assess the contributions to an overall SoTC score because it would be based on combining three variables that were already latent. However, the strength of these relationships was estimated independently of the structural equation modeling (as seen in tables 2.E.2 and 2.E.3); these estimates are seen in figures 2.E.2 and 2.E.3. Due to the weak relationships observed for three of the five capacity construct variables, the overall fit of the full model was not particularly good. However, figure 2.E.3 represents a reduced model (eliminating these three variables from the conceptual model) that fits the data quite well, based on the overall model chi-square test and goodness-of-fit index statistic.

Figure 2.E.2. Strength of Tobacco Control—Full Model

Figure 2.E.3. Strength of Tobacco Control—Reduced Model

Inter-Agency Relationships $\sigma^2 = 0.50$

$R = 0.710$
$se = 0.259$
$p = 0.008$

Leadership $\sigma^2 = 0.77$

$R = 0.483$
$se = 0.204$
$p = 0.022$

Capacity

$R = 0.591$
$se = 0.259$
$p = 0.027$

$R = 0.141$
$se = 0.209$
$p = 0.500$

SOTC

Resources

$R = 0.493$
$se = 0.198$
$p = 0.016$

Funds $\sigma^2 = 0.76$

Media Advocacy $\sigma^2 = 0.72$

$R = 0.531$
$se = 0.146$
$p = 0.001$

Efforts

$R = 0.236$
$se = 0.209$
$p = 0.264$

$R = 0.692$
$se = 0.240$
$p = 0.006$

Staffing $\sigma^2 = 0.52$

Mass Media $\sigma^2 = 0.52$

$R = 0.696$
$se = 0.139$
$p < 0.001$

$R = 0.699$
$se = 0.139$
$p < 0.001$

Developing Local Capacity $\sigma^2 = 0.51$

$R = 0.623$
$se = 0.142$
$p < 0.001$

Policy Advocacy $\sigma^2 = 0.61$

$R = 0.718$
$se = 0.138$
$p < 0.001$

Individual Behaviors $\sigma^2 = 0.49$

GFI = 0.902   Pr > Chi-Square = 0.265

Appendix 2.F. Construct Validation of Strength of Tobacco Control

Concept mapping (more fully described in chapter 8, pages 217–23) was used to validate the SoTC construct. Forty-three key stakeholders in the tobacco control and prevention field (state and local, frontline and research, experienced and relative new-comers) were asked to identify an initial set of tobacco control program components. Components were brainstormed over the World Wide Web, and the following focus statement was used: "One specific component of a strong tobacco control program is..." The statements provided by the respondents were subsequently revised and refined into a final set of 73 components that were sorted by 41 of the original 43 respondents and rated for whether they were a local, state, or mixed responsibility. Concept mapping was used to analyze the sorting and rating data and to generate the conceptual framework.

The results provide a summary of what key stakeholders in the tobacco control field identify as the components of a strong tobacco control program—components that are congruent with the SoTC. The basic conceptual framework categorizes the 73 specific components into 12 categories that, in turn, are grouped into four major areas (manage-ment, processes, programs and services, and outcomes) that suggest a natural progres-sion, or logic model (see figure 2.F.1). The framework also shows that strong tobacco control efforts address both systemic and individual change, with respondents indicat-ing that states should have greater responsibility for systematic change, while local communities should have greater responsibility for individual behavior change.

Figure 2.F.1. Basic Conceptual Framework

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3. Measuring Policy and Legislative Changes

Jamie Chriqui, Marcy Frosh, Ross C. Brownson, and Frances A. Stillman

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Tables and Figures

3. Measuring Policy and Legislative Changes

This chapter describes measures and methods developed for the evaluation of the American Stop Smoking Intervention Study (ASSIST) for assessment of state and local legislative changes in youth access laws and clean indoor air laws. Although only the clean indoor air measure was subsequently used in the overall analysis, these measures have broader applicability in the analysis of changes in state and local laws for specific tobacco control policy objectives.

On the basis of state legislative data from the National Cancer Institute's (NCI's) State Cancer Legislative Database (SCLD) and local data from the American Nonsmokers' Rights Foundation (ANRF), state-level summary scores were created for youth access and clean indoor air policy, encompassing state legislation as well as the incremental effect of stronger local ordinances. State scores were based on a nine-category quantitative rating in each area, subject to a substantive numerical penalty where preemption laws forbade the implementation of stronger local legislation. An incremental local component to the clean indoor air scores was also created for subareas where local laws were equivalent to or stronger than state legislation, weighted by the percentage of the state's population represented in the community.

Analysis of these data showed that state summary scores for youth access legislation increased over time from a mean of 7.20 to 11.57 accounting for preemption, and from 8.35 to 15.59 without preemption, during the period studied (1993–98). Summary scores for clean indoor air exhibited a smaller increase over this period, from a mean of 7.16 to 8.02 with preemption and 8.71 to 10.98 without. The composite state+local scores for clean indoor air also increased during this period from a mean of 7.71 to 8.64 accounting for preemption, and perhaps more important, there was a significant difference in these scores between ASSIST (M = 10.56) and non-ASSIST (M = 7.68) states.

Introduction

This chapter examines a tool for measuring legislative changes related to tobacco use prevention and control, based on state and aggregated local data sources, as well as trends in these data over the duration of ASSIST. Focusing on key areas of youth access to tobacco products and clean indoor air policies (eliminating exposure to environmental tobacco smoke), this tool ranked the extensiveness of specific legislative items to create a summary legislative score for each of these two policy areas. The resulting summary score for clean indoor air was used as part of the Initial Outcomes Index (IOI) created as part of the ASSIST evaluation analysis.

Governments at all levels in the United States have enacted legislation addressing the public health effects of smoking. Increasingly, legislative restrictions are viewed as a critical component of strategies that may also include tax measures, media interventions, community programs, and other efforts. ASSIST directed intervention efforts at four policy areas: eliminating exposure to environmental tobacco smoke, promoting higher taxes for tobacco, limiting tobacco advertising and promotions, and reducing minors' access to tobacco products. This chapter describes the system developed to measure state and local legislative changes in the United States. Of these policy areas, the ASSIST evaluation focused on state and local clean indoor air laws as a variable for the IOI because there were available data sources for this measure. A measure did not have to be developed for state taxes on tobacco because these data were available. The system used data from NCI's SCLD, data from the ANRF database on local legislation, and policy priorities identified for ASSIST. Raw data from the clean indoor air model are presented here. This chapter also reviews how the system applies to state laws designed to restrict minors' access to tobacco products. Although originally developed for use in the ASSIST evaluation, the tools presented in this chapter will enable the tobacco control and research communities to monitor progress toward specific policy markers based on changes in state and local laws.

State and Local Government Action for Tobacco Use Prevention and Control

The volume of state and local laws on clean indoor air and youth access to tobacco is one indicator that legislators have responded to a health policy approach that goes beyond individual health risks to target broad sectors of the population.[1,2] Much of the state-level activity for clean indoor air legislation began in the 1980s.[3] Notably, 1986 was a watershed year for scientific knowledge about environmental tobacco smoke, which was summarized in reports by the surgeon general and the National Research Council. These reports made the scientific case for enacting policies to protect the public from the effects of involuntary smoking, and states responded with laws restricting smoking in public places.[3–5] In 1993, the Environmental Protection Agency released its risk assessment report on the health consequences of involuntary smoking, and state legislators' attention to the clean indoor air issue continued to evolve in state legislatures.[6] States seeking to enact new requirements for clean indoor air found many prototypes in strong local ordinances that had been enacted and implemented in preceding years.[7,8]

New state laws on youth access to tobacco followed federal activity aimed specifically at the youth cohort.[9] The Synar amendment required states to adopt and implement sales restrictions to

minors or risk losing certain block grant funds and, in response, by 2002 all states had enacted laws prohibiting the sale of tobacco to minors.[10] (See NCI Monograph 16, chapters 6 and 9.) Additionally, the Food and Drug Administration promulgated regulations (later invalidated by the Supreme Court) restricting minors' access to tobacco.

Data from NCI's SCLD for 1993 through 1999 indicate that states were active in passing clean indoor air laws from 1993 to 1995 but that the level of activity flattened out in the late 1990s.[11] Data on clean indoor air and youth access laws and regulations by local governments, collected for more than two decades by the ANRF, indicate that for the period 1980 to 1998, the number of local clean indoor air laws and regulations enacted annually in the United States peaked in 1993.[12] For the same period, the annual number of laws enacted to restrict youth access to tobacco lagged behind clean indoor air ordinances until 1994. Local activity on youth access has slightly outpaced clean indoor air provisions since 1994, but passage of new local ordinances in both of these areas has slowed.[12] At the time of the ASSIST evaluation, over 1,500 communities had enacted some type of clean indoor air ordinance, and over 1,300 communities had enacted some type of youth access to tobacco ordinance.[13]*

The trend toward adoption of preemption language related to state clean indoor air laws (and youth access to tobacco laws) is well discussed in the literature.[14,15] At the time of the ASSIST evaluation, 27 states included preemption provisions in connection with tobacco control laws.[16] As defined generally, state preemption prohibits lower level jurisdictions from enacting laws more stringent than, or different from, the higher level law.[17] Both the Department of Health and Human Services and the American Public Health Association have issued statements opposing state preemption of local tobacco control ordinances.[18,19]

The Value of Monitoring Policy and Legislative Changes

The usefulness of surveillance of tobacco control policy change is well recognized, and monitoring systems are now an important part of tobacco control efforts in the United States. Former U.S. Surgeon General David Satcher emphasized the importance of data collection and data analysis to identify tobacco control problems and to make progress in solving these problems, and he called for the replication of such systems worldwide.[20]

The NCI system for rating selected tobacco control laws is a benchmark tool: The model offers data comparing the laws in all 50 states and the District of Columbia to well-established public health goals.[11,21] The value of longitudinal monitoring of this kind is also made clear in Stillman et al.,[22] 1999, wherein the ratings serve as a key variable in the ASSIST IOI (along with cigarette prices and the percentage of workers covered by a 100% smoke-free workplace).

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*Information about the ANRF database of community ordinances is located at www.no-smoke.org/document.php?id=313.

The rating system was not designed to predict the effect of laws on behavior; instead, it was expected that the relationship between the rating data and other variables such as prevalence and consumption could be tested as it was in the ASSIST evaluation.

The NCI rating system establishes a numerical rating for every state based on the extensiveness of the state's youth access and clean indoor air laws. The system measures changes in these laws, establishes a firm baseline, uses verifiable data based directly on state laws, and rates the same item for every state (with a high level of interrater agreement) based on established public health objectives.[11,21] The system thereby offers a high degree of measurability for the ASSIST evaluation and other research.

In the ASSIST evaluation, the unit of measure is the state; therefore, an index to assess states based on their changes in tobacco control policy is particularly useful in at least two important respects. The clean indoor air ratings serve as one variable in the IOI and thereby as a measure of the effect of ASSIST on policy outcomes. Specifically, for purposes of its IOI, the ASSIST evaluation used a combined state+local clean indoor air rating. As noted below, only local measures that were as restrictive or more restrictive than the state law were included in the combined rating. ASSIST states had higher policy scores than non-ASSIST states prior to 1995, and the early baseline environment in these

states may account for the new clean indoor air laws that were enacted in later years. In a related aspect of the ASSIST evaluation, the combined state+local clean indoor ratings became a variable in the analysis of whether the initial outcomes affected smoking prevalence and consumption rates.[22]

In another example, the NCI rating system was also analyzed with the NCI Tobacco Use Supplement to the U.S. Census Bureau's Current Population Survey.[23] The analysis revealed a differential of more than 30 percentage points among the states in the proportion of the workforce with smoke-free policies.[24] As new findings show that there are significant risks in even short-term exposure to secondhand smoke,[25,26] data that help states, cities, and countries evaluate the extensiveness of their clean indoor air laws will become increasingly important.

Generating quantitative indicators based on state and local laws can help inform decision makers about whether specific aspects of their tobacco control policy are in the best interests of public health. Measures of tobacco control inputs are important in evaluating the comprehensiveness and strength of tobacco control policies by (1) providing target goals by which states can monitor progress, (2) facilitating comparison among states and counties, (3) enabling longitudinal tracking of changes in policy actions over time, and (4) measuring the effect of the inputs on outputs or behavioral and other changes.[27]

Methods for Rating the Comprehensiveness of Tobacco Control Laws

The methods used in the ASSIST evaluation for rating state tobacco control laws have been published in detail.[11,21] This section summarizes those methods and their limitations and presents an additional approach used in the evaluation for adding a local-level component to the system for rating state clean indoor air legislation.

Rating State Tobacco Control Laws

In 1995, NCI convened a technical advisory committee composed of governmental and nongovernmental tobacco control specialists to develop a system for rating state tobacco control laws in the SCLD. With this effort, the NCI program personnel and the ASSIST evaluation team hoped to create a tool to monitor changes in tobacco control policy in all states.

The rating system developed by the committee included information on state laws only; executive orders, regulations, and nongovernmental policies were not captured in the system. In one instance (Maryland, 1995–99), proxy scores were used to complete categories of a state clean indoor air rating for which a narrower statutory provision connoted a broad restriction upheld by the state's highest court in regulation form. The committee recognized that providing data on state laws alone would not reflect overall tobacco control policy for states. Nevertheless, a tracking system for state laws had the benefit of providing consistent, reliable data on a critical component of state tobacco

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Rating System for State Laws

- The system has two policy areas: clean indoor air and youth access.
- In each policy area, nine legislative items are rated.
- Four or five decision criteria rate the extensiveness of each item.
- Within each policy area, the sum of the individual ratings for each of the nine items is the summary score assigned to the legislative (policy) area for the specified state.

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control policy, and such data were viewed as a potentially valuable research tool.

To identify the variables to include in the rating system, the committee reviewed major provisions of state laws, ASSIST policy priorities,[28,29] and reports of scientific research. The committee identified nine legislative items to rate in the youth access and the clean indoor air legislative areas (tables 3.1 and 3.2). For the youth access area, six items specifically address restrictions aimed at limiting minors' access to tobacco products, and three items emphasize the importance of enforcement efforts. Similarly, for the clean indoor air area, seven legislative items address specific location restrictions that can affect a large number of persons, and two items address enforcement of the location restriction laws. The ratings reflect the cumulation of each state's law over time, so that all amendments to and repeals of the law are incorporated in the annual scores.

Decision criteria are applied to each legislative item to determine its rating by number of points. The item is described according to four or five criteria representing possible levels of requirements

Table 3.1. Target Criteria Rated with 4 Points for Items in the Youth Access Policy Area

Item		Target criteria rated with 4 points
1	Minimum age	Prohibits the sale or distribution of any tobacco products to persons under 18 years of age through any sales or distribution outlet, and a warning sign is required at point of purchase with specific penalty for failing to post a sign
2	Packaging	Prohibits all cigarette sales other than in a sealed package conforming to federal labeling requirements
3	Clerk intervention	Prohibits access to or purchase of tobacco products without the intervention of a sales clerk
4	Photographic identification	Requires merchants to request photographic identification for people who appear to be under 21 years of age
5	Vending machines	Total ban on sale of all tobacco products through vending machines in all locations
6	Free distribution	Total ban on distribution of free tobacco samples, coupons for free samples, or rebates
7	Graduated penalties	Establishes a system of graduated penalties or fines applicable to all youth access laws, to be levied within 3 years, plus possibility of suspension or revocation of a required tobacco retail license for repeated sales to minors
8	Random inspections	Establishes random, unannounced inspections of retailers as part of the enforcement mechanism, using underage buyers for the purpose of identifying violators, and does not prohibit other use of minors to test compliance
9	Statewide enforcement	Establishes a clearly designated statewide enforcement authority for sales

Source: Alciati, M. H., M. Frosh, S. B. Green, R. C. Brownson, P. H. Fisher, R. Hobart, A. Roman, R. C. Sciandra, and D. M. Shelton. 1998. State laws on youth access to tobacco in the United States: Measuring their extensiveness with a new rating system. *Tobacco Control* 7:345–52. Reproduced with permission of the BMJ Publishing Group.

in the item. In each instance, a score of four points reflects the target score from a public health policy perspective. For example, for a law in the area of clean indoor air, the first item applies to government workplaces, and the target criterion is that 100% of government worksites are 100% smoke free. An additional point is assigned if the law specifies that government worksites and grounds are 100% smoke free. The five decision criteria for government worksites describe incrementally the requirements in the law that will lead to that outcome and have rating points from 0 to 5 accordingly. The more comprehensive the requirement, the more points are assigned. See sidebar for an example of the decision criteria for ratings.

The criteria used for rating the youth access and clean indoor air areas were devised to depict the degree of comprehensiveness and stringency of the provisions in the laws. The highest rating for some items is +5, for others the rating is +4, and it describes an ideal situation, usually with tobacco restrictions and population coverage at 100%. The

Table 3.2. Target Criteria Rated with 4 Points for Items in the Clean Indoor Air Policy Area

Item		Target criteria rated with 4 points
1	Government worksites	Government worksites are 100% smoke free, no exemptions
2	Private worksites	Private worksites are 100% smoke free, no exemptions
3	Schools	No smoking permitted in schools during school hours or while school activities are being conducted
4	Childcare facilities	No smoking permitted during operating hours in childcare facilities (explicitly including licensed home-based facilities)
5	Restaurants	Restaurants (explicitly including bar areas of restaurants) are 100% smoke free
6	Retail stores	Retail stores or retail businesses open to the public are 100% smoke free
7	Recreational/cultural facilities	Recreational and cultural facilities are 100% smoke free
8	Penalties	Penalties or fines, applicable to smokers and to proprietors/employers, for any violation of clean indoor air legislation
9	Enforcement	Enforcement authority designated for clean indoor air legislation, and sign posting is required

Source: Chriqui, J. F., M. Frosh, R. C. Brownson, D. M. Shelton, R. C. Sciandra, R. Hobart, P. H. Fisher, R. el Arculli, and M. H. Alciati. 2002. Application of a rating system to state clean indoor air laws (USA). *Tobacco Control* 11 (1): 26–34. Reproduced with permission of the BMJ Publishing Group.

descending criteria reflect where on the per-item rating scale the provisions qualify in relation to the ideal. The criteria also take into account features of the laws that narrow their application—for example, exclusions or explicit exemptions. For each item, if a state law preempts stronger local ordinances, the rating for the specific item is reduced by 2 (–2) points (with a minimum score of 0 on each item).

A summary score, which is the measure of the comprehensiveness of the laws, is calculated for the legislative area for a state by adding the rating points for all nine items for the area. For calculating the summary score, individual items are considered of equal weight across the rating area. For example, for calculation of a summary score for clean indoor air, restrictions on government or private worksites are weighted equally with restrictions on retail stores.

The maximum possible summary score is 39 points for the youth access area and 42 points for the clean indoor air area. Because of the –2-point penalty for an item that is preempted, the summary score for each policy area could be reduced by up to 18 points. The rating reduction for preemption was recognized from the outset as a heavy penalty. However, the committee deemed it important to identify the specific items that included preemptions rather than to create a separate or 10th item to account for preemption because it would be impossible to then account for how many individual items were affected by preemption.

Item 1: Government worksites are 100% smoke free.

Points **Decision Criteria**

+5   100% of government worksites and grounds (or a specified distance from entries/exits) are smoke free, no exemptions

+4   Government worksites are 100% smoke free, no exemptions

+3   No smoking permitted in government worksites unless restricted to enclosed, separately ventilated designated smoking areas or government worksites are 100% smoke free, with a minimal exemption, for example, worksites with five or fewer employees, privately enclosed offices used exclusively by smokers, or other narrow exemption (for example, based on smoker density)

+2   Smoking in government worksites restricted to designated smoking areas that are separate and enclosed or to enclosed, separately ventilated designated smoking areas, with a minimal exemption

+1   Smoking in government worksites restricted only to designated smoking areas; or to designated smoking areas that are separate and enclosed, with a minimal exemption; or any stricter requirement that applies to some but not all types of worksites (for example, warehouses exempted) and/or includes more than a minimal exemption

0   No restrictions, or requirement(s) that smoking be permitted

Source: Chriqui, J. F., M. Frosh, R. C. Brownson, D. M. Shelton, R. C. Sciandra, R. Hobart, P. H. Fisher, R. El Arculli, and M. H. Alciati. 2002. Application of a rating system to state clean indoor air laws (USA). *Tobacco Control* 11 (1): 26–34. Reproduced with permission of the BMJ Publishing Group.

The Rating Process in Detail

The following equations help to illustrate the rating process and the effect of the preemption reduction on the individual item ratings and summary scores for a given state, s, at time t. In these equations, S_{st} represents the summary score for state s at time t across each of the nine items; S_{stp} represents the state summary score with the preemption reduction; p represents the 2-point preemption reduction applied to each item, i, as appropriate; and i_{xst} represents each of the nine items (denoted by x) in both the youth access and clean indoor air areas for a given state, s, at time t.

The state summary score without the preemption reduction is calculated as follows:

$$S_{st} = i_{1st} + i_{2st} + i_{3st} + i_{4st} + i_{5st} + i_{6st} + i_{7st} + i_{8st} + i_{9st} \tag{3.1}$$
$$12 = 4 + 4 + 4 + 0 + 0 + 0 + 0 + 0 + 0.$$

The state summary score with the preemption reduction is calculated as follows:

$$S_{stp} = (i_{1st} - p) + (i_{2st} - p) + (i_{3st} - p) + (i_{4st} - p) + (i_{5st} - p) +$$
$$(i_{6st} - p) + (i_{7st} - p) + (i_{8st} - p) + (i_{9st} - p) \tag{3.2}$$
$$6 = (4 - 2) + (4 - 2) + (4 - 2) + 0 + 0 + 0 + 0 + 0 + 0.$$

Limitations

As developed in 1995, the rating system included state laws only: reliable sources for data on executive orders, regulations, and nongovernmental policies were too limited for inclusion at

that time. (In the instance of Maryland's scores for 1995 through 1999, proxy scores were used to complete categories of the state clean indoor air rating for which a narrower statutory provision connoted a broad restriction upheld by the state's highest court in regulation form.) State laws alone could not reflect overall tobacco control policy for states; nevertheless, the system has the benefit of providing consistent, reliable data on a critical component of state tobacco control policy.

Moreover, the state rating system was not designed as a stand-alone measure; rather, it was intended to serve with other variables as a measure of a state's overall tobacco control policy on initial and long-term outcomes. The limitations of the system and the decision rules applied in its creation should be considered in light of this goal. An assessment of the effect of the state youth access laws on youth smoking behavior has been published.[30] Data on the effect of clean indoor air laws[11] as part of the IOI are presented in chapter 4 of this monograph.

The rating system was not intended to produce predictive scales for measuring the effect of laws on behavioral and other outcomes. Rather it was intended to evaluate the extent to which state laws met specified health policy goals and to document changes in those laws over time. For these reasons, no attempt was made to give different weights to individual items within the rating scale. Analyses to test the construct validity, which might be appropriate for psychological and behavioral research, were not applicable here for a number of reasons.

These reasons are related not only to the obvious limitations of the sample size (fixed at 51), but also to the nature of the data involved. Any attempt to relate extensiveness of the laws to subsequent tobacco consumption would require adjustments for other variables, in addition to information about changes in laws and tobacco consumption over time. Many potentially mediating variables are relevant here, including the implementation and enforcement of state laws. It was anticipated that the usefulness of the rating system would be tested in its application as a covariate or intervening variable in subsequent research. For further discussion of such variables, see chapter 5 on state facilitating conditions.

Rating Local Tobacco Control Laws— The Case of Clean Indoor Air

Recognizing the importance of local policy activity related to clean indoor air, a working group of the ASSIST Evaluation Technical Expert Panel was convened to adapt the state clean indoor air rating method for use in measuring local clean indoor air ordinances. To adapt the method, the working group first needed to identify the best available source of information on local tobacco control ordinances as a basis for understanding the extent to which a local rating method could be developed. Local ordinance data available as of the end of 1998 (the most recent data available at the time of the ASSIST evaluation) were obtained from the ANRF for this purpose. The ANRF data were deemed to be the best available source of local ordinance tobacco data across the states at the time; however, the data were not entirely

complete because of difficulties in collecting ordinance information from local governments. Therefore, the working group decided to use the ANRF data as a proxy for local ordinances in the states.

The local rating criteria and points were devised to correspond, to the extent possible, with the state rating categories and points. Limitations in the ANRF data precluded rating four of the nine items in the state method. Accordingly, the following five items were used to rate the local ordinances:

1. Private worksites
2. Restaurants
3. Recreational and cultural facilities
4. Enforcement
5. Penalties

The categories of government worksites, schools, childcare facilities, and retail stores were omitted.

Each community received a rating for each of the five items. The summary score for the legislative area (clean indoor air) for a community was the sum of the five per-item scores. A series of comparisons were made to adjust the local scores for each community on each of the five provisions to reflect whether the local score was greater than (equation 3.3), less than (equation 3.4), or the same as (equations 3.5 and 3.6) the state score.

In the following equations, i_{xst} represents the per-item (x) score for state s at time t; i_{xlot} represents the per-item score for the individual local community lo at time t; ai_{xlot} represents the adjusted per-item score for the individual community lo at time t. If a local score equaled a state score, the local community was

given 0.5 points to indicate that the local community's ordinance was at least as strong as the state's ordinance (equation 3.5).

When the local item is stronger than the state item,

$$i_{xlot} > i_{xst} \rightarrow ai_{xlot} = i_{xlot} - i_{xst} \quad (3.3)$$

When the local item is weaker than the state item,

$$i_{xlot} < i_{xst} \rightarrow ai_{xlot} = 0 \quad (3.4)$$

When the local item is as strong as the state item,

$$i_{xlot} = i_{xst} \rightarrow ai_{xlot} = 0.5 \quad (3.5)$$

When the local item and the state item both equal 0,

$$i_{xlot} = 0; i_{xst} = 0 \rightarrow ai_{xlot} = 0 \quad (3.6)$$

Separate adjusted local item scores were created for each community represented in the data set. Once the adjusted local per-item scores were computed, each score was then weighted by the percentage of the state's population (*perpop*) represented in the community (equation 3.7):

Weighted adjusted local per-item
$$\text{score} = ai_{xlot} \times perpop_{lo} \quad (3.7)$$

Population estimates as of July 1, 1996, were used as a proxy for the median community-level population across the years of interest for the ratings. The population estimates were obtained from the U.S. Census Bureau.[31] To account for possible jurisdictional overlap, the population figures for a county accounted only for the unincorporated portions of the county. For example, the population of the city of Rockville, an

incorporated city within Montgomery County, Maryland, was not included in the county's population score.

The weighted adjusted local per-item ratings were used to calculate the summary scores for each community within a state, and those were then summed to create a total local rating for each state. The combined state+local score per item was calculated by adding the state legislative rating score (incorporating the preemption reduction) to the state's local rating for each year, 1993 through 1998.

Challenges in Developing the Local Rating System

Developing the local legislative rating methodology presented three unique challenges. First, at the time of the ASSIST evaluation there was no central repository to which local governments sent information about the tobacco control measures they had passed. Instead, ANRF tracks and collects information on local tobacco control policy activity, and this database was used as a proxy measure of local ordinance activity.

Second, local ordinances, in and of themselves, must be examined within their appropriate jurisdictional contexts. In other words, if a county has an ordinance that restricts smoking in restaurants to separately enclosed areas and a city within the county has an ordinance requiring that the separately enclosed areas also contain separate ventilation, which ordinance would apply to restaurants in the city? From our legal research to resolve this issue, we determined that the predominant scheme emerging in regard to jurisdictional hierarchy is that of a dominant municipality whereby incorporated areas are accorded jurisdictional precedence limited only by state law in a given policy area. In other words, incorporated cities' ordinances take precedence over county ordinances (when the city is incorporated within the county).

Third, we had to account for the fact that, in many instances, state law preempts stronger local laws. To account for this when creating a combined state+local rating measure, we used the state clean indoor air score that incorporated the preemption reduction plus the local score, which was weighted for the percentage of the population covered by the local ordinances. The working group chose not to exclude those ordinance provisions that might have been preempted because excluding them would have counted the preemption effect twice: The state score had already been reduced by two points for each preempted item. In addition, the state scores that incorporate the preemption reduction were used to account for the effect of preemption on the state's ability to encourage policy making and enforcement. An alternative approach to account for the preemption effect would have been to use the state scores without the preemption reduction and then to omit local scores for items that had been preempted by state law. The working group decided against the latter approach because the local ordinance information was proxy data and the local scores, in and of themselves, might not accurately capture the preemption effect.

State and State+Local Rating Results

The following discussion summarizes the results of the state ratings as well as the results of the state+local clean indoor air ratings.* In all instances, the overall summary scores were low and indicated that the states (and localities in the case of clean indoor air) were far from meeting key public health targets in the youth access and clean indoor air topic areas. These results have been published in detail.[10,11,21]

Youth Access Ratings

The summary scores for youth access legislation increased over time (table 3.3). Without the preemption reduction, the youth access summary ratings ranged from 0 to 26 points for 1993 and from 0 to 30 points for 1999. With the preemption reduction applied, the scores ranged from 0 to 18 points for 1993 and from 0 to 30 points for 1999. The states with the highest summary scores for 1997 through 1999 did not include any preemptive provisions in their laws.

The mean youth access summary score without the preemption reduction increased by more than 7 points for 1993 through 1999. With the preemption reduction applied, the mean youth access summary rating increased only 4.37 points. As table 3.3 and figure 3.1 show, an increasing number of state laws preempted local youth access provisions in the later years. This finding is consistent with other studies on the prevalence of state youth access preemption provisions during the 1990s.[15,17]

Clean Indoor Air Ratings

The change in summary scores over time was smaller for clean indoor air

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*Individual state scores for clean indoor air and youth access are presented in chapter 4.

Table 3.3. Summary Scores for Youth Access Legislation, All States, 1993–99

Score	1993	1994	1995	1996	1997	1998	1999
Score reduced for preemption							
Low	0	2	1	1	2	3	3
High	18	21	21	21	29	30	30
Mean	7.20	7.94	8.16	9.06	10.96	11.24	11.57
SD	4.03	4.39	4.48	4.77	6.29	6.71	6.57
Score not reduced for preemption							
Low	0	3	3	3	3	3	3
High	26	26	26	26	29	30	30
Mean	8.35	10.22	10.80	12.16	14.39	15.08	15.59
SD	4.99	5.80	5.93	5.85	6.15	6.23	6.25

Note: The maximum possible score is 39 points.

Figure 3.1. Mean Youth Access Summary Scores by Year and Preemption Status
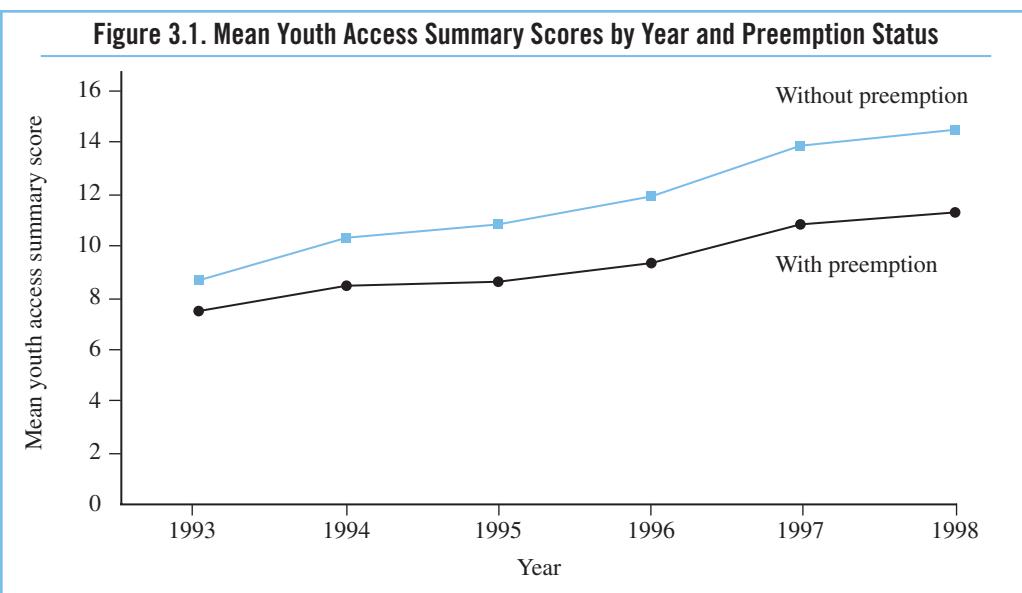
Table 3.4. Summary Scores for State Clean Indoor Air by Preemption Score Adjustment and Year, All States, 1993–99
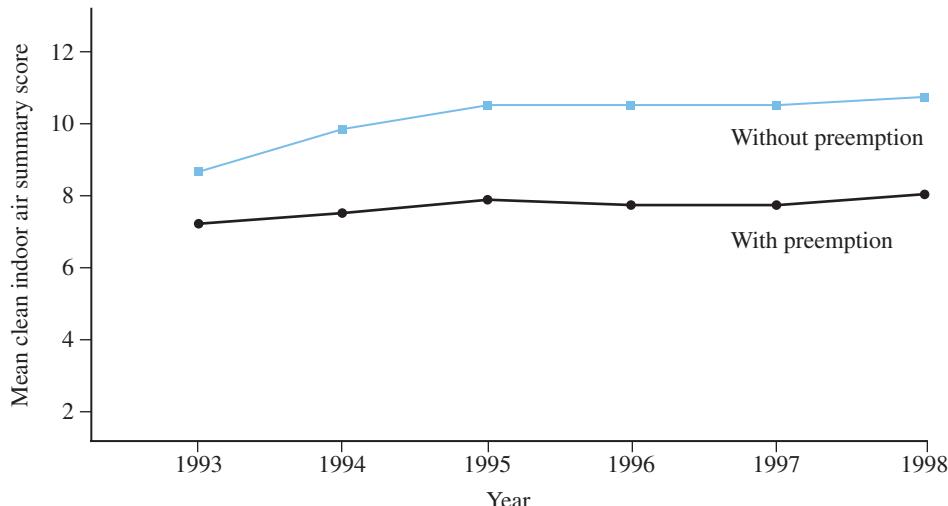
Score	1993	1994	1995	1996	1997	1998	1999
Score reduced for preemption							
Low	0	0	0	0	0	0	0
High	18	19	23	23	23	23	23
Mean	7.16	7.43	7.86	7.71	7.71	7.84	8.02
SD	5.54	5.45	5.92	5.94	5.94	5.98	6.02
Score not reduced for preemption							
Low	0	0	0	0	0	0	0
High	20	31	31	31	31	31	31
Mean	8.71	10.02	10.67	10.67	10.67	10.80	10.98
SD	5.18	6.06	6.11	6.11	6.11	6.08	6.03

Note: The maximum score is 42 points.

than for youth access (table 3.4). The high scores (both with and without the preemption reduction) did not change after 1995. Without the preemption reduction, the scores ranged from 0 to 20 points for 1993 and from 0 to 31 points for 1999. With the preemption reduction applied, the scores ranged from 0 to 18 points for 1993 and from 0 to 23 points for 1999.

The mean summary scores without the preemption reduction did not change

Figure 3.2. Mean Clean Indoor Air Summary Scores by Year and Preemption Status

between 1995 and 1997, and the mean scores with the preemption reduction decreased from 1995 to 1996 and remained the same through 1997. In both cases, the difference between the mean scores remained stable at 2.96 points for 1996 through 1999 (figure 3.2). Thus, the clean indoor air summary scores were continuously affected by preemption during the 1990s.

State+Local Clean Indoor Air Ratings

As noted above, for the purpose of the ASSIST evaluation, a measure was constructed that could be used to examine the combined effect of state+local laws on initial and later outcomes. Also, the data for this analysis covered 1993 through 1998 and reflect the state clean indoor air score (with preemption) plus the additional local score weighted for the percentage of the population covered by the local ordinances.

A comparison of the summary scores for the state+local clean indoor air legislation for 1993 through 1998 (table 3.5) with the state clean indoor air scores with preemption (table 3.4) shows that, for the most part, the addition of the local score increased the clean indoor air rating over time. The addition of the local ratings to the state ratings increased the mean total scores consistently over time from 0.55 points for 1993 to 0.77 points for 1997, but the mean scores decreased between 1997 and 1998 to 0.62 points (tables 3.4 and 3.5). The variance in the scores (as measured by the standard deviation) also decreased with the addition of the local scores. By the end of 1998, the means of the combined scores for states with preemption increased by .9 points, but the combined scores continued to reveal how far both states and localities were from meeting tobacco control

policy targets in restricting exposure to environmental tobacco smoke.

Not accounting for other state conditions or factors, the scores for ASSIST state state+local clean indoor air scores were greater than the scores for non-ASSIST states (table 3.6). Across all years, minimum and mean scores were greater for the ASSIST states than for the non-ASSIST states and indicated that the ASSIST states may have started out with stronger laws. Although the highest

score among the non-ASSIST states was greater than for any of the ASSIST states, the deviation between the scores within the ASSIST group was smaller and possibly indicated that local governments were more active in the ASSIST states than in the non-ASSIST states. (See chapter 4 for a further discussion of the adjustments that were made to the state+local scores for inclusion in the ASSIST IOI, and for a discussion of the significance of the scores by ASSIST state status.)

Table 3.5. State+Local Clean Indoor Air Summary Scores by Year, 1993–98

Score	1993	1994	1995	1996	1997	1998
Low	0	0	0	0	0	0
High[a]	18.00	19.98	24.10	24.10	24.10	24.10
Mean	7.71	8.08	8.55	8.43	8.48	8.64
SD	5.32	5.19	5.73	5.77	5.80	5.83

Note: The maximum score is 42 points. The state score reflects the state score adjusted for preemption.
[a]Maryland was the outlier in all years, due to passage of the Maryland Occupational and Safety Health (MOSH) regulation prohibiting workplace smoking, along with the lack of preemption legislation.

Table 3.6. State+Local Summary Scores for Clean Indoor Air for ASSIST and Non-ASSIST States, 1993–98

Score	1993	1994	1995	1996	1997	1998
Non-ASSIST						
Low	0	0	0	0	0	0
High	18.00	18.00	24.10	24.10	24.10	24.10
Mean	6.80	6.95	7.59	7.60	7.66	7.68
SD	5.49	5.05	5.99	5.99	6.04	6.06
ASSIST						
Low	1.86	3.57	3.44	3.06	3.06	3.06
High	16.33	19.98	20.18	20.39	20.47	20.31
Mean	9.54	10.32	10.47	10.07	10.13	10.56
SD	4.58	4.83	4.75	5.07	5.06	4.96

Note: The maximum score is 42 points.

Summary

Tobacco use prevention and control are public health issues that have been addressed by federal, state, and local governments through laws and other policy instruments, and longitudinal monitoring of policy and legislative changes is fundamental to tobacco control. Enactment of tobacco control laws, however, establishes only a framework for preventing and controlling tobacco use. Enforcement of these laws is equally—if not more—challenging than getting the laws passed.

Tobacco control policies are also accomplished through means other than state laws. While there is no comprehensive database for the various inputs involved, there are some data that move in this direction—for example, data on trends in smoking policies for workers and occupations due to mandated and voluntary actions[32] and data on hospital-based smoking bans.[33] In addition, there is a need for data on intermediate indicators related to tobacco control policies and laws, specifically, changes in knowledge of health consequences and knowledge of codified laws.[34]

Former U.S. Surgeon General Satcher characterized data monitoring and analysis as critical public health tools.[20] In line with the former surgeon general's global thinking on this issue, a worldwide tracking system of comprehensive measures for change in tobacco control policy would be an invaluable tool. Current databases that capture state (and local) tobacco control legislation in the United States can help lay the groundwork for such an effort.

The ASSIST evaluation used data from NCI's SCLD (www.scld-nci.net) for state youth access and clean indoor air laws. NCI's SCLD program has monitored state tobacco control laws since 1993 and makes data available to the research and public health communities. In addition, the *SCLD Updates Index*, a searchable quarterly summary of a wide range of cancer-related legislation, provides current information on tobacco laws. Information on tobacco-related state legislation is also available from three other sources:

- The State Tobacco Activities Tracking and Evaluation System (STATE; http://apps.nccd.cdc.gov/statesystem), is a CDC database that monitors state tobacco control laws and executive orders.
- State Legislated Actions on Tobacco Issues (SLATI) of the American Lung Association (www.lungusa.org) is an advocacy-based reporting service on state tobacco control measures.
- The Campaign for Tobacco-Free Kids (www.tobaccofreekids.org) is a nonprofit, nongovernment initiative that provides tobacco control-related information such as state and federal tobacco tax rates, and the current status of tobacco-relevant legislation.

A number of state legislatures have searchable data on tobacco control laws available on their Web sites; however, the state legislative information available varies greatly by state in terms of the frequency of updating. In addition, the state legislatures often note that the material provided on the Web site does not reflect an "official" version of the law and that

it must be obtained from hard copy volumes produced by the legislature.

For legislation on local clean indoor air, the ASSIST evaluation used the database of the ANRF (www.no-smoke.org), a nonprofit organization that has tracked local tobacco control ordinances and health regulations since 1985. Some state and local governments and research organizations, such as the Robert Wood Johnson Foundation-supported ImpacTeen project (www.impacteen.org) at the University of Illinois at Chicago, also collect local tobacco control ordinance information for use in research and policy efforts. Given the difficulty of monitoring legislative changes at the local level, developing a coordinated and comprehensive approach to collecting data will be important.

Uniform data on local tobacco control laws are more difficult to collect and analyze than state laws, but the complement of state+local data offers considerable potential for refining and specifying changes in tobacco control policy nationwide. As local tobacco policy information becomes more readily available, new measures will be needed that can be used to evaluate the effect of policy on initial and later behavioral outcomes. Tools such as the IOI can be applied more extensively to tobacco control measures once more data are available.

Finally, researchers face both the opportunity and the challenge of linking data and data analyses of governmental action on tobacco use prevention and control to other relevant data sets. The ASSIST evaluation broke new ground in measuring policy outcomes with the IOI, which includes state and local clean indoor air scores and other variables. Research that builds on available and new measurement tools will have important benefits for long-term tobacco control. Some researchers are already using tobacco control policy markers for research in this promising direction.[24,30]

Conclusions

1. As part of the ASSIST evaluation, a measure of legislative changes was developed in two areas: youth access to tobacco products and clean indoor air. The resulting clean indoor air score became a component of the Initial Outcomes Index used in the overall analysis.

2. The methodology for the measurement of legislative policy change involved a rating scale applied to nine target criteria within each policy area, based on state-level data compiled from the National Cancer Institute's State Cancer Legislative Database and aggregated local data from the American Nonsmokers' Rights Foundation. Penalty values were applied to states with preemption laws, while population-adjusted incremental values were added in cases where stronger local laws existed.

3. Target criteria for youth access to tobacco included minimum age, packaging, clerk intervention, photographic identification, vending machines, free distribution, graduated penalties, random inspections, and statewide enforcement. Target criteria for clean

indoor air included government worksites, private worksites, schools, childcare facilities, restaurants, retail stores, recreational/cultural facilities, penalties, and enforcement.

4. During the period of study from 1993 to 1999, mean summary scores for youth access legislation increased 4.37 points from 7.20 to 11.57 when adjusted for preemption, and 7.24 points from 8.35 to 15.59 without this adjustment. Similarly, mean summary scores for clean indoor air legislation increased 0.86 points from 7.16 to 8.02 when adjusted for pre-emption, and 2.27 points from 8.71 to 10.98 without this adjustment.

5. Beyond the immediate use as outcome metrics within the ASSIST evaluation, this effort was a valuable test case for the quantitative measurement of legislative policy outcomes for a broad range of future tobacco use prevention and control issues.

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Chapter 4. Initial Outcomes Index

Elizabeth A. Gilpin, Anne M. Hartman, and Frances A. Stillman

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Tables and Figures

4. Initial Outcomes Index

Some outcomes of a tobacco control program, such as tobacco use prevalence, may become clear only over a period of many years. Therefore, initial and intermediate outcome measures, which in turn can be related to final outcomes such as smoking prevalence, represent an important tool for program evaluation. This chapter discusses criteria for measurement of initial and intermediate outcomes from tobacco control programs, the development of a specific metric (the Initial Outcomes Index; IOI) for the American Stop Smoking Intervention Study (ASSIST) evaluation, and the IOI's association with final outcomes such as tobacco use prevalence and consumption.

The IOI was formed from three initial outcomes, each of which was significantly correlated with reduced prevalence and consumption levels at baseline in 1993: total cigarette price, a rating of local and state clean indoor air policies, and the percentage of workers covered by 100% smoke-free workplaces. The IOI index value was formed from equal weightings of these three factors, normalized at baseline, because the results of a principal components analysis showed very similar loadings.

Over the period of study from 1992 through 1999, 65% of ASSIST states showed an increase in IOI greater than the mean for all states, versus only 32% of non-ASSIST states. In a comparison of IOI results with final outcomes, IOI showed a significant association with prevalence and consumption levels throughout the study period, whereas the only IOI factor that showed a significant association between changes over time and changes in outcomes was a strong relationship between cigarette price and per capita consumption. Nonetheless, the data produced from this evaluation serve as an important baseline for future efforts to track initial outcomes that relate tobacco control program effects to long-term outcomes.

Introduction

This chapter discusses the process of defining initial outcomes for ASSIST and the criteria used to ultimately define the IOI used in the ASSIST evaluation analysis.[1] As discussed in more detail in chapter 9, part of this analysis examined the relationship between these initial outcomes and other evaluation metrics as well as final outcomes such as tobacco prevalence and per capita consumption. This IOI was designed to serve as a near-term measure for the effectiveness of ASSIST interventions.

In an effective tobacco control program, it is reasonable to expect that early, or initial, outcomes of the interventions would relate to later outcomes, usually defined as declines in tobacco use. However, changing the smoking behavior of a population does not necessarily occur immediately subsequent to a tobacco control program. For

example, increased tobacco taxes are associated with decreased experimental and established smoking among youth,[2] but this effect would not be reflected in smoking prevalence rates for several years. Therefore, policy makers need more proximal measures of program effects to protect and advocate for program funding as well as to evaluate program progress. This chapter explains the concept and importance of measuring initial outcomes and presents criteria for evaluators to consider in defining and selecting those outcomes in their evaluations of program effects, followed by a discussion of the specific initial outcomes selected for the ASSIST evaluation.

For ASSIST, the units of observation for these outcomes were the 50 states of the United States and the District of Columbia. Because only 51 units of observation were available for the ASSIST evaluation, for statistical purposes it was necessary to combine the selected initial outcomes into a single measure, the IOI. The methodology for constructing the ASSIST IOI and its relation to the measures describing the ASSIST final outcomes (reduced adult smoking prevalence and lower adult cigarette consumption rates) are described below. Data for each initial outcome are also described and tabulated.

Tobacco Use Outcome Measures

The two most widely used and generally accepted indicators of population tobacco use are smoking prevalence and per capita cigarette consumption.[3] These measures are used in this chapter and in chapter 9, which provides a comprehensive analysis of final outcomes as part of the evaluation of the ASSIST intervention. This section gives a brief description of the data sources for these measures as used in the ASSIST evaluation.

Adult Smoking Prevalence

Adult (18 years old and older) smoking prevalence estimates for each state and for the District of Columbia were obtained from the Tobacco Use Supplement to the Current Population Survey (TUS-CPS).[4] The baseline prevalence estimates were from the September 1992, January 1993, and May 1993 TUS-CPS, and the estimates at the end of the intervention period were from the September 1998, January 1999, and May 1999 TUS-CPS.[4]

The CPS is a nationwide population survey (civilian, noninstitutionalized population, 15 years old and older) conducted continuously by the U.S. Bureau of the Census for labor force monitoring.[5] Briefly, the CPS includes a probability sample based on a stratified sampling scheme of clusters of four neighboring households identified from the most recent decennial census, updated building permits, and other sources. All strata are defined within state boundaries, and the sample is allocated among the states so that state-specific estimates can be computed. National Cancer Institute (NCI) staff developed the TUS, and trained Bureau of Census interviewers pretested it prior to its implementation.

For the TUS-CPS, all household members 15 years old and older are

asked to answer two questions that determine their current smoking status: (1) whether they have smoked at least 100 cigarettes in their entire life and (2) whether they now smoke cigarettes every day, some days, or not at all. To be considered a current smoker, respondents must answer *yes* to the first question and *every day* or *some days* to the second. If one or more household members are not present at the time of the initial household interview, they are called later and administered the TUS-CPS by telephone. Even so, not all household members answer the TUS-CPS. (The response rate is between 75% and 85%.) The answers on smoking status are obtained from a proxy respondent for each household member not present at the time of the household interview and are replaced with self-response data following the administration of the TUS-CPS. For the present analyses, both proxy and self-report data on smoking status were used. Smoking prevalence was computed as the percentage of all adult respondents who were identified as current smokers.

Per Capita Cigarette Consumption

Until late 1998 when it was disbanded, the Tobacco Institute compiled cigarette sales data monthly in each state for federal tax reporting purposes.[6] Since then, individuals from the institute formed a consulting firm, and now they produce the same data as part of the economic consulting firm Orzechowski and Walker, with support from the tobacco industry.[7] These data are reported annually (November 1 to October 31) to the Federal Trade Commission, which

publishes the new data each year along with those from past years.

As these data are from wholesale warehouse removals, there is considerable variation from one month to the next—in particular, the levels of removals in the last month of any quarter are strongly correlated with the removals in the first month of the next quarter. This variation has little to do with actual consumption and likely reflects business practice. To remove this source of variability, data were combined into two-month intervals with December/January, February/March, and so on treated as single intervals. To convert the sales data to per capita cigarette consumption, the mean number of packs removed from warehouses in a given interval was divided by the total population of adults aged 18 years old and older in each state at each bimonthly time point. Annual population totals are available from the U.S. Bureau of the Census,[8–10] and these were interpolated to obtain the population at given times (interval midpoints) during the year. For the analyses described in chapter 9, the bimonthly values were analyzed. For this chapter, generally the data were aggregated for the periods August/September through April/May to correspond to the period when adult smoking prevalence estimates were obtained from the TUS-CPS.

Although a decline in smoking prevalence is generally reflected in a decline in per capita cigarette consumption, the opposite may not occur. Current smokers could choose to smoke less instead of quitting, or new, younger smokers could reach adulthood with a lower level of

consumption than the level of consumption of smokers in previous cohorts. In these situations, prevalence would remain constant, but per capita consumption would decline.

Defining and Selecting Initial Outcomes

Once a tobacco control program is under way, early intervention strategies, if effective, should begin to foster societal changes that will ultimately result in lower smoking prevalence and per capita cigarette consumption. These two results are the final outcomes of the program, and they, in turn, will lead to reductions in smoking-related morbidity and mortality, the public health goals of tobacco control. Comprehensive tobacco control programs with appropriate monetary and human resources undertake a variety of efforts aimed at influencing the social environment, such as the following:

- Educating the public
- Advocating for the enactment of new legislation or policies
- Promoting smoking cessation through clinics and telephone helplines
- Advocating for increased enforcement of laws restricting smoking or restricting sales of tobacco products to minors
- Forming coalitions of advocates to conduct tobacco control efforts[11,12]

Although the effects of each of these efforts on smoking prevalence or cigarette consumption may not be known for years, early effects or reactions in the 0- to 2-year aftermath can be defined and tracked. These effects are initial outcomes. For example, an initial outcome may be the passage of a law that prohibits smoking in public buildings or the adoption by businesses of smoke-free workplace policies. These initial policy outcomes might lead directly to the final outcomes. (For example, a smoker in a smoke-free workplace might smoke less or quit altogether.) However, another outcome, an intermediate outcome, such as enforcement of the law or policy, might be necessary for the final outcome to occur. For example, unless clean indoor air policy is enforced, it may not have an effect on smoking behavior. Whether an outcome is initial or intermediate is usually determined from the strategic plan of the tobacco control program, which sets forth the specific tactics and outcomes expected from those tactics.

Initial and Intermediate Outcomes Versus Other Forces of Change

It is not always clear whether an outcome is an initial or an intermediate outcome or whether it is directly attributable to an intervention's specific activities or to a change that is already occurring in society. While it is generally easier to link an initial outcome to a specific intervention, the link for an intermediate outcome may be somewhat more difficult to establish. These points are illustrated in the examples below.

New legislation pertaining to restricting smoking in the workplace is clearly an initial outcome. However, increased levels of workers' reports of workplace smoking restrictions, more of an intermediate outcome, might come about through means other than just legislation.

Examples of Initial Outcomes

Examples of initial outcomes for the types of efforts mentioned in this section include the following:

- *Awareness of media campaigns.* Media campaigns are one tool that tobacco control programs can use to educate the public. Such campaigns have focused on the health risks that cigarette smoke poses both to smokers and to nonsmokers, especially children. Some campaigns have been primarily informational about the dangers of smoking; others have directly attacked the tobacco industry. A measurable initial outcome of such efforts could be the rate of recall that the public has of specific media campaigns, assessed through surveys. Another outcome might be the change in the population's smoking-related knowledge or attitudes.

- *News coverage.* Calling journalists' attention to important issues related to tobacco (e.g., newly documented adverse health effects, the benefits of new policy initiatives) is a strategy for encouraging the public and policy makers to support the enactment of tobacco control policies. A measurable initial outcome of these media advocacy efforts could be the number of published news stories and editorials that present the issue favorably to tobacco control. With resultant increased public support, an intermediate outcome might be passing legislation that has been associated with quitting smoking (e.g., clean indoor air laws) or better enforcement of current legislation.

- *Use of cessation assistance.* Many comprehensive programs offer smoking cessation assistance to smokers through local programs or statewide telephone helplines. A measurable initial outcome of these programs could be the number of individuals attending the cessation programs or calling the helpline.

- *Enforcement of laws forbidding sales to minors.* At the time a tobacco prevention and control program is implemented, a law might already be on the books that prohibits sales of tobacco to minors, but it is not being enforced. A strategy of the program might be to increase enforcement by working with the local agency that has responsibility for enforcement or to increase compliance by educating merchants about the law and the benefits of enforcing the law. A measure of the initial outcome of these efforts could be the results of sales checks in which minors attempt to buy cigarettes.

- *Formation of coalitions.* As soon as possible in the start-up of a community-based program, all members of the community—usually represented by organizations—who would have an interest in preventing and controlling tobacco use should be invited and involved in planning and conducting the strategies. The initial outcome is the formation of a coalition, which can be measured by the number of members and the type of community representation in the coalition.

For instance, some large corporations, subject to smoke-free workplace laws in some states, extend such policies to cover all of their facilities nationwide. Also, smoke-free policies in some locales are a result of health department regulation rather than legislation. Thus, workers' reports of a 100% smoke-free workplace might be a measure of the reach or strength of legislation or regulation, or the reports might reflect prevailing and expanding social norms.

A little further downstream from the initiation of a tobacco control policy, and more clearly an intermediate outcome, is the level of report of smoke-free homes. Increased population knowledge about the dangers of secondhand smoke would be the initial outcome result from a tobacco control program's media campaign (intervention) to educate the public about the dangers of secondhand smoke. Armed with this knowledge, people then may increasingly decide to restrict or

ban smoking altogether in their homes. However, tracking that decision to an intervention is not necessarily straightforward; other program elements, including workplace smoking restrictions, may have influenced or facilitated the decision to have a smoke-free home.

Thus, in selecting outcomes to measure, it is important that program planners and evaluators at least in theory be able to relate the activities of the intervention to the outcome to be measured and recognize that other factors might also bring about the initial or intermediate outcome of interest.

Criteria for Selecting Initial Outcomes in Evaluations of Tobacco Control Efforts

The four criteria for selecting initial outcomes to include in an evaluation are the following:

1. The outcome must be consistently measurable across all units of the evaluation and over time. While states are a logical unit for evaluation, a local government may also want to track its progress over time and institute surveillance systems for this purpose. Evaluating a particular tobacco control program over time, or comparing different tobacco control programs (e.g., states) at a given point in time, requires standardized means of collecting information and constructing the appropriate measures. If the nature of the measure (e.g., how data are gathered or reduced) changes even slightly, it will be impossible to determine whether any changes in the resulting values are from actual changes in the population or are simply an artifact of the new measure. One mechanism for gathering consistent and comprehensive data is a national population survey. With standard sampling plans and methodologies and a standard set of questions, population surveys can serve as a surveillance system for initial, intermediate, and final outcomes expected from a tobacco control program.

2. There must be sufficient variability in the measure across the units of observation and/or over time. If little variability exists, it would not be possible to meaningfully rank the units according to the level of the particular initial outcome. And if all units changed in lockstep, there would be no basis for comparing trends over time.

3. The initial outcome should be a potentially caused result of an intervention undertaken as part of a tobacco control program. For example, cigarette prices will increase if the legislature passes a new excise tax. Sales of cigarettes to minors should decline if enforcement of youth access laws is increased. In these examples, cigarette price and test-buy data are the initial outcomes. It is not always possible a priori to know how the initial outcomes will change over time. Change may occur so slowly that there is little to analyze, or so rapidly and in lockstep that attribution to the intervention is difficult. Evaluators should learn from the experiences of others regarding which initial outcomes might provide the best indicator of an intervention's effect.

4. Either preexisting evidence should indicate an association, or in its

absence there should be at least a potential link between the initial outcome and the ultimate outcomes. As an example, the level of media attention given to tobacco-related issues should raise public awareness and knowledge as well as influence policy makers. This in turn could influence social norms, which ultimately may discourage smoking initiation and increase smoking cessation, leading to reduced per capita cigarette consumption and smoking prevalence. However, the level of media attention may not actually correlate significantly with the level of per capita cigarette consumption or smoking prevalence until a number of years have passed. A lag would be expected between the initial outcome and its effect on smoking behavior.

Initial Outcomes Selected for the ASSIST Evaluation

For the evaluation of ASSIST, three initial outcomes were selected: (1) cigarette price (including tax), (2) rating of local and state clean indoor air policies, and (3) percentage of workers covered by 100% smoke-free workplaces. The discussion in this section focuses on the rationale for selecting the initial outcomes for the ASSIST evaluation, variability of the initial outcomes across the states (the unit of measure for the ASSIST evaluation), and the relation of the initial outcomes to the final outcomes. In addition to the criteria for selecting a useful initial outcome (described in the preceding section), the ASSIST evaluation required that

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ASSIST Policy Areas

Following the ASSIST framework, the 17 ASSIST states promoted interventions in four policy areas, expressed as objectives in the "ASSIST Program Guidelines for Tobacco-Free Communities":

Eliminate environmental tobacco smoke in all areas where others may face involuntary exposure and the serious health risks associated with inhalation of other people's tobacco smoke.

Eliminate all tobacco product advertising and promotion, other than point-of-sale and objective product information advertising.

Reduce access to and availability of tobacco products, particularly to persons under the legal age of purchase.

Reduce consumption of cigarettes and other tobacco products through price increases using increased taxes and other costs imposed on tobacco products.

Source: ASSIST Coordinating Center. 1991. Overview. ASSIST program guidelines for tobacco-free communities. Internal document, ASSIST Coordinating Center, Rockville, MD (p. 12).

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baseline data (just prior to the onset of the program) for each initial outcome measured be available at several points through the end of the program.

A central component of the ASSIST model is the use of policy to change physical environments and influence social norms that in turn help shape health-related behavior. To achieve these objectives, the ASSIST program guidelines required the states to implement interventions in four policy areas: clean indoor air, restricted tobacco advertising and promotion, reduced access to tobacco products by minors, and price

increases of tobacco products. The initial outcomes measured in the evaluation derive from these policy areas and interventions. However, because the actual initial outcomes to be monitored were not selected until after the ASSIST intervention began, appropriate data related to restriction of advertising and promotions and to reduced access to tobacco products were not included as part of the data collection at baseline. Thus, initial outcomes related to these two interventions could not be assessed.

Cigarette Price

The cost of a pack of cigarettes to the consumer reflects the selling price, federal and state excise taxes, and state and local sales taxes. Research has established that smokers are sensitive to the cost of cigarettes; smokers change the amount they purchase in accordance with the price they have to pay. Studies consistently estimate the adult price elasticity of demand[13] to be about –0.4. This means that for every 10% increase in cigarette prices, demand for cigarettes should fall by 4%.[14,15]

While the amount of state excise tax could also be considered an initial outcome, the ASSIST evaluation uses the total price of a pack of cigarettes because the tobacco industry sometimes temporarily changes the price of cigarettes to counteract a tax increase. It is the total cost of cigarettes to the consumer that affects consumption; therefore, price, not tax, was the initial outcome selected for the evaluation.

Because the ASSIST evaluation examined trends over time, the average cigarette price for each state and for each year was adjusted to the baseline period using the consumer price index. The adjusted prices are referred to as the "real" prices of cigarettes in each year.

Table 4.1 shows the real cigarette prices for each state from baseline to the end of the ASSIST program (as of November of each year). Considerable variability is apparent in the real price of cigarettes among the states in any given year. At baseline (1992–93), the price of cigarettes ranged from $1.53/pack in Kentucky to $2.32/pack in Hawaii. Over the course of ASSIST, many states raised their tobacco excise taxes, and the tobacco industry raised cigarette prices in 1998 after the Master Settlement Agreement was final. Thus, the average price per pack over all states increased from $1.90/pack at baseline to $2.15/pack at the end of the program (1998–99). The pack price decreased slightly over the ASSIST period in Minnesota but increased by $0.80 in Alaska.

The relationship between the real price of cigarettes at baseline and adult smoking prevalence[16] for each state is shown in figure 4.1 ($r = -.39$, $p < .01$). In this figure and in subsequent figures, it should be noted that values at the extremes can influence the magnitude of the correlation coefficients. However, even after omitting extreme values, the weaker correlations were still statistically different from zero ($p < .05$).
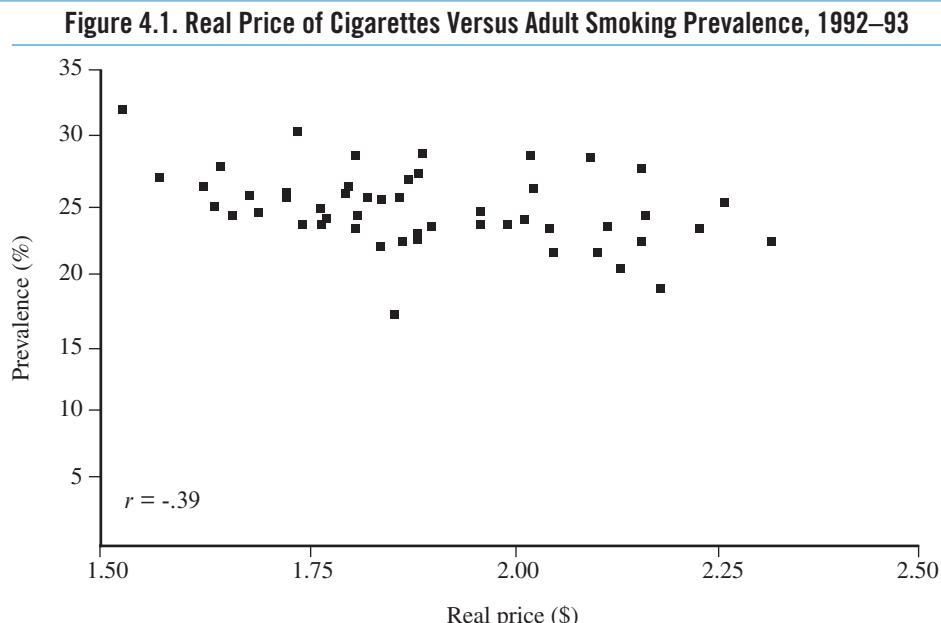
Figure 4.2 shows the correlations at baseline between real cigarette price and adult per capita cigarette consumption. The values for per capita cigarette consumption are the average of the

Table 4.1. Real Price of Cigarettes, 1992–99

(Shading indicates ASSIST states.)

State	1992–93	1993	1994	1995	1996	1997	1998	1998–99	Change
AK	2.161	1.963	1.918	1.969	1.929	2.617	2.845	2.963	0.802
AL	1.800	1.570	1.534	1.522	1.569	1.661	1.768	1.898	0.098
AR	1.892	1.731	1.670	1.622	1.703	1.730	1.883	2.002	0.110
AZ	1.887	1.662	1.628	2.019	2.096	2.132	2.284	2.394	0.507
CA	2.183	1.997	1.992	1.963	1.928	1.963	2.092	2.539	0.356
CO	1.661	1.497	1.564	1.571	1.569	1.637	1.773	1.901	0.240
CT	2.162	2.127	2.071	2.023	1.993	2.035	2.175	2.309	0.147
DC	2.233	2.210	2.237	2.281	2.190	2.207	2.330	2.448	0.215
DE	1.812	1.488	1.531	1.567	1.546	1.579	1.722	1.852	0.040
FL	2.018	1.775	1.746	1.768	1.742	1.787	1.985	2.104	0.086
GA	1.693	1.493	1.513	1.493	1.474	1.531	1.684	1.799	0.106
HI	2.318	2.190	2.263	2.224	2.265	2.382	2.724	2.843	0.525
IA	1.963	1.763	1.791	1.786	1.793	1.796	1.945	2.069	0.106
ID	1.767	1.549	1.634	1.719	1.740	1.728	1.916	2.029	0.262
IL	1.962	1.887	1.869	1.859	1.895	1.897	2.218	2.341	0.379
IN	1.646	1.511	1.470	1.443	1.478	1.540	1.728	1.851	0.205
KS	1.813	1.638	1.655	1.628	1.613	1.703	1.884	1.993	0.180
KY	1.526	1.376	1.360	1.369	1.391	1.451	1.651	1.758	0.232
LA	1.843	1.607	1.551	1.596	1.564	1.700	1.876	2.002	0.159
MA	2.053	1.963	2.054	2.016	2.308	2.392	2.572	2.689	0.636
MD	1.998	1.782	1.765	1.731	1.805	1.827	2.001	2.111	0.113
ME	2.025	1.850	1.866	1.834	1.810	2.050	2.456	2.543	0.518
MI	1.886	1.665	2.260	2.254	2.229	2.273	2.408	2.531	0.645
MN	2.263	2.044	2.050	2.053	2.076	2.062	2.105	2.243	–0.020
MO	1.625	1.493	1.489	1.545	1.533	1.593	1.780	1.884	0.259
MS	1.863	1.641	1.571	1.595	1.625	1.655	1.854	1.979	0.116
MT	1.746	1.479	1.480	1.453	1.483	1.546	1.704	1.808	0.062
NC	1.571	1.377	1.413	1.405	1.421	1.539	1.691	1.808	0.237
ND	1.868	1.868	1.815	1.795	1.854	1.914	2.054	2.187	0.319
NE	1.842	1.746	1.712	1.709	1.743	1.803	1.950	2.074	0.232
NH	1.769	1.542	1.561	1.562	1.589	1.736	1.935	2.057	0.288
NJ	2.137	1.905	1.903	1.911	1.858	1.950	2.511	2.624	0.487
NM	1.778	1.626	1.634	1.657	1.664	1.699	1.839	1.977	0.199
NV	2.099	1.987	1.937	1.927	1.903	1.882	2.082	2.222	0.123
NY	2.106	2.108	2.096	2.059	2.082	2.100	2.289	2.411	0.305
OH	1.726	1.556	1.558	1.554	1.572	1.603	1.764	1.886	0.160
OK	1.875	1.665	1.601	1.572	1.619	1.688	1.844	1.963	0.088
OR	1.887	1.744	1.806	1.768	1.778	2.063	2.243	2.346	0.459
PA	1.904	1.643	1.635	1.662	1.687	1.779	1.884	2.021	0.117
RI	2.049	1.768	2.130	2.130	2.087	2.187	2.342	2.462	0.413
SC	1.681	1.428	1.400	1.450	1.456	1.527	1.646	1.772	0.091
SD	1.825	1.568	1.601	1.651	1.697	1.769	1.875	1.989	0.164
TN	1.812	1.606	1.581	1.565	1.566	1.601	1.784	1.908	0.096
TX	2.120	1.864	1.876	1.857	1.815	1.893	2.075	2.189	0.069
UT	1.860	1.656	1.684	1.695	1.756	2.059	2.220	2.333	0.473
VA	1.725	1.598	1.567	1.544	1.499	1.491	1.665	1.784	0.059
VT	1.802	1.638	1.601	1.912	1.906	1.982	2.133	2.245	0.443
WA	2.167	2.285	2.294	2.435	2.538	2.561	2.654	2.780	0.613
WI	2.027	1.834	1.876	1.950	1.895	1.946	2.218	2.331	0.304
WV	1.739	1.555	1.579	1.541	1.537	1.605	1.775	1.874	0.135
WY	1.638	1.441	1.457	1.506	1.476	1.487	1.646	1.775	0.137
Overall									
Mean	1.898	1.725	1.742	1.759	1.771	1.850	2.029	2.155	0.257
SD	0.191	0.227	0.248	0.252	0.260	0.283	0.305	0.309	0.187
ASSIST									
Mean	1.890	1.736	1.803	1.812	1.826	1.891	2.085	2.204	0.313
SD	0.224	0.262	0.306	0.317	0.344	0.340	0.363	0.361	0.206
Non-ASSIST									
Mean	1.902	1.719	1.712	1.733	1.744	1.829	2.001	2.130	0.229
SD	0.176	0.211	0.212	0.214	0.206	0.253	0.273	0.281	0.173

Source: Orzechowski, W., and R. C. Walker. 2000. *The tax burden on tobacco: Historical compilation 1999.* Monthly state cigarette tax reports, Vol. 34. Arlington, VA: Orzechowski & Walker.

Figure 4.1. Real Price of Cigarettes Versus Adult Smoking Prevalence, 1992–93

Note: Smoking prevalence data are from U.S. Department of Commerce, Bureau of the Census. September 1992, January 1993, May 1993. *Tobacco Use Supplement to the Current Population Survey.* Washington, DC: U.S. Department of Commerce.
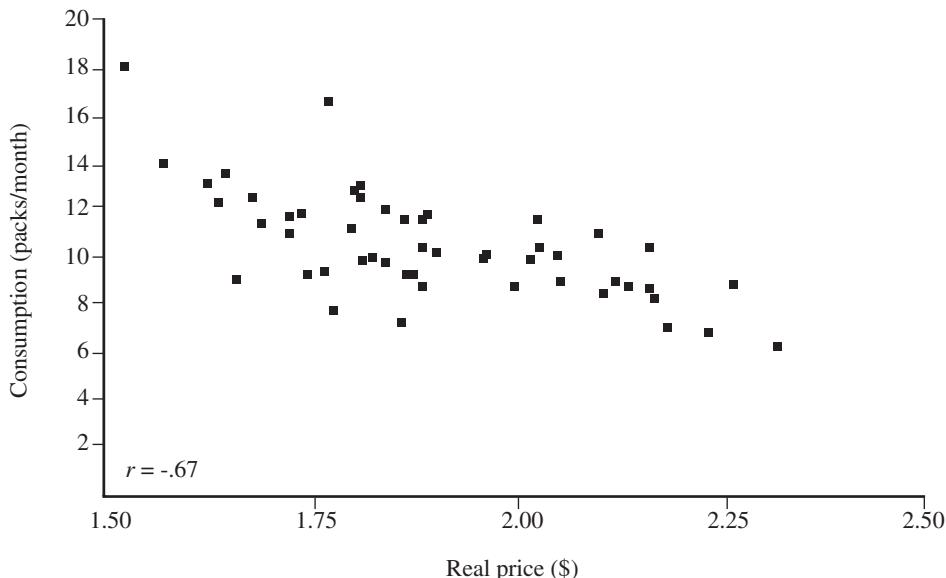
bimonthly values for the 10-month period from August/September 1992 through April/May 1993, which correspond to the same months for which prevalence was computed from the TUS-CPS. The correlation between the real price of cigarettes and per capita cigarette consumption was –.67 ($p < .0001$).

Strength of Clean Indoor Air Legislation

Public health concerns about the harmful effects of secondhand smoke and about the right of nonsmokers to breathe clean air have translated into community ordinances and state or local laws to protect nonsmokers.[17–20] Restrictions on smoking protect nonsmokers from secondhand smoke in government and private worksites, schools, childcare facilities, restaurants, retail stores, and recreational and cultural facilities.

The strength of the legislation is a score that reflects both the strictness and the coverage of clean air ordinances within each state and should reflect the success of advocacy efforts within each state. The score includes a preemption penalty and a further adjustment for local ordinance strength. (See chapter 3.) Table 4.2 presents the legislative scores for each state for each year from 1993 to 1998. The maximum possible score for a state with top ratings across the board is 42. (See chapter 3 for a more thorough explanation of how the legislative scores were obtained and adjusted for strength of local laws and preemption.) In 1993,

Figure 4.2. Real Price of Cigarettes Versus per Capita Cigarette Consumption

Note: Per capita cigarette consumption data are from U.S. Department of Commerce, Bureau of the Census. September 1992, January 1993, May 1993. *Tobacco Use Supplement to the Current Population Survey.* Washington, DC: U.S. Department of Commerce.

the legislative scores ranged from a low of zero for Iowa, Mississippi, and Oklahoma to a high of 18 for Alaska. Iowa and Mississippi remained at zero through 1998 and were joined by Kentucky in 1994. Because of preemptive laws, some state scores declined over the period, others remained the same because no new legislation was enacted, and some improved. For instance, California declined by more than 8 points after preemption, whereas Maryland increased its score by more than 19 points. The mean clean indoor air legislative score did, however, increase slightly over time, from 7.71 points in 1993 to 8.64 points in 1998.

Figures 4.3 and 4.4 show the correlations of this legislative score with adult smoking prevalence ($r = -.37$, $p < .01$) and per capita cigarette consumption ($r = -.30$, $p < .05$), respectively, at baseline in 1993.
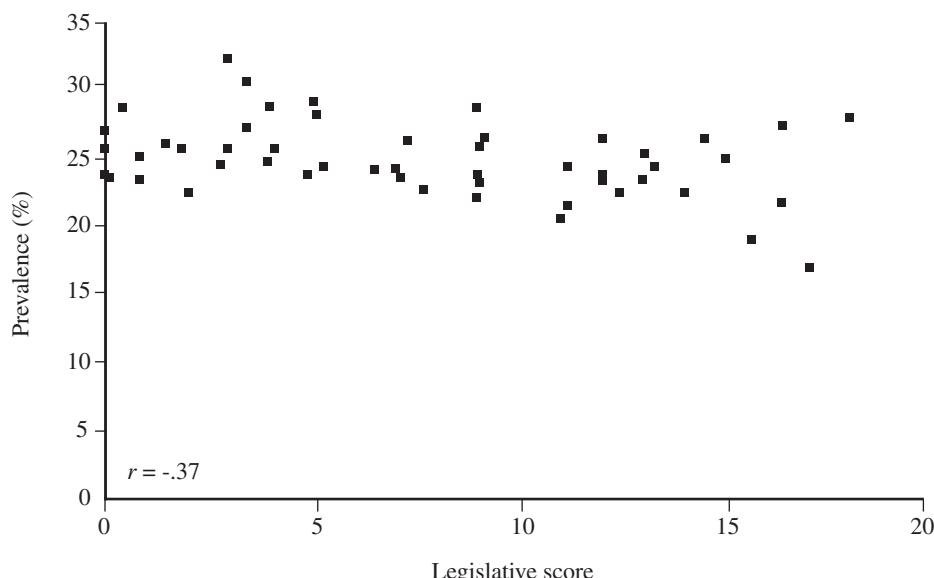
Smoke-free Workplaces

Considerable evidence indicates that smoking restrictions lead to smokers modifying their smoking behavior by reducing consumption or quitting altogether.[21–27] The inconveniences that smokers experience in having to leave their work areas to smoke, combined with their awareness of the smoke-free social norm, are incentives for them to reduce or quit smoking. Accordingly, the percentage of indoor workers reporting that their workplace is completely smoke-free is an important early outcome

Table 4.2. Legislative Score Including Preemption and Local Adjustment
(Shading indicates ASSIST states.)

State	1993	1994	1995	1996	1997	1998	Change
AK	18.00	18.00	18.00	18.00	18.00	18.07	0.07
AL	1.48	1.48	1.53	1.53	1.53	1.53	0.05
AR	5.03	5.03	5.03	5.03	5.03	5.03	0.00
AZ	7.67	7.89	7.89	8.35	8.37	8.37	0.70
CA	15.62	6.93	6.93	6.96	6.97	6.98	−8.64
CO	5.28	6.43	6.24	6.24	6.24	6.24	0.96
CT	2.00	2.00	2.00	2.00	2.00	2.00	0.00
DC	12.00	12.00	12.00	12.00	12.00	12.00	0.00
DE	0.83	5.37	5.08	5.08	5.08	5.08	4.25
FL	7.00	7.00	7.00	7.00	7.00	7.00	0.00
GA	2.82	7.04	7.18	7.20	7.20	7.17	4.35
HI	12.42	12.06	12.06	12.06	13.67	14.26	1.84
IA	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ID	9.00	9.00	9.00	9.00	9.00	9.00	0.00
IL	3.94	3.94	6.94	6.92	6.92	6.92	2.98
IN	5.12	5.12	5.18	5.18	5.18	9.23	4.11
KS	13.27	14.47	14.47	14.47	14.47	14.47	1.20
KY	3.00	0.00	0.00	0.00	0.00	0.00	−3.00
LA	2.99	7.83	8.11	8.11	8.11	8.11	5.12
MA	11.17	11.89	12.49	12.64	12.82	13.01	1.84
MD	4.91	4.94	24.10	24.10	24.10	24.10	19.19
ME	9.00	9.00	9.00	9.00	9.00	9.10	0.10
MI	16.33	16.33	16.34	16.34	16.35	16.35	0.02
MN	13.01	13.01	13.00	13.00	13.00	13.00	−0.01
MO	14.49	14.49	14.49	14.49	14.49	14.49	0.00
MS	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MT	12.00	12.00	12.00	12.00	12.00	12.00	0.00
NC	3.41	3.57	3.44	3.44	3.44	3.44	0.03
ND	14.00	14.00	14.00	14.00	14.00	14.00	0.00
NE	9.00	9.00	9.00	9.00	9.00	9.00	0.00
NH	15.00	15.00	15.00	15.00	15.00	15.00	0.00
NJ	11.02	11.02	11.02	11.04	11.05	14.06	3.04
NM	6.49	6.54	6.72	6.72	6.85	6.85	0.36
NV	4.00	4.00	4.00	4.00	4.00	4.00	0.00
NY	16.33	19.98	20.18	20.39	20.47	20.31	3.98
OH	7.29	10.28	10.28	10.28	10.32	10.32	3.03
OK	0.00	1.00	1.00	1.00	1.00	1.00	1.00
OR	9.06	9.06	9.06	9.06	9.26	9.26	0.20
PA	0.13	0.13	0.13	0.13	0.13	0.13	0.00
RI	13.00	13.00	13.00	13.00	13.03	13.05	0.05
SC	9.04	11.04	11.04	3.06	3.06	3.06	−5.98
SD	4.08	5.08	0.31	0.31	0.31	0.31	−3.77
TN	0.47	0.47	0.47	0.47	0.47	0.47	0.00
TX	7.12	7.45	7.47	7.47	7.56	7.58	0.46
UT	17.00	14.00	14.00	14.00	14.00	14.00	−3.00
VA	1.86	3.86	3.86	3.86	3.86	3.86	2.00
VT	9.13	9.13	13.13	13.13	13.13	13.13	4.00
WA	11.16	11.16	11.16	11.16	11.16	11.16	0.00
WI	12.04	15.04	15.04	15.04	15.04	15.04	3.00
WV	3.41	4.00	5.76	6.62	7.10	7.28	3.87
WY	0.84	0.84	0.84	0.84	0.84	0.84	0.00
Overall							
Mean	7.71	8.08	8.55	8.43	8.48	8.64	0.93
SD	5.32	5.19	5.73	5.77	5.80	5.83	3.59
ASSIST							
Mean	9.54	10.32	10.47	10.07	10.13	10.56	1.02
SD	4.58	4.83	4.75	5.07	5.06	4.96	2.40
Non-ASSIST							
Mean	6.80	6.95	7.59	7.60	7.66	7.68	0.88
SD	5.49	5.05	5.99	5.99	6.04	6.06	4.09

Figure 4.3. Legislative Score Versus Adult Smoking Prevalence
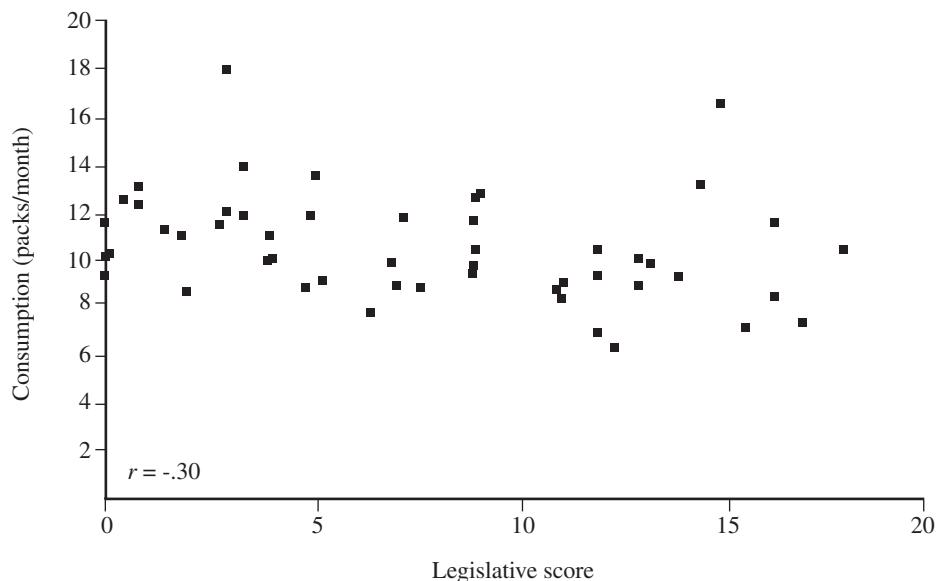
Note: Per capita cigarette consumption data are from U.S. Department of Commerce, Bureau of the Census. September 1992, January 1993, May 1993. *Tobacco Use Supplement to the Current Population Survey.* Washington, DC: U.S. Department of Commerce.

and reflects to some degree the strength and scope of clean indoor air legislation. Because some private workplaces have a smoke-free policy even though there is no law requiring it, and because some workplaces may not comply with state or local laws requiring no-smoking restrictions in public or work areas, workers' reports of the policies provide additional relevant information beyond that captured in the legislative score.

The TUS-CPS included questions to identify indoor workers and to assess the level of smoking restrictions in the workplace. The supplements asked, "Which of these best describes the area in which you work most of the time?"[28(p9-15)] A response indicating that the person worked indoors and outside a home and was not self-employed led to a further question: "Does your place of work have an official policy that restricts smoking in any way?"[28(p9-16)] Those persons who answered "yes" were then asked, "Which of these best describes your place of work's smoking policy for indoor public or common areas?"[28(p9-16)] and "Which of these best describes your place of work's smoking policy for work areas?"[28(p9-17)] Those persons who reported that smoking was not allowed in any work areas and in any public and common areas were considered to have a smoke-free workplace.

Table 4.3 presents the results for the percentage of indoor workers reporting smoke-free workplaces from baseline to the end of ASSIST. The values in the

Figure 4.4. Legislative Score Versus per Capita Cigarette Consumption

Note: Per capita cigarette consumption data are from U.S. Department of Commerce, Bureau of the Census. September 1992, January 1993, May 1993. *Tobacco Use Supplement to the Current Population Survey.* Washington, DC: U.S.

table were interpolated/extrapolated from the results of the 1992–93, 1995–96, and 1998–1999 TUS-CPS. (For example, the slope of the line between the 1992–93 and 1995–96 values was used to determine how much to add to the 1992–93 value to obtain values for 1994 and 1995.) Again, there was considerable variability in this measure among the states at baseline: Kentucky and Washington State were the states with the lowest percentage (29.1%) and highest percentage (66.8%), respectively, of indoor workers covered by smoke-free workplace policies. All states improved over time, with the mean percentage

of indoor workers protected increasing from 46.4% at baseline to 68.5% at the end of ASSIST. The state showing the least improvement was Oregon, which started at a relatively high level in 1993, and the state improving the most was Arkansas, which started at a relatively low level.

The correlations between percentage of workers reporting a smoke-free workplace and smoking prevalence ($r = -.57$, $p < .0001$) and per capita cigarette consumption ($r = -.51$, $p < .0001$) at baseline, respectively, are shown in figures 4.5 and 4.6.

Table 4.3. Percentage of Indoor Workers with Smoke-free Workplaces
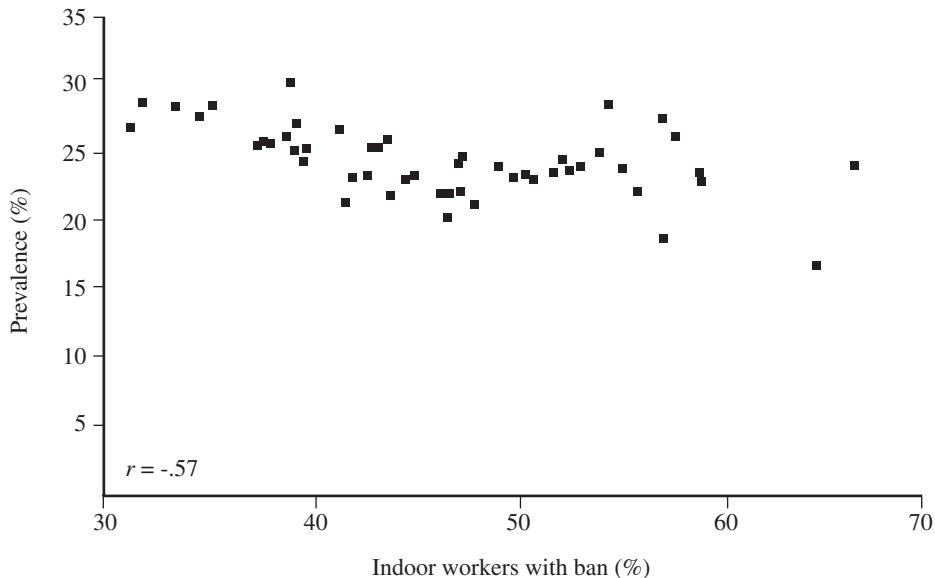
(Shading indicates ASSIST states.)

State	1992–93	1993	1994	1995	1996	1997	1998	1998–99	Change
AK	57.4	60.7	64.7	68.7	70.3	71.5	72.7	72.9	15.5
AL	38.2	43.0	48.8	54.5	57.9	60.9	63.8	64.3	26.1
AR	31.9	36.5	42.0	47.5	52.6	57.6	62.5	63.4	31.5
AZ	56.2	58.4	61.1	63.8	65.4	66.8	68.2	68.5	12.3
CA	57.5	62.4	68.3	74.1	75.6	76.3	77.0	77.1	19.6
CO	53.4	58.3	64.2	70.1	71.6	72.1	72.6	72.6	19.2
CT	47.5	52.8	59.2	65.6	68.6	71.0	73.4	73.8	26.3
DC	51.1	57.5	65.2	72.9	74.1	74.1	74.0	74.0	22.9
DE	50.1	54.4	59.4	64.5	66.9	68.7	70.5	70.8	20.7
FL	52.8	56.5	60.8	65.1	66.7	67.8	68.8	69.0	16.2
GA	47.4	50.1	53.3	56.5	59.8	63.1	66.3	66.9	19.5
HI	46.5	50.6	55.4	60.2	63.9	67.4	70.8	71.4	24.9
IA	45.2	49.8	55.3	60.8	64.0	66.9	69.7	70.2	25.0
ID	59.2	62.3	66.1	69.8	70.7	71.0	71.2	71.3	12.1
IL	39.8	45.5	52.4	59.3	62.4	64.9	67.3	67.7	27.9
IN	34.7	39.4	45.0	50.6	53.5	55.8	58.0	58.4	23.7
KS	49.3	53.1	57.6	62.1	65.8	69.4	73.0	73.6	24.3
KY	29.1	34.9	41.8	48.7	51.5	53.5	55.5	55.9	26.8
LA	39.3	44.0	49.7	55.4	58.5	61.0	63.6	64.0	24.7
MA	48.1	54.3	61.8	69.3	72.3	74.4	76.5	76.9	28.8
MD	52.1	60.5	70.6	80.7	82.2	82.0	81.7	81.7	29.6
ME	54.8	59.7	65.6	71.5	73.3	74.3	75.2	75.4	20.6
MI	39.5	43.3	47.8	52.4	55.4	58.1	60.8	61.3	21.8
MN	54.4	58.2	62.7	67.1	69.6	71.6	73.6	73.9	19.5
MO	38.9	44.3	50.8	57.3	60.3	62.7	65.0	65.4	26.5
MS	39.9	43.7	48.2	52.8	55.9	58.7	61.4	61.9	22.0
MT	42.9	46.9	51.8	56.7	60.6	64.3	68.0	68.6	25.7
NC	31.3	37.9	45.8	53.7	56.7	58.7	60.8	61.1	29.8
ND	47.0	50.9	55.5	60.1	62.5	64.5	66.5	66.8	19.8
NE	44.0	49.3	55.6	62.0	64.3	65.9	67.5	67.7	23.7
NH	52.5	57.9	64.3	70.8	72.6	73.5	74.3	74.5	22.0
NJ	46.8	52.5	59.4	66.3	68.7	70.2	71.7	72.0	25.2
NM	55.4	58.1	61.3	64.5	65.8	66.7	67.6	67.7	12.3
NV	33.5	35.2	37.3	39.4	42.2	45.2	48.2	48.7	15.2
NY	41.8	48.1	55.6	63.1	66.6	69.3	71.9	72.4	30.6
OH	37.8	43.1	49.3	55.6	58.6	60.9	63.2	63.6	25.8
OK	41.5	46.1	51.7	57.2	60.6	63.6	66.6	67.1	25.6
OR	59.3	61.3	63.6	66.0	66.5	66.6	66.6	66.7	7.4
PA	42.2	47.1	52.9	58.7	62.2	65.2	68.3	68.8	26.6
RI	44.8	51.6	59.7	67.9	70.0	70.9	71.8	71.9	27.1
SC	37.5	43.3	50.3	57.3	60.0	61.8	63.6	63.9	26.4
SD	43.5	48.7	54.9	61.0	61.7	61.3	60.9	60.9	17.4
TN	35.3	40.4	46.4	52.5	56.1	59.2	62.3	62.8	27.5
TX	50.6	54.4	59.0	63.5	64.8	65.4	66.0	66.1	15.5
UT	65.0	70.1	76.2	82.3	83.5	83.8	84.0	84.0	19.0
VA	43.2	48.4	54.6	60.8	64.3	67.1	70.0	70.5	27.3
VT	58.0	63.5	70.1	76.8	77.7	77.5	77.3	77.2	19.2
WA	66.8	68.3	70.0	71.7	72.6	73.4	74.1	74.2	7.4
WI	43.9	48.8	54.8	60.8	62.6	63.5	64.5	64.7	20.8
WV	39.1	44.8	51.6	58.5	60.7	62.0	63.4	63.6	24.5
WY	47.6	51.3	55.7	60.1	62.3	64.1	65.8	66.1	18.5
Overall									
Mean	46.4	51.0	56.6	62.1	64.6	66.4	68.2	68.5	22.1
SD	8.71	8.37	8.24	8.42	7.79	7.06	6.48	6.39	5.70
ASSIST									
Mean	45.6	50.5	56.5	62.5	64.9	66.6	68.3	68.6	23.0
SD	9.07	8.17	7.32	6.78	6.38	6.03	5.73	5.69	6.11
Non-ASSIST									
Mean	46.8	51.3	56.6	61.9	64.4	66.3	68.1	68.5	21.7
SD	8.65	8.58	8.77	9.22	8.50	7.63	6.79	6.91	5.52

Source: U.S. Department of Commerce, Bureau of the Census. September 1992, January 1993, May 1993; September 1995, January 1996, May 1996; September 1998, January 1999, and May 1999. *Tobacco Use Supplement to the Current Population Survey.* Washington, DC: U.S. Bureau of the Census.
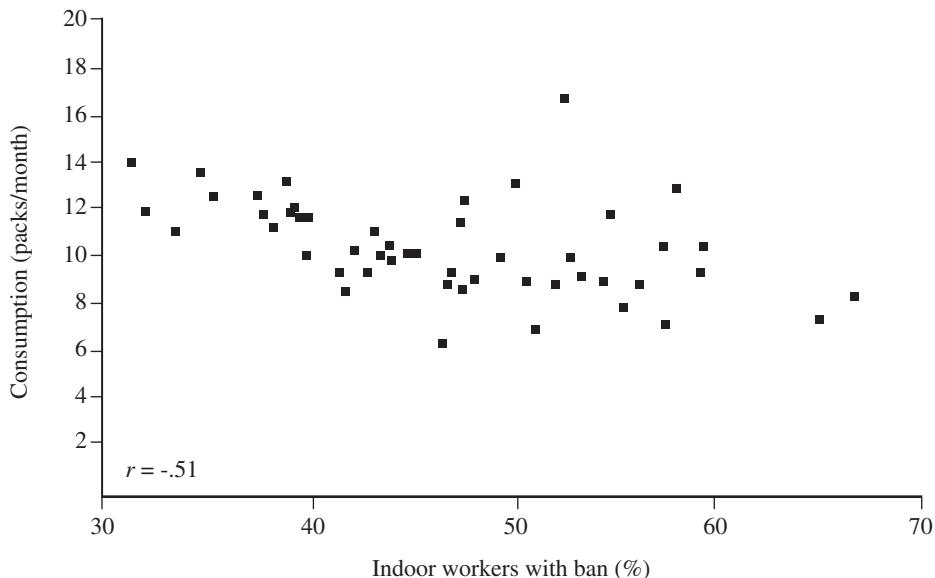
Figure 4.5. Workplace Smoking Ban Versus Adult Smoking Prevalence

r = -.57

Prevalence (%)

Indoor workers with ban (%)

Source: National Cancer Institute. 2005. What is the TUS-CPS? http://riskfactor.cancer.gov/studies/tus-cps.

Figure 4.6. Workplace Smoking Ban Versus per Capita Cigarette Consumption

r = -.51

Consumption (packs/month)

Indoor workers with ban (%)

Source: National Cancer Institute. 2005. What is the TUS-CPS? http://riskfactor.cancer.gov/studies/tus-cps.

The IOI for Policy

Construction of the IOI

Each of the three initial outcomes chosen for the ASSIST evaluation was measured consistently among the states and over time, varied considerably among the states, was conceptually related to the program interventions, and was significantly correlated with adult smoking prevalence and per capita cigarette consumption. Because the state is the unit of analysis for the ASSIST evaluation, with only 51 units of observation and a number of other variables to consider (see chapter 9), all three outcomes could not be included separately in the statistical analyses of the final outcomes (smoking prevalence and per capita cigarette consumption). Thus, the individual initial outcomes were combined into an index.

For individual outcomes to be combined into an index, there should be some indication of a consistent relationship or correlation among those outcomes; as one changes, the others should also change. Table 4.4 shows the intercorrelations among the initial outcomes for 1993 and 1998. The correlations were stronger among the initial outcomes in 1998 than they were in 1993.

Although the purpose of constructing the IOI for the ASSIST analysis was to economize on the number of factors that would need to be considered in the final analysis (see chapter 9), another reason to combine factors would be to avoid multicollinearity. A well-constructed IOI could be useful in evaluating total program effect if it comprised initial outcomes related to each program component. The correlations among the initial outcomes in 1998–99 are strong enough that the use of the index for the ASSIST evaluation is warranted.

Creating an index implies combining the individual initial outcomes, either by summing them directly or by weighting them in some way. One way of determining appropriate weighting factors is from a principal components analysis of the standardized variables. Because the first principal component is the linear combination of the variables (initial outcomes), which explains the greatest portion of the variance, it provides an alternative to equal weighting of the three initial outcomes. However, preliminary results indicated that the weights for the three variables (on the first principal component) were very nearly equal. Thus, it was decided to simply sum the individual initial outcomes.

Table 4.4. Correlations among Initial Outcomes in 1992–93 and 1998–99

| | Correlation | |
Initial outcome	1992–93	1998–99
Cigarette price vs. legislative score	.374[*]	.525[***]
Cigarette price vs. smoke-free workplace	.385[*]	.442[*]
Legislative score vs. smoke-free workplace[a]	.427[*]	.503[**]

[a]1993 and 1998 data.
[*]$p < .01$. [**]$p < .001$. [***]$p < .0001$.

Since the unit of measurement for each initial outcome was different, the values for each initial outcome at baseline were standardized (mean = 0, standard deviation = 1), and the resulting z scores were summed to obtain the IOI at baseline. Subsequent values for each year from 1993 through 1998 were obtained by subtracting each state's score in a given year from the baseline mean and dividing by the baseline standard deviation to obtain a normalized difference score with the baseline value as the reference. The normalized z scores for each initial outcome were added to obtain the index values for 1993 through 1998. Table 4.5 shows the IOI value for each of the states in each year. At baseline, the IOI values ranged from a low of –4.81 in Kentucky to a high of 4.57 in Alaska. All states showed an improvement, with Alaska improving the most. Of the ASSIST states, 65% (11/17) showed improvement at or greater than the mean increase from baseline to the end of the intervention period for all states, whereas only 32% (11/34) of the non-ASSIST states showed this degree of improvement.

Simple univariate tests comparing means for ASSIST states with those for non-ASSIST states at baseline and at the end of the intervention period showed no statistically significant differences (two-tailed z tests and $p < .05$) for the IOI or for any of the IOI components. However, the ASSIST states showed marginally significantly higher mean legislative clean indoor air scores at both times ($p < .10$). Without appropriate adjustment for important covariates, these analyses are problematic; a more appropriate and thorough analysis is presented in chapter 9.

Correlation of the IOI with Final Outcomes

The correlation of the IOI with adult smoking prevalence at baseline ($r = –.57$, $p < .0001$) is shown in figure 4.7. The correlation of the IOI with per capita cigarette consumption ($r = –.64$, $p < .0001$) is shown in figure 4.8.

Table 4.6 presents the correlations of each initial outcome with each final outcome at baseline (1992–93) and at the 1995–96 and 1998–99 time frames. The "change" columns show the correlations of change for each initial outcome with the change in final outcomes over the entire ASSIST intervention period. The correlation of each initial outcome and the overall IOI with adult smoking prevalence and per capita cigarette consumption was statistically significant within each time frame. However, none of the 1993 to 1999 changes in initial outcomes was correlated at all with the change in adult smoking prevalence; all the correlations were less than .11 in magnitude. The correlation of change in the IOI with change in per capita cigarette consumption was significant, but this was due entirely to the highly significant relationship between change in cigarette price and change in per capita consumption. In contrast to cigarette price, the other two initial outcomes—legislative score and percentage of indoor workers with smoke-free workplaces—were not significantly correlated with change in per capita cigarette consumption.
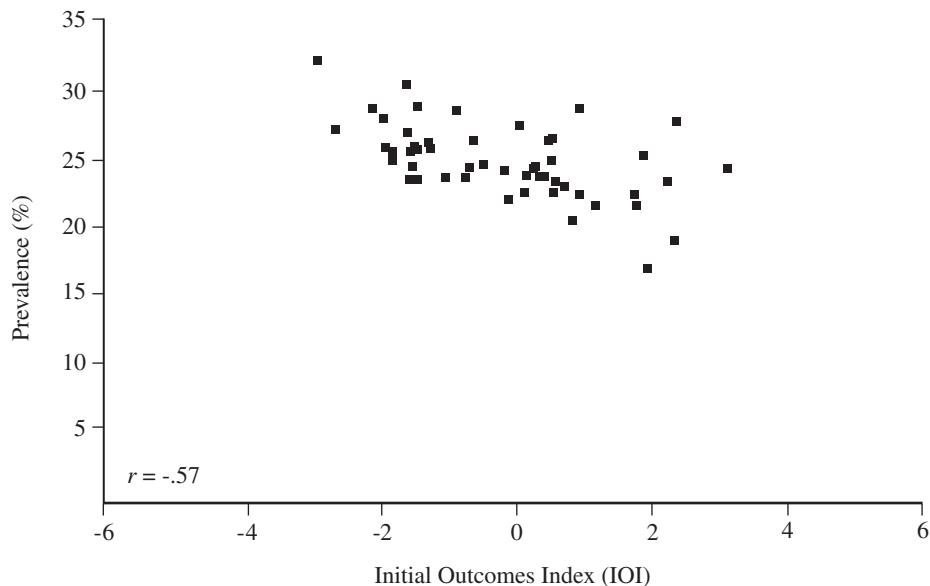
Table 4.5. Initial Outcomes Index
(Shading indicates ASSIST states.)

State	1992–93	1993	1994	1995	1996	1997	1998	1998–99	Change
AK	4.57	3.91	4.14	4.86	4.84	8.58	9.92	10.55	5.98
AL	−2.62	−3.28	−2.80	−2.20	−1.56	−0.74	0.15	0.89	3.51
AR	−2.20	−2.52	−2.20	−1.82	−0.81	−0.10	1.27	1.99	4.19
AZ	1.06	0.14	0.31	2.66	3.34	3.69	4.65	5.25	4.19
CA	4.25	3.84	2.85	3.37	3.37	3.63	4.38	6.74	2.49
CO	−0.90	−1.19	0.06	0.74	0.89	1.30	2.07	2.75	3.65
CT	0.44	0.86	1.30	1.78	1.98	2.47	3.47	4.22	3.78
DC	3.10	3.71	4.73	5.85	5.51	5.60	6.24	6.85	3.75
DE	−1.31	−2.52	−0.86	−0.15	0.01	0.39	1.35	2.07	3.38
FL	1.23	0.38	0.72	1.34	1.38	1.74	2.89	3.53	2.30
GA	−1.87	−2.61	−1.35	−1.06	−0.78	−0.10	1.07	1.73	3.60
HI	3.10	2.89	3.76	4.11	4.75	6.06	8.36	9.04	5.94
IA	−1.24	−1.77	−0.99	−0.39	0.03	0.37	1.47	2.17	3.41
ID	1.02	0.24	1.12	1.99	2.20	2.17	3.18	3.78	2.76
IL	−1.13	−0.87	−0.17	1.13	1.68	1.97	3.92	4.61	5.74
IN	−3.14	−3.31	−2.88	−2.37	−1.86	−1.28	0.73	1.42	4.56
KS	0.93	0.45	1.28	1.66	2.01	2.89	4.25	4.89	3.96
KY	−4.81	−4.94	−4.79	−3.95	−3.51	−2.97	−1.69	−1.09	3.72
LA	−1.99	−2.68	−1.41	−0.47	−0.29	0.72	1.93	2.64	4.63
MA	1.66	1.90	3.37	4.14	6.04	6.75	7.98	8.63	6.97
MD	0.65	0.49	1.56	6.14	6.70	6.79	7.67	8.24	7.59
ME	1.87	1.52	2.28	2.79	2.87	4.23	6.49	6.96	5.09
MI	0.76	0.04	3.68	4.17	4.39	4.93	5.95	6.64	5.88
MN	3.83	3.11	3.65	4.18	4.58	4.74	5.20	5.96	2.13
MO	−1.01	−1.08	−0.36	0.67	0.96	1.54	2.79	3.38	4.39
MS	−2.37	−3.10	−2.95	−2.30	−1.79	−1.31	0.05	0.76	3.13
MT	−0.40	−1.33	−0.76	−0.34	0.26	1.02	2.27	2.88	3.28
NC	−4.26	−4.51	−3.39	−2.54	−2.12	−1.27	−0.24	0.41	4.67
ND	1.10	1.54	1.79	2.21	2.80	3.34	4.30	5.04	3.94
NE	−0.33	−0.23	0.33	1.04	1.49	1.98	2.93	3.61	3.94
NH	1.39	0.82	1.66	2.41	2.76	3.62	4.77	5.42	4.03
NJ	1.92	1.36	2.14	2.97	2.97	3.63	7.31	7.93	6.01
NM	0.17	−0.31	0.11	0.63	0.82	1.12	1.96	2.70	2.53
NV	−1.12	−1.51	−1.54	−1.35	−1.15	−0.92	0.48	1.27	2.39
NY	2.18	2.91	4.40	5.10	5.66	6.08	7.34	8.03	5.85
OH	−1.96	−2.25	−0.96	−0.26	0.17	0.61	1.71	2.40	4.36
OK	−2.13	−2.70	−2.21	−1.73	−1.09	−0.38	0.78	1.46	3.59
OR	1.68	1.15	1.75	1.82	1.93	3.47	4.42	4.96	3.28
PA	−1.87	−2.68	−2.06	−1.25	−0.71	0.12	1.01	1.79	3.66
RI	1.60	0.91	3.74	4.67	4.69	5.32	6.23	6.88	5.28
SC	−1.90	−2.56	−1.53	−0.47	−1.63	−1.05	−0.22	0.47	2.37
SD	−1.40	−2.15	−1.08	−1.00	−0.68	−0.35	0.16	0.75	2.15
TN	−3.08	−3.58	−3.02	−2.41	−1.99	−1.44	−0.13	0.58	3.66
TX	1.54	0.63	1.28	1.70	1.63	2.12	3.15	3.75	2.21
UT	3.68	3.20	3.48	4.24	4.70	6.31	7.18	7.77	4.09
VA	−2.37	−2.44	−1.51	−0.92	−0.76	−0.48	0.76	1.44	3.81
VT	1.09	0.87	1.43	4.57	4.65	5.02	5.79	6.37	5.28
WA	4.40	5.18	5.43	6.36	7.00	7.21	7.78	8.45	4.05
WI	1.20	0.76	2.23	3.30	3.22	3.59	5.13	5.74	4.54
WV	−2.48	−2.79	−1.77	−0.85	−0.45	0.15	1.22	1.77	4.25
WY	−2.51	−3.12	−2.53	−1.77	−1.68	−1.42	−0.38	0.33	2.84
Overall									
Mean	0.00	−0.38	0.42	1.24	1.56	2.19	3.36	4.05	4.05
SD	2.32	2.44	2.48	2.66	2.67	2.79	2.84	2.84	1.26
ASSIST									
Mean	0.21	−0.03	1.16	1.91	2.19	2.74	4.03	4.68	4.47
SD	2.47	2.60	2.75	2.75	2.95	2.92	3.00	2.99	1.34
Non-ASSIST									
Mean	−0.10	−0.55	0.05	0.90	1.23	1.91	3.03	3.74	3.85
SD	2.27	2.37	2.29	2.58	2.50	2.72	2.73	2.75	1.18
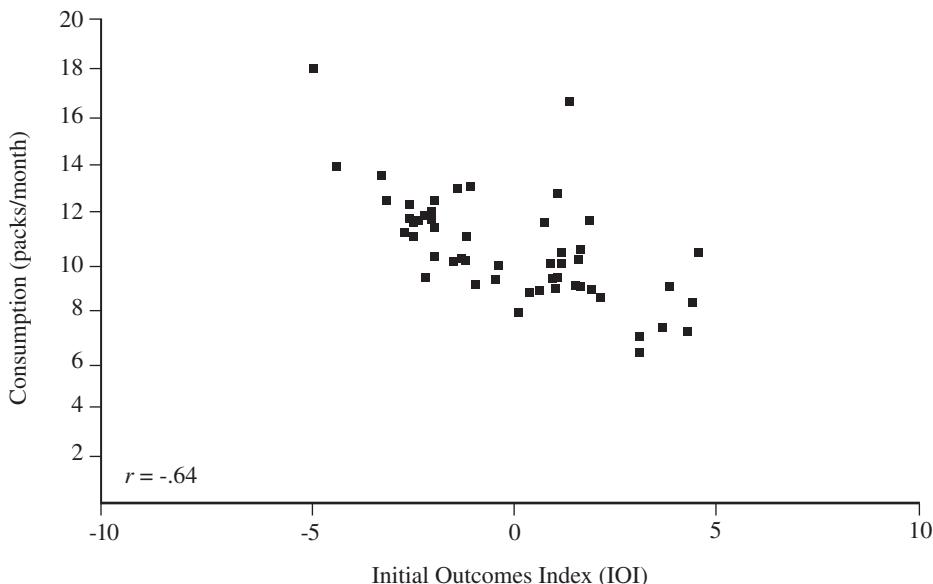
Figure 4.7. Initial Outcomes Index Versus Adult Smoking Prevalence

Note: Source for prevalence data: National Cancer Institute. 2005. What is the TUS-CPS? http://riskfactor.cancer.gov/studies/tus-cps.

Figure 4.8. Initial Outcomes Index Versus per Capita Cigarette Consumption

Note: Source for per capita consumption data: National Cancer Institute. 2005. What is the TUS-CPS? http://riskfactor.cancer.gov/studies/tus-cps.

For each state, figure 4.9 plots change in the IOI against change in adult smoking prevalence. Figure 4.10 plots change in the IOI against per capita cigarette consumption between baseline and the end of the program.

While these results are not completely convincing in the context of the ASSIST evaluation, they do not mean that the approach would not be useful in another program evaluation. As illustrated earlier in this chapter, other measures of tobacco control activity could have been included in the IOI measure for ASSIST that perhaps would have made it more sensitive to program effects. As it stands, the description of the IOI provided in this chapter should be taken as a model of how to combine such measures into an index for further analysis.

In addition, the 50 states and the District of Columbia were divided into three groups of 17 based on their IOI at baseline. To examine trends in per capita cigarette consumption in each group, the bimonthly consumption values were averaged over the states in each group from 1983 to early 2000. The results are shown in figure 4.11. A smoothed trend line was computed for each group.[29] In the pre-ASSIST period, the trends in per capita cigarette consumption for the three groups were nearly parallel and diverged from one another only slightly. After mid-1993, the low IOI group showed a general increase in per capita cigarette consumption that did not turn down again until 1999, and the medium and high IOI groups showed greater separation than previously. Although both continued to decline, the rate of decline was somewhat slower than earlier, except that the high IOI group appeared to gain momentum again in 1997. In April 1993, the price of premium brands of cigarettes decreased,[30] and particularly in the low IOI group, it appeared that tobacco control efforts were not sufficient to completely counteract the influence of the price drop on consumption.

Table 4.6. Correlation of Initial Outcomes with Final Outcomes and Change in Initial Outcomes with Change in Final Outcomes

	1992–93	1995–96	1998–99	Change
Cigarette price				
Adult smoking prevalence	−.392**	−.391**	−.366**	−.073
Per capita cigarette consumption	−.671****	−.705****	−.675****	−.683****
Legislative score				
Adult smoking prevalence	−.366**	−.277*	−.320*	−.092
Per capita cigarette consumption	−.299*	−.348*	−.385**	.018
Smoke-free workplaces				
Adult smoking prevalence	−.571****	−.687****	−.633****	.108
Per capita cigarette consumption	−.516****	−.465***	−.517****	.207
IOI				
Adult smoking prevalence	−.574****	−.557****	−.495***	−.051
Per capita cigarette consumption	−.641****	−.661****	−.666****	−.425**

Note: IOI indicates Initial Outcomes Index.

*p < .05. **p < .01. ***p < .001. ****p < .0001.

Figure 4.9. Change in Initial Outcomes Index Versus Change in Adult Smoking Prevalence
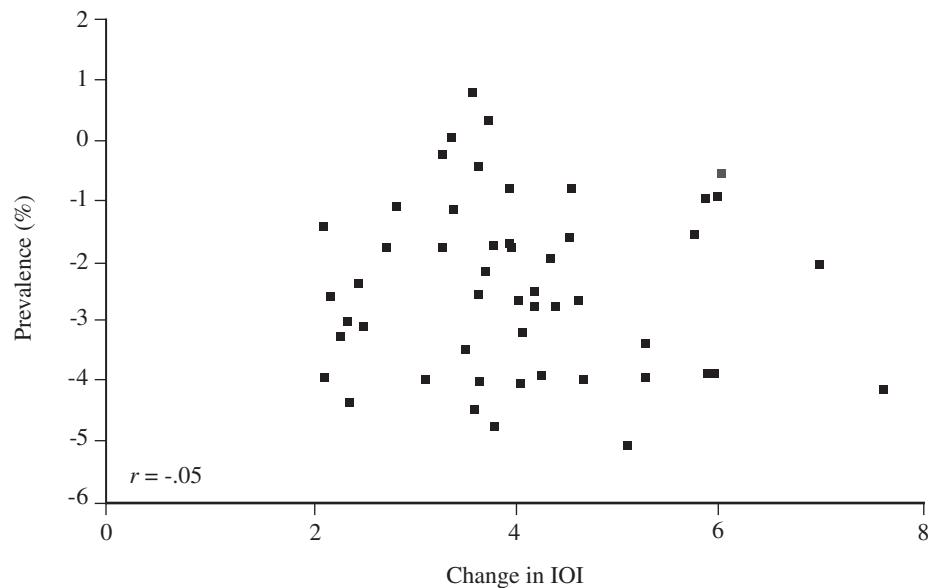
Figure 4.10. Change in Initial Outcomes Index Versus Change in per Capita Cigarette Consumption
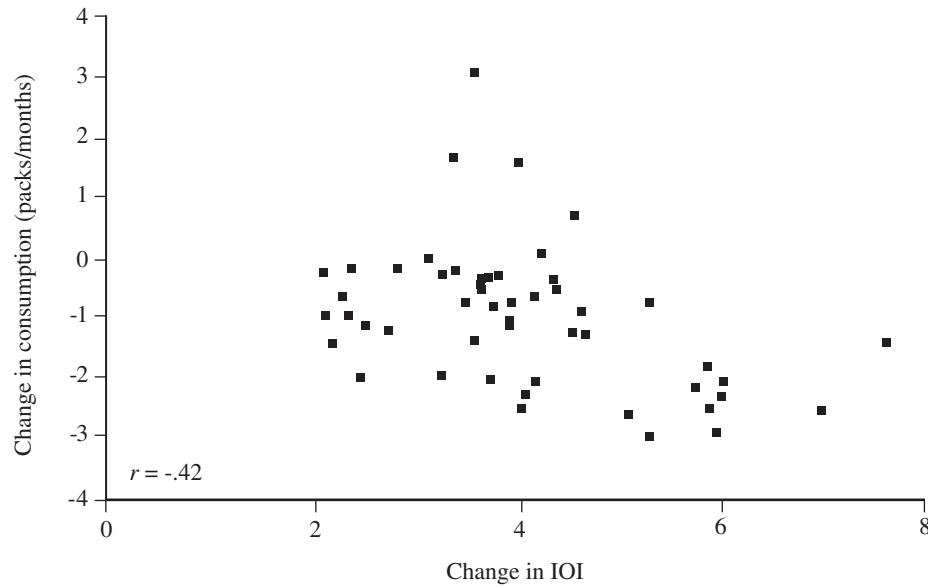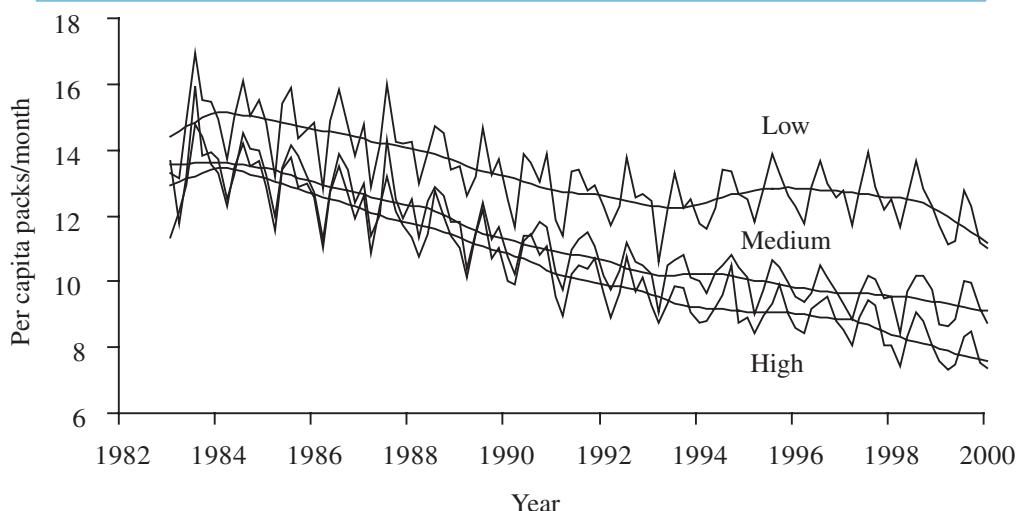
Figure 4.11. Trends in per Capita Cigarette Consumption for States in Each Tertile Group of Tobacco Control Initial Outcomes Index

Summary

An initial outcome is an early indication of whether the efforts of a tobacco control program are having an effect. An early indication of program effectiveness is sometimes necessary to convince legislators that the program is having an effect even before the program would be expected to influence the smoking behavior of a population. Increases in the levels of initial outcomes should eventually discourage tobacco use and thereby improve public health. To be useful in evaluating tobacco control programs, an initial outcome should (1) be measured consistently over time and among the units of observation (e.g., states for the ASSIST evaluation), (2) show variability among the units of observation, (3) reflect successful implementation of tobacco control program efforts, and (4) be related at least logically to the final outcome measures—smoking prevalence and per capita cigarette consumption.

Many outcomes could be selected as initial outcomes. The choice of outcomes will vary among programs and will depend on individual program emphases and the availability of measures. The initial outcomes selected for the ASSIST evaluation were cigarette price, a score (or rating) of local and state clean indoor air policies, and the percentage of indoor workers who reported that they worked in a 100% smoke-free environment. Each of these initial outcomes (1) could be measured consistently among states and over time, (2) showed a high degree of variability among states, (3) was related to a specific ASSIST program area, and (4) was significantly correlated with both adult smoking prevalence and

per capita cigarette consumption. The changes over time were noticeable, and ASSIST states appeared to change more than non-ASSIST states. However, the differences in change between the two groups of states were not large. It might be that for large changes to occur, states might have to achieve a certain threshold of public support. Once this "tipping point" is reached, legislatures might more readily enact legislation regarding both taxation and protection from secondhand smoke.

Because of the limited number of units of observation available for the ASSIST evaluation, an IOI was created for use in the analyses of the final outcomes. Such an index may also be necessary for the evaluation of state programs if the unit of observation is a limited number of jurisdictional levels (e.g., counties, regions) of program delivery and assessment. However, if the program has only one or two program areas of emphasis or if little is gained by combining the initial program measures, it would be best to evaluate the initial outcomes separately.

The three initial outcome measures for the ASSIST evaluation were not selected until after ASSIST program implementation. It would have been optimal to have had more discussion during the planning phases of the intervention regarding which initial outcomes would be assessed. Such discussions should include the methodology for repeatedly assessing the initial outcomes over the units of observation at different points in time, before, during, and after the intervention period. It turned out that no initial outcome measures were available for two of the ASSIST program areas.

Another limitation of the initial outcomes selected for ASSIST is the overlap between the legislative score and the percentage of indoor workers reporting smoke-free workplaces. In addition, as mentioned above, readiness to enact legislation regarding taxation might also be associated with readiness to enact clean indoor air laws. Nevertheless, the ASSIST IOI was correlated with the final outcomes measured at baseline (1992–93), during the program (1995–96), and at the end of the program (1998–99). Change in the IOI was significantly correlated with changes in per capita cigarette consumption, mainly because of the strong correlation of cigarette price and this outcome, but change in the IOI was not correlated with change in adult smoking prevalence.

During the ASSIST intervention period, tobacco control efforts were gathering momentum in non-ASSIST states, which complicated the evaluation of ASSIST. (See chapters 1 and 2.) For example, a tobacco control program had been ongoing in California (a non-ASSIST state) since 1990 (see Monograph 16, chapter 5, pp. 146–147, and chapter 11, pp. 497–498). Also, the Centers for Disease Control and Prevention and the Robert Wood Johnson Foundation provided modest funding for tobacco control activities, including Initiatives to Mobilize for the Prevention and Control of Tobacco Use (IMPACT), the SmokeLess States National Policy Initiative, and the Campaign for Tobacco-Free Kids, in many other states. The Robert Wood Johnson Foundation's SmokeLess States initiative faced fewer political and bureaucratic

barriers than did ASSIST and IMPACT. Rather than working directly with state agencies, SmokeLess States employed voluntary health organizations or other nongovernmental organizations, such as state tobacco control coalitions, as their lead agencies. As shown in the analyses described in this chapter, many states made significant progress in (1) increasing cigarette prices, (2) improving their legislative clean indoor air scores, and (3) increasing the percentages of indoor workers in smoke-free workplaces.

The methodology described in this chapter for specifying and combining initial outcome measures was illustrated in the context of the ASSIST evaluation but could be adapted for evaluations of other tobacco control programs at the state and local levels. There are lessons to be learned from the ASSIST experience with regard to selection of initial outcomes. For example, if a prevention program plans to focus efforts on enforcing youth access laws, there should be a metric in place to evaluate whether such enforcement has occurred. This metric could be derived from sales checks or could rely on an adolescent smokers population survey that asks whether the adolescent was asked for identification the last time he or she tried to buy cigarettes. Presumably this metric would show variability in levels over the units of observation and should be related ultimately to measures of youth smoking behavior (e.g., prevalence of smoking in the past 30 days, daily smoking). Ideally, appropriate measures for the initial outcomes expected from each program component should be designed before a comprehensive program is initiated.

However, useful information can still be provided even if not all program areas have initial outcomes that can be assessed. As mentioned above, an index of these initial outcomes may be necessary if the initial outcomes are many and the observational units are few.

Conclusions

1. It may take many years for tobacco control programs to demonstrate desired changes in tobacco use. Measurements such as the change in policy assessed by the Initial Outcomes Index represent a promising way to assess program effectiveness within a shorter term.
2. Criteria for selecting initial outcomes for the ASSIST evaluation included continuous measurability, sufficient variability over time or other units of observation, a relationship with a tobacco control intervention, and evidence indicating a relationship with tobacco-related health outcomes.
3. The Initial Outcomes Index used in the ASSIST evaluation analysis was defined as an equal weighting of three factors that were initially correlated with lower tobacco use: total cigarette price, a rating of local and state clean indoor air policies, and the percentage of workers covered by 100% smoke-free workplaces.
4. Overall, ASSIST states showed a greater increase in the Initial Outcomes Index than non-ASSIST states. The Initial Outcomes Index was also significantly related to tobacco prevalence and consumption. However, the only Initial Outcomes

Index component related to changes in outcomes was the relationship between cigarette price and per capita consumption. This metric represented an important first step in establishing the relationship between initial policy outcomes for tobacco control and long-term program outcomes.

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5. State Facilitating Conditions and Barriers to Implementation of Tobacco Control Programs

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5. State Facilitating Conditions and Barriers to Implementation of Tobacco Control Programs

Underlying state conditions can have an important impact on the success of tobacco control interventions such as the American Stop Smoking Intervention Study (ASSIST). Factors such as population-level smoking patterns; the economic influence of the tobacco industry; and the overall social, cultural, and policy environment can potentially affect the implementation of tobacco control programs and individual smoking behavior.

This chapter describes the measures of state conditions—demographic factors and economic dependence on tobacco—used as covariates in the ASSIST evaluation analysis. The demographic measures were obtained from census and population survey data and included gender, age, race and ethnicity, education, income, state population, metropolitan area representation, and region. The measure of state dependence on tobacco growing and manufacturing is described more fully in chapter 6 of this monograph.

Other factors that the extant literature suggests might affect tobacco control interventions and outcomes are discussed, from individual and environmental factors such as family, religion, community organizations, and local government, to state-level factors such as per capita wealth and dominant political affiliation. Although examining these relationships was outside the scope of the ASSIST evaluation, they are promising areas for future study.

The state-level demographic covariates described in this chapter were not significantly related to smoking prevalence in the evaluation analysis described in chapter 9 because in this analysis they had already been used as covariates at the individual level to adjust state-level smoking prevalence rates. However, several variables described in this chapter contributed significantly to state-level differences in per capita cigarette consumption, including percentage of the population that was Hispanic, percentage with incomes below poverty level, and percentage of gross state product derived from tobacco growing and manufacturing.

Introduction

This chapter explores the individual and state conditions that could have potentially influenced the implementation and outcomes of a state tobacco use prevention and control program. States varied widely on these factors. First, an overview of multiple-level factors that affect tobacco use is provided, followed by review and description of the state factors included as covariates in the ASSIST evaluation and how they were measured. The covariates do not represent an exhaustive list of factors that might have affected the evalu-

ation; therefore, other factors that might be considered for inclusion in future analyses are also reviewed.

Overview of Influences
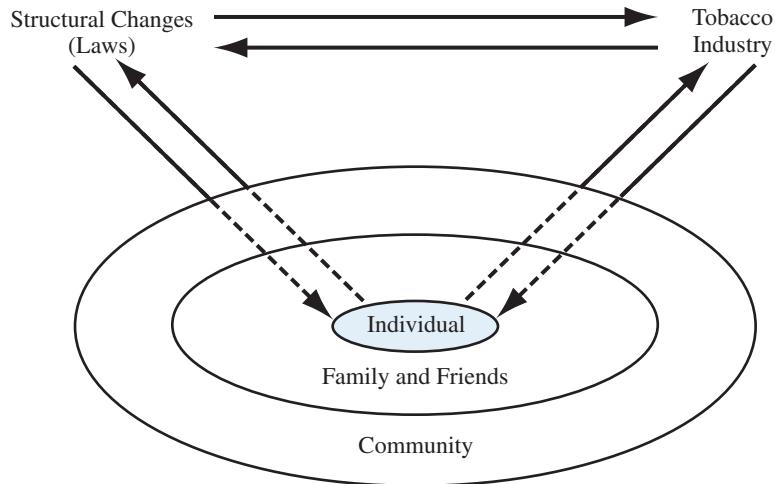
Reducing the number of smokers in the population, a key goal of tobacco control efforts, is accomplished through youth prevention and adult cessation. If fewer youths become smokers and more smokers quit, the impact of smoking-related diseases on the public health is reduced. Thus, it is important to understand those factors that influence individual smoking behavior (affecting initiation or cessation). Figure 5.1 presents a simplified view of these influences and how they might interact.

Family, close friends, and even acquaintances can influence how an individual views tobacco use and whether that individual becomes and remains a smoker. The larger community, schools, the workplace, churches, and other

organizations to which the individual belongs may also influence his or her perceptions and beliefs about tobacco use. Finally, the prevalence of smoking within a community will reflect and, in turn, affect these perceived norms.

Local, state, and federal legislative bodies can influence the community environment through enactment of laws (e.g., smoke-free workplace laws, youth access laws) and antitobacco media campaigns. The community environment, in turn, affects individuals both directly and indirectly. For example, laws that restrict workplace smoking have the potential to change both community norms and individual behavior. When a community passes and enforces laws that restrict workplace smoking, that community creates an environment where smoking is a marginalized, non-normative activity. Workplace smoking restrictions also directly affect the individual. For example, a worker might find that he or she can no longer smoke inside at work.

Figure 5.1. Interactions of Forces Acting to Influence Tobacco Use

The tobacco industry works as a counterforce to enactment of tobacco control laws (see chapter 8), but it can also be the target of action by governments. For example, the 1998 Master Settlement Agreement between 46 states and the tobacco industry placed restrictions on how that industry can advertise and promote its products, particularly the practices that appeared to be influential in promoting smoking among children and adolescents.[1] Tobacco advertising and promotions seek to portray tobacco use as a normative behavior—acceptable to the community and glamorous, sophisticated, or "cool" for the individual. These images directly contradict the ASSIST goals of creating a social environment in which smoking is non-normative.

To the extent that individuals understand the dangers of tobacco use and appreciate the utility of having laws related to it, they, or the organizations that they form and work through, may lobby governments to take action to pass such laws. Ultimately, by no longer purchasing tobacco products, individuals will have a profound influence on the tobacco industry.

No single factor or group of factors determines whether a youth becomes a smoker or an adult quits smoking. Rather, the individual is influenced by his or her environment and can act to change this environment at many levels: (1) within the family; (2) through organizations within the community; and ultimately (3) through new laws at the local, state, and national levels. Such laws frame the culture in the community with respect to tobacco use. At the same time, the tobacco industry is working diligently to counter any such efforts and to promote smoking within the population.

State Conditions Selected for the ASSIST Evaluation

Many factors could have been associated with tobacco control outcomes, and many were considered for the ASSIST evaluation. However, only a limited number could be included in the evaluation because there were only 51 units of observation (the 50 states and the District of Columbia). In addition, data needed to be available for every state, and those data had to be collected in a uniform manner. This requirement also limited the factors that could be considered for inclusion. For example, no consistent data were available on the resources the tobacco industry devoted to efforts against tobacco control in each state, so this important factor could not be included.

Data were aggregated into indices to reduce the number of covariates included in the statistical analysis. Chapter 2 describes the Strength of Tobacco Control (SoTC) measure, which included subscales for resources, capacity, and efforts. An index for the strength of clean indoor air legislation was developed (chapter 3), which was a component of the Initial Outcomes Index (IOI; chapter 4), along with cigarette price and the percentage of indoor workers who reported that their workplace was smoke free (chapter 4). It was hypothesized (chapters 2 and 9) that SoTC would reflect a state's implementation of tobacco control and that initial outcomes (IOI measures) would affect a state's likelihood of reducing tobacco use behavior, the main outcomes of interest (chapter 9).

Table 5.1. Variables Included in the ASSIST Evaluation Analysis

Variable	Data source
Demographic	
Women (%)	Census
Median age	Census
African American (%)	Census
Hispanic (%)	Census
Education above high school level (%)	CPS
Household income below poverty level (%)	Census
State population	Census
Living in a metropolitan area (%)	CPS
Indicator variables for region of country (Midwest, West, South, or Northeast)	CPS
Economic dependence on tobacco	
Gross state product derived from tobacco growing and manufacture (%)	See chapter 6

Notes: Demographic variables were for persons aged 18 years and older. CPS indicates Current Population Survey.

The state condition variables included in the ASSIST evaluation analyses were demographic factors and a measure of state economic dependence on tobacco. These measures are presented in table 5.1. The sections that follow review in more detail the association of these measures with tobacco use and the sources of these data.

Gender, Age, Race/Ethnicity, Education, Socioeconomic Status, and Geography

Smoking prevalence differs by gender, age, race/ethnicity, educational attainment, socioeconomic status, and geography.[2] A state's demographic profile could potentially affect the implementation and subsequent outcomes of a tobacco control program. For example, older age groups show lower prevalence than younger groups[3] partly because many smokers quit (or die) as they age. In this case a state with a significant number of older residents might have a lower smoking prevalence rate than other states. Alternatively, if tobacco control efforts prove consistently effective among adolescents, as some evidence indicates,[4–7] fewer young people will mature to adulthood as smokers, and over time adult smoking prevalence will fall as a result. In this example, states that have younger populations might show more rapid reductions in smoking prevalence.

The California experience provides evidence that state tobacco control programs can affect youth initiation in this way. Nationally, smoking prevalence among youth rose between 1991 and 1997, when it began to decline again.[8] In contrast, although youth prevalence rates rose in parallel with the national average, they remained lower in California. In addition, the downward trend in youth prevalence began two years earlier in California (in 1995) than in the nation as a whole.[9] This

Demographics and Smoking Cessation

Smokers are increasingly concentrated in lower socioeconomic groups,[a] but it is unknown whether this is a result of poorer access to cessation interventions or increased resistance to quitting. A number of studies summarized in *Women and Smoking: A Report of the Surgeon General*[b] suggest that women may have more difficulty successfully quitting than men, but ASSIST appeared to affect quitting among women more than men (see chapter 9). Historically, African Americans have also had a more difficult time successfully quitting.[c,d,e] Greater difficulty in quitting for this subpopulation may result in slower declines in prevalence for states with large African American populations than would be expected from reduced youth initiation. Finally, some demographic groups (e.g., females) may also not benefit to the extent that others do from pharmaceutical aids for cessation.[f]

[a]Burns, D. M., and K. E. Warner. 2003. Smokers who have not quit: Is cessation more difficult and should we change our strategies? In *Those who continue to smoke* (Smoking and tobacco control monograph no. 15, NIH publication no. 03-5370), 11–31. Bethesda, MD: National Cancer Institute.

[b]U.S. Department of Health and Human Services. 2001. *Women and smoking: A report of the surgeon general.* Washington, DC: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

[c]Royce, J. M., N. Hymowitz, K. Corbett, T. D. Hartwell, and M. A. Orlandi. 1993. Smoking cessation factors among African Americans and whites. COMMIT Research Group. *American Journal of Public Health* 83 (2): 220–26.

[d]Ahluwalia, J. S. 1996. Smoking cessation in African-Americans. *American Journal of Health Behavior* 20 (5): 312–18.

[e]U.S. Department of Health and Human Services. 1998. *Tobacco use among U.S. racial/ethnic minority groups—African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A report of the surgeon general.* Washington, DC: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

[f]Gonzales, D., W. Bjornson, M. J. Durcan, J. D. White, J. A. Johnston, A. S. Buist, D. P. Sachs, et al. 2002. Effects of gender on relapse prevention in smokers treated with bupropion SR. *American Journal of Public Health* 22 (4): 234–39.

difference has been attributed to the California tobacco control program, which began prior to ASSIST but shared many of the same goals and components.

A measure of the state's Hispanic and African American populations was included in the analysis. Hispanic populations show overall lower rates of smoking because the low smoking rates among women in these groups more than offset high rates among men,[10,11] and states with large populations of Hispanics may have lower prevalence rates. In the past, African Americans exhibited higher prevalence rates than most other minority groups except Native Americans,[11] but the gap between African Americans and non-Hispanic whites has narrowed in recent years: in 2001, adult prevalence for African Americans fell below that for non-Hispanic whites.[12] Additionally, African American youth have shown lower rates of initiation in recent years[10] and perhaps are now maturing to adulthood

as confirmed never smokers. Previous research has suggested that some African Americans delayed smoking initiation into the young adult years.[8] Thus, states with large populations of African Americans may show relatively more rapid declines in prevalence than other states, because fewer African Americans are becoming smokers.

Individuals with higher levels of educational attainment are less likely to ever initiate smoking and are more likely to quit than are individuals who are less well educated.[2,13–15] In general, lower socioeconomic groups have higher rates of smoking than other socioeconomic groups.[16,17] However, some studies have shown that after accounting for educational attainment as an indicator of socioeconomic status, many of the racial/ethnic effects described above are considerably diminished.[14,16,18] Midwestern and southern states, compared with eastern and western states, tend to have higher smoking prevalence.[12] If these rates are attributable to socioeconomic rather than to racial/ethnic indicators, different conclusions about the potential effects on a state's population will be reached.

Economic Dependence on Tobacco

The extent to which tobacco growing and manufacturing contribute to a state's economy may play a role in that state's culture regarding tobacco use and its political will to undertake tobacco control. When tobacco is part of a state's history and identity, residents may be less inclined to recognize its dangers and may be more supportive of smoking. If a significant proportion of the workforce is engaged in tobacco production or manufacturing, people may not support tobacco control for fear of job loss. Also, the state government would want to protect its revenue stream gained from this industry and protect its workers.

Research suggests that states that have economies that are highly dependent on tobacco are less likely to adopt strong tobacco control measures. For example, in 2002, the average of state cigarette excise tax rates in the seven largest tobacco-growing states (Georgia, Kentucky, North Carolina, South Carolina, Tennessee, West Virginia, and Virginia) was 9.5¢ per pack, whereas the average in the remaining states and the District of Columbia was more than 69¢ per pack, a differential that has grown significantly over the past several decades.[19] Similarly, Chaloupka and Saffer,[20] using data from 1975 through 1985, found that states with greater per capita production of tobacco were less likely to adopt laws restricting cigarette smoking in a variety of public places, including restaurants, as well as in private workplaces, with the latter effect statistically significant. Likewise, Ohsfeldt, Boyle, and Capilouto[21] found that the per capita value of state tobacco production was negatively associated with strength of smoking restrictions and cigarette excise tax rates.

The degree to which tobacco growing and manufacturing affect state economies is controversial. Much of this research has been sponsored by the tobacco industry, and critics of these studies argue that they are overestimates. For example, Warner and Fulton[22] argue that the multiplier effect significantly overstates the economic impact of tobacco, since it implicitly assumes that

the money spent on tobacco would not be spent elsewhere. When allowing for a redistribution of money spent on tobacco to spending on other goods and services in the absence of tobacco, Warner et al.[23] found that most of the states would actually see increased employment in the absence of tobacco. Tobacco-related jobs from growing, wholesaling, and retailing would be replaced by similar or better jobs related to other goods and services in the absence of tobacco. Thus, it appears that the tobacco industry tries to overstate the economy's dependence on tobacco in order to dissuade individuals and governments from taking any action to control tobacco use.

Data Sources

Demographics

Individual-level data within each state were from the 1992–93, 1995–96, and 1998–99 Current Population Surveys (CPS),[24] conducted in September, January, and May of each period. The U.S. Bureau of the Census continuously conducts these surveys to monitor the labor force, covering the civilian, non-institutionalized population of persons aged 15 years and older in the United States.[24] These household surveys select a stratified probability sample of clusters of households identified from the Census Bureau and other sources. The survey design calls for surveying about 56,000 households per month, and each household is part of a panel that is interviewed eight times over a 16-month period. However, all respondents in the above months were interviewed only once, in one of the

three months listed above. The surveys from these months included a special Tobacco Use Supplement (TUS-CPS) sponsored by the National Cancer Institute specifically for the ASSIST evaluation.[25] About a quarter of the interviews were conducted in person (first or fifth time in a panel); the remainder were conducted by telephone (second, third, fourth, sixth, seventh, or eighth time in a panel). One household resident provided the demographic information for all household residents. The individual-level demographic data were used in the first stage of the two-stage analysis of adult smoking prevalence (see chapter 9).

The data on smoking prevalence and the percentage of indoor workers with smoke-free workplaces were aggregated by state from the TUS-CPS (see chapters 3 and 4). The main part of the CPS was the source of data for one individual-level variable (percentage with above a high school education) and two state-level demographic variables (percentage living in a metropolitan area and region of the country); again, data were summarized for persons aged 18 years and older within each state. The other demographic variables were from the U.S. Bureau of the Census (the economic dependence on tobacco variable is described briefly below and more fully in chapter 6).

The baseline mean values of the variables listed in table 5.1 as well as others (e.g., smoking prevalence) are compared between the ASSIST and non-ASSIST states in table 9.1 (see chapter 9). The baseline values of each variable in table 5.1 for each state are presented in appendix 5.A. Appendix 9.C (see chapter 9) presents adult (aged 18 years and

older) smoking prevalence obtained from the TUS-CPS for each state. It also presents the per capita cigarette consumption from sales data aggregated over the months of the CPS (September through May) for each TUS-CPS period. This aggregation allowed per capita cigarette consumption to be examined in the same time periods as tobacco use prevalence. The actual bimonthly per capita consumption data are available on the University of California Social Science Data Collection Web site.[26] Prevalence and consumption, in addition to being the outcomes of interest, are indicators of the tobacco use culture in each state prior to the ASSIST intervention.

Economic Dependence on Tobacco

Each state's economic dependence on tobacco was computed using a procedure that is fully described in chapter 6. During the period covered by the evaluation, 16 states grew appreciable amounts of tobacco, with 6 states (North Carolina, Kentucky, Tennessee, South Carolina, Virginia, and Georgia) accounting for most of the total. Appreciable levels of cigarette and other tobacco product manufacturing occurred in 24 states. Seven states (North Carolina, Virginia, Kentucky, Georgia, Florida, New York, and Tennessee) accounted for the majority of employment in tobacco product manufacturing, with 5 others (Alabama, Connecticut, Illinois, Pennsylvania, and West Virginia) accounting for much of the remaining employment. Four of the ASSIST states (North Carolina, South Carolina, Virginia, and West Virginia) had significant economic dependence on tobacco.

The measure used in the ASSIST evaluation was obtained by summing the estimates for employment/compensation and for tobacco manufacturing for each year of interest for each state. Some states had a zero for one or both measures. The final estimates were scaled so that the sum of state estimates equaled published estimates for the entire United States for each year. Finally, the estimates were divided by the total gross state product, and the results were summed to form the tobacco-dependence measures used in the ASSIST evaluation analyses.

As a preview to chapter 9, which presents the analysis of the final outcomes (state smoking prevalence and per capita consumption), none of the state-level conditions were significantly associated with smoking prevalence. This occurred because the data on smoking prevalence had been adjusted at the individual level for the demographic variables before the state-level analysis was conducted. Thus, when adjustment was made for the relationship between demographics and smoking status at the individual level, these factors were not important in explaining variation in prevalence at the state level. The analysis of per capita cigarette consumption from tobacco sales data could be conducted only at the state level. In these analyses, several variables contributed significantly to the observed differences among states: percentage Hispanic, percentage with incomes below poverty, and percentage of gross state product derived from tobacco growing and manufacturing.

Other Potential Covariates

In this section, other factors that could potentially affect tobacco control efforts and outcomes are discussed. Since it is the individual who uses tobacco, individual characteristics that have been differentially associated with tobacco use are first described. For example, the potential impact of a tobacco control program may be limited if a state's population has a disproportionate number of difficult-to-affect individuals (e.g., a large fraction of smokers who are highly nicotine dependent). Next, factors that influence the individual in the relatively immediate environment are summarized, and a section follows that describes conditions at the state level, other than population composition, that could also modify a state's ability to adopt and carry out tobacco control policy.

Family

Families share genes and environments, both of which can affect smoking behavior. There is evidence that genetic characteristics may play a role in determining which individuals become dependent smokers.[27,28] Genetic characteristics may also contribute to increased difficulty in quitting for some smokers[29,30] or may modify the potential effectiveness of pharmaceutical aids for smoking cessation.[31] It is currently unknown whether genetic factors co-vary with any particular population subgroups in such a way as to influence tobacco control success.

Although the influence of genetic characteristics on smoking dependence requires further investigation, current data clearly indicate that the culture within the family plays a role in smoking behavior. Parental smoking is an important determinant of adolescent smoking uptake.[32,33] Furthermore, in families in which the parents had quit smoking before children were born or when the children were very young, those children are less likely to smoke as adolescents.[34] Parents are important role models for smoking, and when they smoke their behavior conveys to children that smoking is acceptable and has certain benefits (e.g., relaxation, relief from stress).

In addition to influencing smoking uptake, having other smokers in the family may make it more difficult for someone to quit[35,36] by providing both a cue to smoke and a ready source of cigarettes.[37]

Religious Community

Religious beliefs and practices affect tobacco use. Abstinence from tobacco is one of the fundamental beliefs of the Seventh-Day Adventist Church[38] and the Church of Jesus Christ of the Latter-Day Saints (Mormons).[39] At the individual, family, and community levels, these religious communities directly affect smoking behavior. Research indicates that strict religious and moral prohibitions on risky activities such as smoking are congruent with the philosophy of "the body is a temple," which leads to fewer people engaging in such behaviors.[40] There is also evidence that young adults who attend religious services relatively frequently have lower smoking rates than those who do not attend such services.[41]

Where particular religious communities dominate, they can influence state

smoking prevalence rates. For example, although there are more Seventh-Day Adventists on the West Coast and in the southern United States than in any other region of the United States, they do not predominate in any one state,[42] and their numbers are relatively small. In contrast, over 70% of Utah residents were Mormon during ASSIST[43] and, not surprisingly, Utah was the state with the lowest smoking prevalence in the late 1990s.[12]

Local Government

As mentioned earlier, the more supportive a population is of tobacco control measures, the more likely it is that local tobacco control policy will be enacted. In California, momentum to enact smoke-free policies was created and propagated at the local level. The key players in this movement were the voluntary organizations, together with other coalitions of health-conscious citizens. This resulted in a state law being enacted in 1995 that prohibited smoking in nearly all indoor workplaces, which was extended in 1998 to include bars and gaming rooms.

Such activity at the local level is feared by the tobacco industry because it cannot effectively lobby local governments in every community, both small and large, throughout the nation.[44] The tobacco industry response has been to lobby for legislation and to support candidates at the state level in an effort to see that laws are passed that preempt stronger laws from being passed at the local level.[44–46] However, voluntary health organizations such as the American Heart Association, the American Lung Association, and the American

Cancer Society continue to be active at both the local and state levels working for laws that can further tobacco control and improve public health.

The various individual and immediate environmental characteristics summarized above could affect tobacco control success at the state level, depending on whether the state's populations consist of relatively larger or smaller proportions of these demographic groups. States with high smoking prevalence rates may have higher percentages of families with multiple smokers, which make smoking more culturally accepted and raise barriers to quitting. Alternatively, in states with relatively low prevalence, the social pressure on the remaining smokers to quit might be considerable. Despite considerable research, there is little evidence that the remaining smokers are those who are more addicted and therefore less able to quit.[3,47]

Dominant State Political Philosophy

Ideology, party politics, and political participation are closely tied in the various states.[48,49] Political ideology is often focused on whether the responsibility for health belongs with the individual or with society.[50–52] Other political ideologies characterize governments within the context of conservative or liberal tendencies or positions that historically have been affiliated with political parties.[48]

The political party dominating a state may affect whether tobacco control legislation is implemented. For example, Ohsfeldt, Boyle, and Capilouto[21] found a significant relationship between political liberalism, the strength of a state's

Politically Active Citizens and Tobacco Control

One study suggests that a politically active citizenry may be associated with support for tobacco control, irrespective of political affiliation. Chaloupka and Saffer[a] used a measure of the political participation of state residents in their analysis of the determinants of state restrictions on smoking. They found that the probability of adopting relatively stringent restrictions on smoking was significantly higher in states where a greater percentage of the state population was politically active, as measured by the percentage of the state population voting in elections for the U.S. House of Representatives.

[a]Chaloupka, F. J., and H. Saffer. 1992. Clean indoor air laws and the demand for cigarettes. *Contemporary Policy Issues* 10:72–83.

restrictions on cigarette smoking, and the level of cigarette excise taxes. Chriqui[53] found that Republican-controlled state legislatures were significantly less likely to enact laws designed to restrict minors' access to tobacco products than were states whose legislatures were controlled by the Democratic Party or were divided between the parties.

It is possible that when efforts to enact tobacco control legislation are successful in a few states, other states will be encouraged to work toward similar measures. For example, Weller[54] notes that the success of tobacco tax initiatives in Massachusetts, California, and Arizona encouraged tobacco control advocates and legislators to pursue a similar strategy in Oregon. This spillover effect may also explain why increasing numbers of states have recently been able to enact comprehensive smoke-free workplace

legislation (including bars and clubs). California was the first and, for several years, the only state with such a law, but by early 2006, ten additional states (Connecticut, Delaware, Maine, Massachusetts, Montana, New Jersey, New York, Rhode Island, Vermont, and Washington) had put such laws in place, and a number of other states are in the process of enacting such legislation.

State Wealth

A few studies have investigated state resources and finances as determinants of state tobacco control efforts, although the measures used have not been consistent. Using state per capita total government expenditures as a global measure of the state's ability to support tobacco control efforts, Ohsfeldt, Boyle, and Capilouto[21] found that states that spent more per capita were more likely to adopt stronger restrictions on smoking as well as have higher cigarette excise taxes. Other studies focused specifically on resources available for tobacco control activities. Wakefield and Chaloupka[55] showed that program success in reducing youth smoking was dependent on the extent of implementation and the degree to which such efforts were undermined by the tobacco industry and by other state funding priorities.

Funding for tobacco control was one component of the SoTC measure described in chapter 2. Table 5.2 shows the amount of money spent per capita on tobacco control in each state from 1991 through 1998, which spans the ASSIST intervention period. In 1991, only California showed appreciable spending for tobacco control. By 1993, the ASSIST

Table 5.2. Per Capita Funding ($/Person) for Tobacco Control in Each State, by Year
(Shading indicates ASSIST states.)

State	1991	1992	1993	1994	1995	1996	1997	1998	Change 1991–98
AK	0.00	0.00	0.00	0.88	1.06	1.02	1.00	1.09	1.09
AL	0.01	0.00	0.01	0.06	0.06	0.06	0.04	0.11	0.10
AR	0.01	0.00	0.00	0.05	0.05	0.05	0.05	0.14	0.13
AZ	0.02	0.03	0.01	0.07	0.16	3.05	5.12	7.49	7.47
CA	6.43	2.81	3.90	2.85	2.17	2.12	4.94	5.91	−0.52
CO	0.19	0.18	0.39	0.54	0.53	0.48	0.47	0.43	0.24
CT	0.00	0.01	0.01	0.05	0.03	0.03	0.10	0.18	0.18
DC	0.02	0.04	0.02	0.53	0.44	0.00	0.34	0.84	0.82
DE	0.01	0.02	0.01	0.12	0.15	0.14	0.37	0.76	0.75
FL	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.04	0.04
GA	0.00	0.01	0.00	0.02	0.03	0.02	0.04	0.09	0.09
HI	0.06	0.09	0.12	0.40	0.22	0.21	0.41	0.64	0.58
IA	0.01	0.01	0.00	0.08	0.08	0.08	0.14	0.19	0.18
ID	0.24	0.21	0.18	0.33	0.16	0.16	0.15	0.30	0.06
IL	0.00	0.00	0.00	0.04	0.05	0.05	0.09	0.16	0.16
IN	0.11	0.11	0.13	0.18	0.25	0.21	0.24	0.25	0.14
KS	0.00	0.00	0.00	0.18	0.26	0.25	0.25	0.21	0.21
KY	0.00	0.00	0.00	0.04	0.05	0.07	0.11	0.20	0.20
LA	0.00	0.00	0.00	0.06	0.05	0.05	0.05	0.07	0.07
MA	0.12	0.15	0.15	17.42	14.77	14.16	12.70	7.25	7.13
MD	0.00	0.00	0.00	0.06	0.07	0.08	0.09	0.13	0.13
ME	0.30	0.29	0.70	0.83	0.81	0.80	0.80	0.80	0.50
MI	0.16	0.21	0.30	0.35	0.20	0.20	0.20	0.20	0.04
MN	0.46	0.44	0.63	0.60	0.85	0.69	0.67	0.99	0.53
MO	0.10	0.09	0.21	0.29	0.28	0.25	0.28	0.29	0.19
MS	0.00	0.00	0.00	0.04	0.04	0.04	0.03	0.15	0.15
MT	0.00	0.00	0.00	0.37	0.31	0.30	0.29	0.50	0.50
NC	0.12	0.12	0.27	0.34	0.25	0.25	0.29	0.29	0.17
ND	0.02	0.02	0.00	0.52	0.41	0.40	0.39	0.66	0.64
NE	0.00	0.00	0.00	0.25	0.28	0.31	0.34	0.41	0.41
NH	0.00	0.00	0.00	0.27	0.27	0.26	0.25	0.35	0.35
NJ	0.09	0.08	0.16	0.22	0.20	0.23	0.25	0.12	0.03
NM	0.36	0.33	0.62	0.75	0.68	0.67	0.66	0.66	0.30
NV	0.00	0.00	0.00	0.11	0.15	0.11	0.06	0.20	0.20
NY	0.07	0.06	0.13	0.15	0.13	0.12	0.14	0.14	0.07
OH	0.00	0.00	0.00	0.04	0.03	0.03	0.05	0.09	0.09
OK	0.00	0.00	0.00	0.06	0.05	0.05	0.05	0.15	0.15
OR	0.01	0.02	0.03	0.09	0.08	0.13	0.16	0.26	0.25
PA	0.05	0.00	0.00	0.03	0.01	0.03	0.03	0.05	0.00
RI	0.48	0.45	0.83	1.07	0.93	1.06	1.11	1.33	0.85
SC	0.32	0.37	0.39	0.35	0.26	0.32	0.32	0.31	−0.01
SD	0.02	0.04	0.03	0.15	0.13	0.12	0.12	0.48	0.46
TN	0.00	0.00	0.00	0.02	0.02	0.01	0.01	0.06	0.06
TX	0.02	0.03	0.03	0.05	0.02	0.02	0.02	0.04	0.02
UT	0.27	0.34	0.32	0.42	0.14	0.13	0.21	0.30	0.03
VA	0.07	0.07	0.16	0.21	0.21	0.22	0.23	0.19	0.12
VT	0.02	0.00	0.00	0.30	0.38	0.37	0.35	0.77	0.75
WA	0.14	0.13	0.28	0.33	0.34	0.31	0.32	0.31	0.17
WI	0.12	0.12	0.30	0.39	0.30	0.28	0.31	0.32	0.20
WV	0.23	0.22	0.46	0.64	0.73	0.58	0.64	0.58	0.35
WY	0.00	0.00	0.00	0.28	0.17	0.16	0.16	0.62	0.62

Sources: National Cancer Institute, ASSIST Program Office. Farrelly, M. C., T. F. Pechacek, and F. J. Chaloupka. 2003. The impact of tobacco control program expenditures on aggregate cigarette sales: 1981–2000. *Journal of Health Economics* 22 (5): 843–59.

states began to show increases in funding. However, by the end of the period, all states were spending something, and a number of non-ASSIST states had increased their spending, some to approximately the same level as that of some ASSIST states. Arizona in particular showed a huge increase. In 1998, the mean per capita expenditure for tobacco control in ASSIST states was $0.85 ($SE = 0.47$), compared with $0.70 ($SE = 0.30$) in non-ASSIST states, which represents a change from 1991 of $0.65 ($SE = 0.47$) and $0.48 ($SE = 0.21$), respectively.

The information outlined in this section indicates that a state's political environment and wealth can influence its ability to enact tobacco control policy. Some states tend to support tobacco control, probably because they recognize a role for government in this area. Alternatively, other states may be more likely to view smoking as an individual choice and may be more influenced by tobacco industry efforts working against tobacco control. States with a high prevalence of persons of low socioeconomic status may take in less revenue and therefore have fewer resources to devote to tobacco control. Unfortunately, low socioeconomic status is associated with high smoking rates. Finally, states with greater economic dependence on tobacco may perceive that their interests lie in protecting tobacco rather than instituting tobacco control policies, and the tobacco industry endeavors to reinforce this view.

Summary

This chapter describes how characteristics of individuals, population composition, and conditions at the state level can mediate the ultimate effectiveness of tobacco control efforts. States with relatively greater representation in their populations of certain demographic groups more resistant to smoking cessation or susceptible to smoking uptake may not reduce prevalence to the same extent as other states, even with the same level of resources available for tobacco control.

However, resources for tobacco control differ by state and are part of the underlying state conditions that dictate how fast progress can be made. A state's political climate, general wealth, economic dependence on tobacco, and normative outlook regarding the acceptability of smoking all potentially influence that state's ability to reduce tobacco use. Another factor affecting tobacco control progress is the extent of counteractivity from the tobacco industry. An adequate interpretation of the findings from evaluations of tobacco control programs requires an appreciation of the implications related to all of these factors with respect to tobacco control success.

While appropriate measures of many important state conditions are lacking, the ASSIST analysis (chapter 9) was able to adjust for differing state demographic profiles (gender, age, race/ethnicity, education, poverty level, etc.) and included a composite variable for each state's economic dependence on tobacco (see chapter 6).

Program evaluators need to be aware of the issues raised in this chapter and look for success or lack of success in subgroups within the population before

concluding that a program had little or no effect. This evaluation process can reveal new areas where improved or tailored interventions are necessary and thus inform the design of future tobacco control strategies.

Conclusions

1. Economic and demographic factors are important state conditions that may affect tobacco control interventions. Demographic factors and state economic dependence on tobacco were measured and were used as covariates for the ASSIST evaluation analysis.

2. State demographic factors, developed from census and population survey data, included gender, age, race and ethnicity, education, income, state population, metropolitan area representation, and region. Because such factors have been historically related to differences in smoking prevalence and consumption levels, they can affect long-term changes in the outcomes of tobacco control interventions.

3. State economic dependence on tobacco represented a gross state product derived from tobacco growing and manufacturing. During the timeframe of ASSIST, the influence of this dependence could be observed in areas such as the lower level of tobacco control policy outcomes—for example, increases in cigarette taxes and enactment of clean indoor air laws—in major tobacco-growing states.

4. Several of the state conditions used in the ASSIST evaluation analysis did show a significant relationship with levels of per capita cigarette consumption. Because demographic factors were used to adjust state-level prevalence rates, these factors were already accounted for in the evaluation analysis.

5. Other state-level conditions, such as family, religion, wealth, and political affiliation, represent promising future areas for exploring the relationship between population demographics and health outcomes relating to the use of tobacco.

Appendix 5.A. Baseline Values for Variables Considered in the ASSIST Evaluation Analyses

(Shading indicates ASSIST states.)

State	Female (%)	Median age	African American (%)	Hispanic (%)	Education at or above high school (%)	Below poverty (%)	State population	Metropolitan (%)	Index of Economic Dependence on Tobacco
AK	46.7	38	3.8	3.0	55.2	9.1	409,021	48.0	0
AL	53.2	42	22.9	0.6	36.7	17.4	3,124,244	63.8	0.342722
AR	52.9	43	13.8	0.8	34.2	20.0	1,788,260	40.0	0
AZ	51.3	41	2.7	16.6	51.9	15.4	2,895,613	79.3	0
CA	50.4	39	6.7	23.6	49.8	18.2	22,610,825	96.0	0.002424
CO	51.1	40	3.7	11.4	56.7	9.9	2,615,886	83.3	0
CT	52.4	42	7.3	5.7	49.0	8.5	2,492,818	93.5	1.107191
DC	54.1	40	61.8	5.5	50.5	26.4	461,735	100.0	0
DE	52.3	41	15.6	2.2	45.2	10.2	525,876	65.4	0
FL	52.4	44	11.3	12.3	45.5	17.8	10,507,267	91.1	0.298797
GA	52.4	40	24.9	1.8	42.8	13.5	5,045,636	66.9	11.13065
HI	49.5	41	2.5	6.3	50.5	8.0	863,260	72.3	0
IA	52.4	43	1.5	1.1	43.2	10.3	2,095,129	47.7	0
ID	50.9	41	0.3	4.8	48.2	13.1	769,924	23.5	0
IL	52.3	41	13.4	7.2	46.1	13.6	8,674,831	83.1	0.197492
IN	52.4	41	7.1	1.6	34.6	12.2	4,240,393	65.4	0.32914
KS	51.7	42	5.2	3.4	48.9	13.1	1,865,017	61.1	0
KY	52.6	41	6.6	0.6	35.4	20.4	2,829,299	43.5	34.32137
LA	53.0	41	28.0	2.4	40.0	26.4	3,059,288	77.4	0
MA	52.9	41	4.2	4.1	51.6	10.7	4,609,469	91.0	0.060287
MD	52.3	40	23.9	2.7	46.1	9.7	3,699,137	98.1	0.175933
ME	52.2	42	0.4	0.5	42.0	15.4	931,807	34.9	0
MI	52.4	41	12.9	1.9	44.7	15.4	7,021,665	80.1	0
MN	51.7	41	1.9	1.1	48.2	11.6	3,298,907	69.3	0
MO	52.8	42	9.8	1.1	41.9	16.1	3,878,349	69.6	0.071814
MS	53.5	41	32.0	0.6	39.7	24.7	1,886,630	28.9	0
MT	51.1	43	0.3	1.3	48.7	14.9	606,971	23.6	0
NC	52.3	41	20.1	1.1	41.8	14.4	5,229,560	54.1	65.14254
ND	50.7	42	0.5	0.6	49.9	11.2	466,205	43.6	0
NE	52.1	42	3.2	2.3	46.2	10.3	1,175,012	46.3	0
NH	51.8	40	0.5	0.9	51.0	9.9	835,095	59.6	0
NJ	52.6	42	12.1	9.4	46.1	10.9	5,963,048	100.0	0.030058
NM	51.5	41	1.8	35.8	46.5	17.4	1,132,096	54.2	0
NV	49.3	41	5.8	9.8	46.4	9.8	1,024,116	88.1	0
NY	53.0	41	13.4	11.6	45.9	16.4	13,674,145	91.3	1.104069
OH	52.8	42	9.9	1.2	40.5	13.0	8,234,828	79.3	0.17161
OK	52.2	42	6.7	2.4	44.4	19.9	2,363,718	59.3	0
OR	51.5	42	1.4	3.6	53.7	11.8	2,260,603	73.0	0
PA	53.1	43	8.4	1.7	37.0	13.2	9,145,540	83.2	0.215757
RI	53.0	42	3.1	4.2	44.5	11.2	762,522	92.2	0
SC	52.5	41	27.1	0.9	38.7	18.7	2,696,448	65.6	2.839496
SD	51.5	42	0.5	0.7	44.8	14.2	510,020	17.9	0
TN	52.9	42	14.4	0.7	35.8	19.6	3,813,635	65.2	4.249443
TX	51.5	39	11.0	23.5	45.1	17.4	12,812,537	84.4	0.016489
UT	51.2	38	0.7	4.8	54.6	10.7	1,214,648	87.0	0
VA	51.7	40	17.8	2.6	47.2	9.7	4,881,939	72.3	29.20964
VT	51.8	41	0.3	0.7	46.0	10.0	428,251	24.0	0
WA	51.0	41	2.8	3.9	56.4	12.1	3,866,788	77.3	0
WI	51.9	41	4.2	1.6	43.8	12.6	3,721,995	57.6	0.200908
WV	53.0	44	2.9	0.5	28.0	22.2	1,384,643	40.8	0.899024
WY	50.3	41	0.7	5.0	49.8	13.3	332,679	19.6	0

Note: Demographic factors are for those aged 18 years and older.

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6. Measuring the Impact of Tobacco on State Economies

Lan Liang, Frank J. Chaloupka, and Kathryn Ierulli

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Table and Figures

6. Measuring the Impact of Tobacco on State Economies

On the basis of available evidence, states' economic dependence on tobacco can be shown to be a factor countervailing the efforts of upstream, policy-based interventions such as those of the American Stop Smoking Intervention Study (ASSIST). In areas such as tobacco excise taxes and the adoption of tobacco control policies, there are substantial differences between national averages and those of tobacco-producing states. Therefore, a state-level variable representing the state's economic dependence on tobacco farming and manufacturing was developed for use as a covariate in the ASSIST evaluation regression analyses.

This chapter outlines the issues and assumptions leading to the development of this economic dependence variable, which was based on the economic contribution of tobacco growing and manufacturing, within a broader context including factors such as tobacco consumption, exporting, and importing. The chapter also examines research on the state-level economic impact of tobacco, the wide divergence in assumptions and outcomes between industry-sponsored and non–industry-sponsored studies, and trends toward a continued diminishing impact of tobacco on state economies over time.

Introduction

This chapter describes the development of a measure for state economic dependence on tobacco, as a covariate factor in the analyses performed for the ASSIST evaluation model.[1] It contains some basic background information on tobacco growing and manufacturing in the United States, describes studies by the tobacco industry and others that assess the economic contribution of tobacco to the national economy and the economies of individual states, reviews the methods used to construct state-level measures of the economic impact of tobacco for use in the ASSIST evaluation, and discusses these data and associated trends.

Tobacco has played an important role in the economy of the United States since the colonial era. American Indians presented Christopher Columbus with gifts of tobacco upon his arrival in 1492, and he introduced tobacco to Europe upon his return there. As demand rose in Europe, tobacco became the most important American agricultural export of the late eighteenth century.[2] High tobacco tariffs in England helped lead to the American Revolutionary War. Subsequently, the tobacco industry contributed significantly to the economic growth of the United States through much of the nineteenth and twentieth centuries.

Although the consumption of tobacco products has declined in recent years, tobacco growing and manufacturing continue to be important parts of several state economies, with a potential impact on the implementation of upstream, policy-based tobacco control

interventions in these states. Evidence such as the following suggests that the economic importance of tobacco plays a key role in shaping state tobacco control policies and activities, social norms about tobacco use, and, consequently, tobacco use itself:

- As of January 1, 2004, the four states with the lowest cigarette excise taxes per pack were Virginia (2.5¢), Kentucky (3¢), North Carolina (5¢), and South Carolina (7¢), all among the top tobacco-growing states. Since then, Virginia, Kentucky, and North Carolina have all significantly increased their cigarette excise taxes, while South Carolina still ranks among the lowest.
- The average cigarette excise tax in the six leading tobacco-growing states (Kentucky, North Carolina, Georgia, South Carolina, Tennessee, and Virginia) is currently 25.7¢ per pack, while the average in non–tobacco-growing states is 100.5¢ per pack. The overall average excise tax for all states as of February 2006 is 91.7¢.
- The strength of state clean indoor air laws in non–tobacco-growing states was nearly five times that in the six leading tobacco-growing states, as measured by a comprehensive index that accounts for state preemption in 1999.[3]

Limited empirical evidence supports the notion that the economic impact of tobacco on a state's economy can act as a barrier to the adoption of effective tobacco control policies. Chaloupka and Saffer,[4] for example, found that states with greater per capita production of tobacco were less likely to adopt laws restricting smoking, with a statistically significant effect on the adoption of only the most comprehensive restrictions. Similarly, Ohsfeldt and his colleagues[5] found that the per capita value of state tobacco production had a negative impact on the strength of state restrictions on smoking and on state cigarette excise taxes. As a result of findings such as these, a study was undertaken as part of the ASSIST evaluation that ultimately led to state-level economic dependence on tobacco being quantified as a covariate in the evaluation analysis.

Background

Tobacco Growing

The 2002 Census of Agriculture indicates that there were 56,977 farms that grew tobacco in the United States in that year, just under 2.7% of all U.S. farms.[6] These farms used 428,631 acres to grow tobacco—less than 0.5% of all farm acreage in the United States. This percentage was down sharply from the 93,530 farms and 837,363 acres reported in the 1997 Census of Agriculture. Tobacco farming generally has been quite profitable, with the typical farm that grows tobacco generating nearly four-fifths of its gross income from tobacco.[7] While these figures indicate a significant reduction in the number of tobacco farms and acreage devoted to tobacco growing, there has been a sharp rise in the average tobacco acreage per tobacco farm, with the average acreage per farm increasing by nearly two-thirds from 1987 to 2002.

Tobacco growing in the United States has been declining for several decades, and the rate of decline has been accelerating in recent years (see figure 6.1). Overall tobacco leaf production peaked at more than 2.3 billion pounds in 1963 and then declined gradually from 1963 through 1990. From 1990 through 1998, production was relatively stable, averaging about 1.6 billion pounds per year. Since 1998, however, overall leaf production has dropped sharply, falling by nearly 50%.
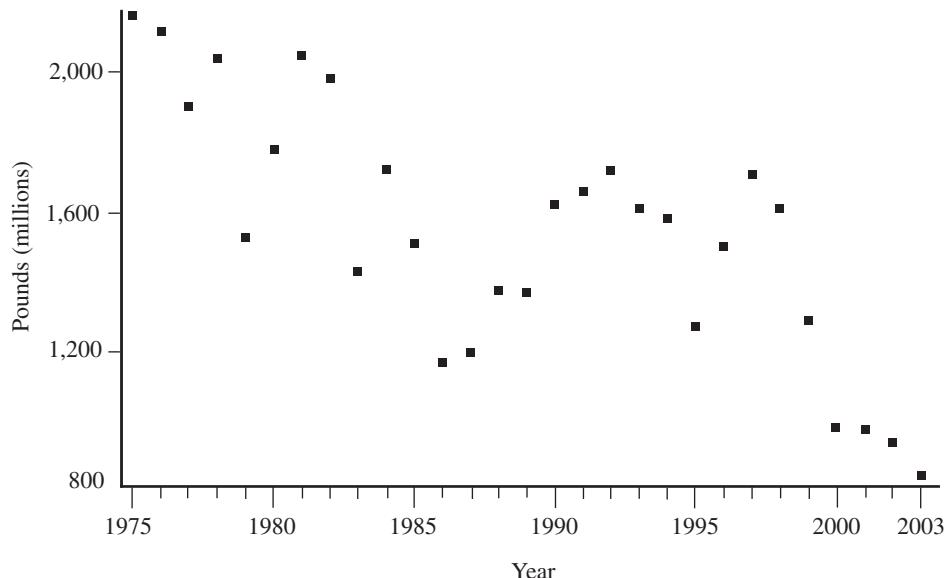
Several factors have contributed to the decline in overall tobacco leaf production in the United States (see figure 6.2):

- **Declining U.S. cigarette production.** U.S. cigarette production peaked at just over 750 billion cigarettes in 1996 and has declined sharply since then, falling to just under 500 billion cigarettes by 2003.

- **Reduced consumption.** U.S. cigarette consumption peaked at 640 billion cigarettes in 1981 and then declined steadily through the early 1990s before leveling off for several years. Since 1998, overall cigarette consumption has further declined by about 8%. Part of this decline is explained by tax and price increases, stronger tobacco control policies, and increased investments in tobacco control programs.

- **Increased cigarette imports.** Cigarette imports have risen over the past several years, from just under 3 billion cigarettes in 1996 to more than 23 billion cigarettes in 2003.

Figure 6.1. Tobacco Leaf Production

Source: USDA. 2003. *Tobacco situation and outlook yearbook.* Washington, DC: USDA, Market and Trade Economics Division, Economic Research Service; USDA. 2004. *Tobacco outlook.* Washington, DC: USDA, Economic Research Service.

A Small and Shrinking Fraternity: Tobacco Growing by the Numbers

Beyond the fact that tobacco farming has declined as a percentage of state revenue, the impact of these declines has been tightly concentrated. Although some form of tobacco is grown in nearly half of the U.S. states, the vast majority of tobacco leaf comes from a small number (6) of states, and the economies of those states are, in turn, affected disproportionately by the recent declines.

- Based on cash receipts from tobacco in 2002, the states most dependent on tobacco farming and manufacturing include (share of total cash receipts in parentheses) North Carolina (37.1%), Kentucky (26.3%), Tennessee (9.1%), Virginia (7.3%), South Carolina (6.2%), and Georgia (6.0%).[a] Other states with cash receipts from tobacco of at least $4 million in 2002 include Florida, Ohio, Indiana, Connecticut, Pennsylvania, Massachusetts, Wisconsin, Missouri, Maryland, and West Virginia. In total, this second group of states grows less than 8% of the tobacco crop in the United States.
- Despite the fact that 6 states account for the largest share of the overall U.S. tobacco crop, cash receipts from tobacco typically account for a relatively small percentage of receipts from all farm commodities; in 2002, the only state in which tobacco accounted for more than 10% of receipts from all farm commodities was Kentucky (at 14.4%).[a]
- Regional tobacco varieties represent a very small share of the overall market, including Southern Maryland, Virginia dark fire-cured, Kentucky-Tennessee fire-cured, Virginia sun-cured, Green River, One Sucker, Pennsylvania seedleaf filler, Connecticut Valley broadleaf binder, Wisconsin binder, and Connecticut Valley cigar wrapper. The vast majority of the tobacco grown in the United States is flue-cured and burley tobacco, accounting for approximately 61% and 33%, respectively, of tobacco leaf production in 2003.[b]

[a]U.S. Department of Agriculture. 2003. *Tobacco situation and outlook yearbook.* Washington, DC: Market and Trade Economics Division, Economic Research Service, U.S. Department of Agriculture.

[b]Capehart, T. 2004. *Tobacco outlook* (TBS-257, 09.17.04 Summary). Washington, DC: U.S. Department of Agriculture, Economic Research Service. http://usda.mannlib.cornell.edu/reports/erssor/specialty/tbs-bb/2004/tbs257.pdf.
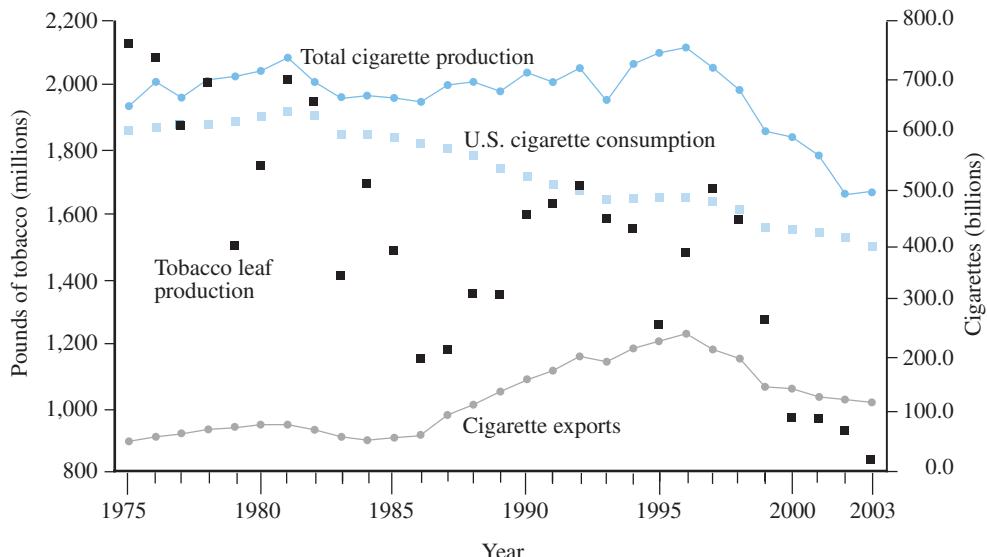
- **Decreased cigarette exports.** Much more of the recent decline in production is the result of the decline in cigarettes exported from the United States. Total exports peaked at nearly 244 billion cigarettes in 1996 but had fallen by more than half (to just over 121 billion cigarettes) in 2003. Much of this decline can be attributed to leading U.S. cigarette manufacturers' shifting production overseas in recent years.
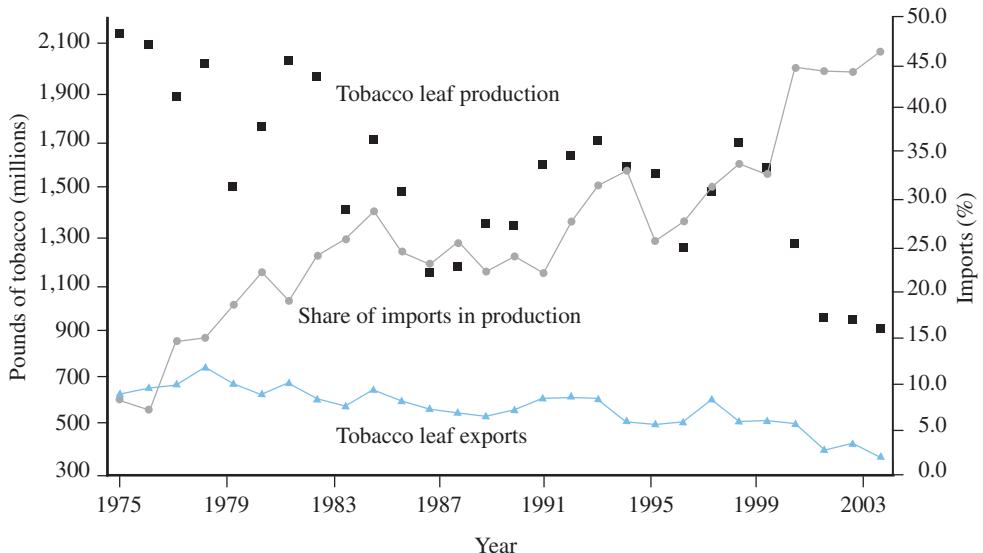
Changes in the global markets for tobacco leaf have also contributed to the decline in U.S. tobacco leaf production (see figure 6.3). One such change is the sharp increase in U.S. imports of foreign-grown tobacco leaf. Imports of flue-cured tobacco grew from an average of 15.6 million pounds per year in the early 1970s to an average of 192.6 million pounds per year for the most recently available 5 years (1998 through 2002); similar patterns exist for imports of burley tobacco (average of 19.0 million pounds per year in the early 1970s and 202.4 million pounds per year for 1998–2002).[8]

Consequently, the share of imported tobacco leaf used in U.S. cigarette

Figure 6.2. Tobacco Leaf Production and Cigarette Production, Consumption, and Exports

Source: USDA. 2003. *Tobacco situation and outlook yearbook.* Washington, DC: USDA, Market and Trade Economics Division, Economic Research Service; USDA. 2004. *Tobacco outlook*. Washington, DC: USDA, Economic Research Service.

Figure 6.3. Tobacco Leaf Production and Exports, and Imports' Share in U.S. Use

Source: USDA. 2003. *Tobacco situation and outlook yearbook*. Washington, DC: USDA, Market and Trade Economics Division, Economic Research Service; USDA. 2004. *Tobacco outlook*. Washington, DC: USDA, Economic Research Service; USDA. 2004. *U.S. tobacco import update*. Washington, DC: USDA, Economic Research Service.

production rose from less than 1% in the early 1970s to 46.3% in 2002.[8] At the same time, exports of U.S.-grown tobacco leaf have fallen by nearly half over the past 25 years, from a peak of 765 million pounds in 1978 to 384 million pounds in 2002.[8] The significant growth in tobacco farming in other countries and reductions in barriers to trade in tobacco leaf have greatly increased competition in the global tobacco markets, resulting in lower-priced and better-quality tobacco leaf. The relatively high U.S. tobacco leaf prices (in large part the result of the price support system in the United States) have contributed to the declines in both domestic and foreign demand for U.S.-grown tobacco leaf.

Tobacco Manufacturing

While tobacco leaf is the primary ingredient in tobacco products, it accounts for a very small share of the overall value of tobacco products. Gale and his colleagues[7] estimated that in 1997, domestically grown tobacco leaf accounted for about 2.3% of the total value of the tobacco products consumed in the United States. The largest share of this total, 43%, was the value added in tobacco product manufacturing—defined as the final value of the tobacco products produced minus the costs of the raw materials and intermediate products used in producing tobacco, such as tobacco leaf, papers, filters, and packaging materials. A relatively small share of this percentage was labor costs (just over 6%), whereas a much larger share went to advertising (almost 20%). Capital costs (including profits) accounted for much of the remainder of the manufacturing share, while

wholesale and retail value added and federal, state, and local taxes accounted for the rest of the overall value.

There are three primary types of manufacturing related to tobacco: stemming and redrying, manufacturing cigarettes, and manufacturing other tobacco products. In contrast to the large number of tobacco farms, relatively few establishments are involved in tobacco manufacturing. On the basis of the most recently available data from the Census of Manufacturers, in 1997, 25 establishments owned by 14 companies were involved in tobacco stemming and redrying,[9] 13 establishments were owned by 9 companies involved in manufacturing cigarettes,[10] and 63 establishments were owned by 52 companies involved in manufacturing other tobacco products. Collectively, these establishments employed 33,620 persons, with cigarette manufacturing accounting for nearly two-thirds of the total.[9–11] Although tobacco product manufacturing involves relatively few people, the value added by manufacturers is significant. In 1997, the value added in production was $29.3 billion for manufacturing cigarettes, $2.7 billion for manufacturing other tobacco products, and $0.7 billion for stemming and redrying.

In contrast to tobacco farming, tobacco manufacturing takes place in a small number of states. As with tobacco farming, however, most of the economic contribution of tobacco manufacturing is concentrated in even fewer states. Almost two-thirds of the value added from tobacco manufacturing in 1997 came from manufacturing in North Carolina (34.3%), Virginia (21.4%), and

Kentucky (9.8%). Other states in which tobacco products are manufactured include Alabama, Florida, Georgia, Illinois, Pennsylvania, Tennessee, and West Virginia.

Overall employment in tobacco manufacturing has been falling for several decades. In 1977, almost 61,000 persons were employed in tobacco manufacturing; by 2000, employment had fallen by more than half to just over 28,000 persons. As with the declines in tobacco leaf production, part of this decline in employment can be attributed to declines in overall U.S. cigarette production and consumption. In addition, much of the decline in employment is the result of tobacco industry actions, including increased automation of production processes (a longstanding trend)[12] and the shifting of production from the United States to other countries (particularly important in more recent years). Major factors behind the shift to overseas production include reductions in trade and investment barriers, the opening of previously closed markets (particularly in Asia and Central/Eastern Europe), lower labor and other operating expenses, and an interest in locating in expanding markets.

Studies on the Economic Impact of Tobacco

Tobacco-Industry-Sponsored Studies

The earliest studies on the impact of tobacco growing, manufacturing, and related activities on the U.S. and state economies were produced by the tobacco industry, and comparable studies have been produced in numerous other countries. Over the past 25 years, industry-commissioned studies in the United States have estimated the industry's contributions to employment, income, and tax revenues.[13–18] These studies have often been used in efforts to influence legislators in debates over tobacco control policies by arguing that stronger tobacco control policies and the resulting reductions in tobacco use would lead to significant job losses and reductions in income and tax revenues. More recently, reductions in industry settlement payments to the states have been added to the list of potential negative economic consequences of tobacco control policies (see the discussion on the Philip Morris USA Web site about the impact of state cigarette tax increases on Master Settlement Agreement payments).[19,20]

The tobacco-industry-sponsored studies typically conclude that tobacco makes a significant contribution to virtually every state economy. The methodologies used in these studies are similar. For example, the 1996 American Economics Group[18] study describes the economic impact of tobacco in multiple sectors: the core sector, the supplier sector, and the expenditure-induced sector.

- The *core sector* includes not only the growing of tobacco and the manufacturing of tobacco products but also the wholesale and retail distribution of tobacco products.
- The *supplier sector* is defined by the industries that are involved in producing goods and services that are used by those in the core sector, including those supplying paper products; fertilizer for tobacco

farmers; and gas, water, and electricity used in farming, manufacturing, and distribution.

- The *expenditure-induced sector* reflects the "multiplier" effects associated with the spending resulting from the incomes generated by those working in the core and supplier sectors, as well as effects resulting from government spending of excise and sales tax revenues from tobacco products, and personal and corporate income taxes and FICA taxes from those in the core and supplier sectors.

The 1996 American Economics Group report, the most recent industry-sponsored, publicly available report, describes the economic impact of to-bacco in 1994. This report concludes that tobacco generated over 1.8 million jobs that produced $54.3 billion in wages and benefits, while total taxes generated from tobacco were almost $36 billion. Most of tobacco's economic impact comes from the supplier and expenditure-induced sectors rather than the core sector. For example, jobs in the core sector ac-counted for less than one-quarter of the total, whereas incomes earned in the core sector accounted for just over one-sixth of the total. Similarly, according to American Economics Group estimates, less than half of the taxes generated by tobacco come from sales and excise taxes on tobacco products, with the ma-jority coming from personal, FICA, and corporate income taxes. Within the core sector, the jobs most clearly dependent on tobacco (those in tobacco growing, auction warehousing and distribution, and manufacturing) and the incomes they generate account for a small share

of the core sector totals (43.3% and 32.6%, respectively).

Non–Tobacco-Industry-Sponsored Studies

In recent years, the tobacco-industry-sponsored studies have been increasingly scrutinized, and several recent studies have concluded that the estimates produced by the tobacco-industry-sponsored studies significantly overstate the impact of tobacco on the U.S. and state economies.[21–25] The key difference between these studies and the tobacco-industry-sponsored studies results from the non–tobacco-industry-sponsored studies' focus on the net rather than gross economic impact of tobacco. Specifically, the non–tobacco-industry-sponsored stud-ies explicitly model the alternative economic activity that would result if resources used for tobacco were used for other economic activity. This per-spective is given little attention in the tobacco-industry-sponsored studies; for example, in the 1985 Chase Economet-rics study,[14] the authors acknowledge that money not spent on tobacco would be reallocated to other spending and that there would be virtually no difference at the national level between economic ac-tivity with and without tobacco.

Warner and Fulton[22] were the first to formally address this issue in their analy-sis of the economic impact of tobacco on the Michigan economy. Using a relative-ly sophisticated macroeconomic model (the REMI model developed by Regional Economic Models, Inc.) adapted for Michigan, Warner and Fulton forecast the effects on employment and income

under alternative scenarios ranging from accelerations in the rate of decline of tobacco use to the complete elimination of tobacco consumption. They then compared these forecasts with those assuming a continuation of the current trend in tobacco consumption. In each scenario, the money that would have otherwise been spent on tobacco was redistributed to spending on other goods and services on the basis of the typical spending patterns of Michigan consumers. Assuming a doubling in the rate of decline in tobacco use, Warner and Fulton[22] predict relatively modest gains in employment and incomes in Michigan. Under the more extreme assumption that tobacco consumption would be eliminated, they estimate an overall increase of about 5,600 jobs in Michigan and an increase in Michigan incomes of $226 million. These gains reflect the fact that Michigan is an importer of tobacco products and that, in the absence of tobacco, funds once spent on tobacco would be more likely to be spent on goods and services produced in Michigan, producing more jobs and higher incomes in Michigan.

As in Warner and Fulton's 1994 study,[22] Warner et al.[24] reallocated the money that would have been spent on tobacco to spending on other goods and services on the basis of regional consumption patterns. These estimates were compared with those generated by assuming that existing trends in tobacco use would continue. On the basis of their findings, Warner et al. conclude that industry claims about large job losses resulting from stronger tobacco control policies and programs and resulting declines in tobacco use are significantly

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The Regional Impact of Tobacco Economics

Warner and his colleagues[a] examined tobacco's net economic impact on regional economies, based on the eight regions defined by the U.S. Department of Commerce's Bureau of Economic Analysis, with the bureau's southeastern region divided into non–tobacco-growing and tobacco-growing/producing states. Modeling a period between 1993 and 2000, Warner et al. predict that

- A doubling of the downward trend in tobacco use would lead to a loss of 36,600 jobs in the southeastern tobacco region by 2000—only 0.2% of total employment in the region—with offsetting increases in the rest of the country.
- Even a total elimination of tobacco use would stabilize at slightly more than 1% of the employment in this region, while producing a net *gain* of jobs at a national level. Warner and colleagues predict a loss of about 303,000 jobs in the southeastern tobacco region in this case, stabilizing to 222,000 jobs by 2000 as the regional economy adjusted, but the number of jobs gained in other regions would rise to produce an overall increase of 133,000 jobs nationally.

[a]Warner, K. E., G. A. Fulton, P. Nicolas, and D. R. Grimes. 1996. Employment implications of declining tobacco product sales for the regional economies of the United States. *JAMA: The Journal of the American Medical Association* 275 (16): 1241–46.

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overstated and that the real economic impact of tobacco is relatively small.

These forecasts are consistent with observed economic activity in major tobacco-growing regions, as described by the United States Department of Agriculture (USDA) in 1997.[25] In its review, the USDA concludes that the declines

in tobacco production in the 1980s had relatively little impact on the economies of major tobacco-growing regions, with inflation-adjusted income rising by 28% on average in all U.S. tobacco-growing counties from 1979 through 1989. The USDA study attributes this result to the fact that tobacco growing accounted for less than 1%, on average, of total incomes in these counties.

Measuring the Economic Impact of Tobacco for ASSIST

On the basis of the studies discussed in the previous section, the measure of the contribution of tobacco to state economies developed for the ASSIST evaluation focuses on the core activities that are directly related to tobacco. Specifically, this measure was intended to focus on tobacco growing, warehousing, and manufacturing; the measure excludes the wholesale and retail distribution of tobacco products, the supplier sector, and the expenditure-induced sector, given that economic activity related to tobacco in these sectors would almost certainly be replaced by economic activity related to other goods and services in the absence of tobacco and, hence, does not depend on tobacco.

An initial examination of the data available from published sources as well as data presented in the tobacco-industry-sponsored studies[16,18] clearly indicated that tobacco warehousing was a relatively minor activity, with tobacco growing and tobacco product manufacturing accounting for 95% or more of direct tobacco employment and an even higher share

of income. Moreover, the correlations between the warehousing and tobacco-growing measures for both employment and income were very high (.94), indicating that tobacco growing served as an effective measure of both activities. Given the relatively minor economic contribution of tobacco warehousing, its high correlation with tobacco growing, and the lack of reliable state-level data on it, the measure developed for the ASSIST evaluation focused on tobacco growing and tobacco manufacturing.

Industry-sponsored studies make a variety of somewhat arbitrary assumptions (e.g., assuming that each tobacco-farming-related job is a half-time job and that the number of unpaid workers relative to paid workers is the same for all farms[18]) to produce estimates of the number of full-time-equivalent farmers growing tobacco and the incomes they earn from tobacco farming. For this evaluation, rather than adopting these arbitrary assumptions and the likely error that would be introduced into the economic impact measure, an alternative measure was used that more directly reflects the value of tobacco farming. Specifically, state-level cash receipts from tobacco, available from the USDA, were used to capture the contribution of tobacco farming to state economies.

Similarly, several alternative measures of the economic contribution from tobacco manufacturing were considered, including total employment in tobacco product manufacturing, total compensation in tobacco product manufacturing, and the value added from tobacco product manufacturing. Published data on these measures were available from

The Problem of Quantifying Tobacco Labor

Alternative metrics were considered in the development of the measure of the impact of tobacco on state economies, including measures based on employment and wages. However, quantifying employment and wages for tobacco farming is a difficult task, given that few farmers grow tobacco exclusively (indeed, on farms that grow tobacco, only 6% of the land, on average, is used for tobacco[a]); many working on farms are unpaid (e.g., owner-operators and family labor); and employment is seasonal and includes many temporary, short-term laborers.

[a]Gale, H. F. Jr., L. Foreman, and T. Capehart. 2000. *Tobacco and the economy: Farms, jobs and communities* (Agricultural Economic Report No. 789). Washington, DC: U.S. Department of Agriculture, Economic Research Service.

multiple sources, including the Bureau of Labor Statistics (the ES-202 reports), the Bureau of Economic Analysis (state annual personal income tables), and the U.S. Census Bureau (County Business Patterns reports). All data obtained were for Standard Industrial Classification 21, which includes the following activities: multiple aspects of tobacco processing; production of cigarettes, cigars, and other tobacco products; tobacco thrashing, stemming, and redrying; and related activities. Varying amounts of data are contained in these published reports, with some data unreported for confidentiality reasons (e.g., for confidentiality reasons, the BLS ES-202 reports do not contain information on employment when 70% or more of the total in the state is controlled by one firm). The published data were supplemented with

unpublished information from a variety of federal and state agencies, and, on the basis of historical trends and relative shares, some imputation was done to obtain estimates of employment in and compensation from tobacco manufacturing for each state in each year, with the imputation done so that the sum of state estimates equaled reported estimates for the United States.

To provide an understanding of the relative importance of tobacco to the overall state economy, all measures were divided by an appropriate measure of total economic activity in the state. Specifically, the dollar-denominated measures were divided by gross state domestic product (GSP), and the employment measures were divided by total employment in the state (both obtained from the Bureau of Economic Analysis). Finally, a single variable reflecting the combined economic contribution of tobacco growing and manufacturing was obtained by adding the measures of the value of crop receipts from tobacco as a share of GSP and the total compensation for tobacco manufacturing as a share of GSP. This variable was ultimately used as a covariate as part of state conditions for the regression analyses described in other chapters.

State Data and Trends
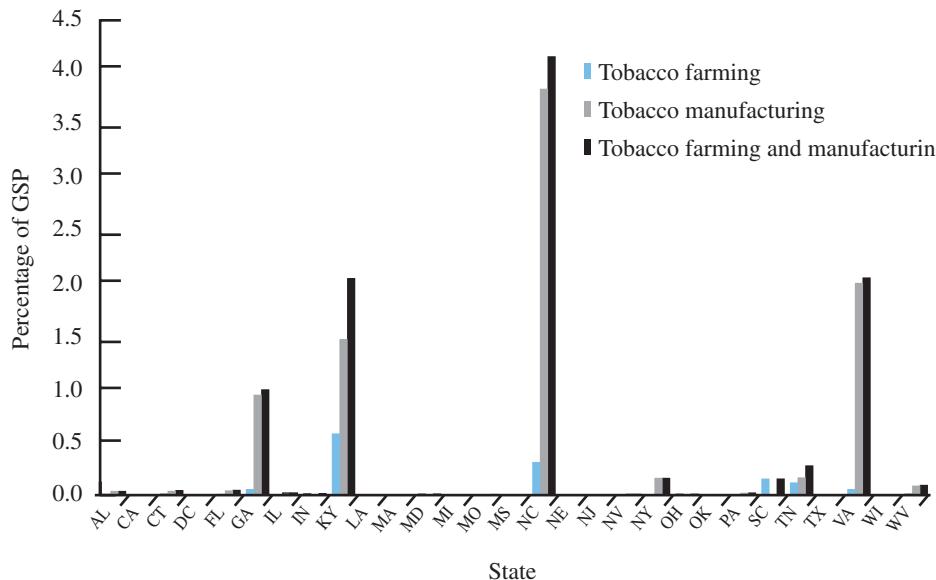
Several interesting observations emerge from the data on the contribution of tobacco to state economies. First, as illustrated in figure 6.4 (the data in figures 6.4–6.11 were calculated by the authors) and table 6.1, while tobacco growing and manufacturing do contrib-

ute to economic activity in a number of states, this contribution is relatively minor in most of these states. In 2000, for example, the share of GSP accounted for by tobacco farming and manufacturing was just over 4% in North Carolina, just over 2% in Kentucky and Virginia, and slightly less than 1% in Georgia. Over the period from 1979 through 2000, the share of GSP accounted for by tobacco growing and manufacturing exceeded 0.2% in any year in just two other states—South Carolina and Tennessee.

Second, as illustrated in figure 6.5, the economic contribution of tobacco to the national economy has been declining for most of the period from 1979 through 2000. Tobacco farming contributed just over 0.1% of gross domestic product (GDP) in the early 1980s; by 2000, this

was down to less than 0.03% of GDP. Tobacco manufacturing's contribution to GDP has been somewhat more stable but has been generally declining since the early 1990s. In general, the value of tobacco manufacturing depends heavily on the price of tobacco products, as can be seen by some of the larger changes in the share of GDP accounted for by tobacco manufacturing over time. For example, the "Marlboro Friday" reductions in the prices of leading cigarette brands in 1993 contributed to a significant decline in the economic impact of tobacco manufacturing, whereas the settlement-related price increases of the late 1990s contributed to the increase in the economic impact of tobacco manufacturing at the end of the period. Recent declines in the production of tobacco products have almost certainly

Figure 6.4. Tobacco Farming and Manufacturing as Share of Gross State Product (GSP), 2000

Note: Tobacco farming and manufacturing do not contribute to GSP in Alaska, Arkansas, Colorado, Hawaii, Iowa, Idaho, Maine, Minnesota, Mississippi, Montana, North Dakota, New Hampshire, New Mexico, Oregon, Rhode Island, South Dakota, Utah, Vermont, Washington, and Wyoming.

Table 6.1. Percentages of Gross State Product from Tobacco Growing and Manufacturing
(Shading indicates ASSIST states.)

State	1992	1993	1994	1995	1996	1997	1998	1999
AK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AL	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.03
AR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
AZ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CT	0.11	0.07	0.05	0.06	0.07	0.07	0.07	0.06
DC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FL	0.03	0.02	0.02	0.03	0.03	0.03	0.03	0.03
GA	1.11	0.90	0.87	1.13	1.15	1.15	1.08	1.01
HI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ID	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IL	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.01
IN	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01
KS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
KY	3.43	3.24	3.25	2.94	2.99	2.61	2.31	2.03
LA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MA	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MD	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01
ME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MN	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MO	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
MS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NC	6.51	4.81	4.53	4.48	4.11	4.07	3.54	3.04
ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NJ	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NV	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03
NY	0.11	0.11	0.14	0.15	0.19	0.18	0.19	0.19
OH	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
OK	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OR	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PA	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.01
RI	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SC	0.28	0.26	0.23	0.22	0.24	0.23	0.19	0.16
SD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TN	0.42	0.38	0.33	0.31	0.34	0.30	0.26	0.22
TX	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
UT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VA	2.93	2.50	2.50	2.48	2.44	2.26	2.04	1.83
VT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WA	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
WI	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00
WV	0.09	0.08	0.09	0.09	0.08	0.08	0.08	0.07
WY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Figure 6.5. Tobacco Farming and Manufacturing as Share of Gross Domestic Product (GDP), United States
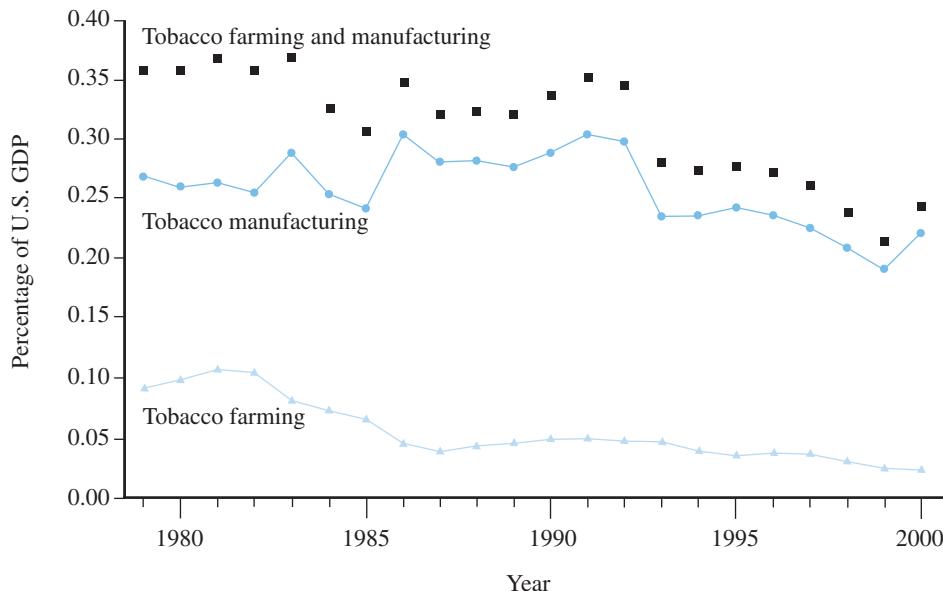
Figure 6.6. Tobacco Farming and Manufacturing as Share of Gross State Product (GSP), North Carolina
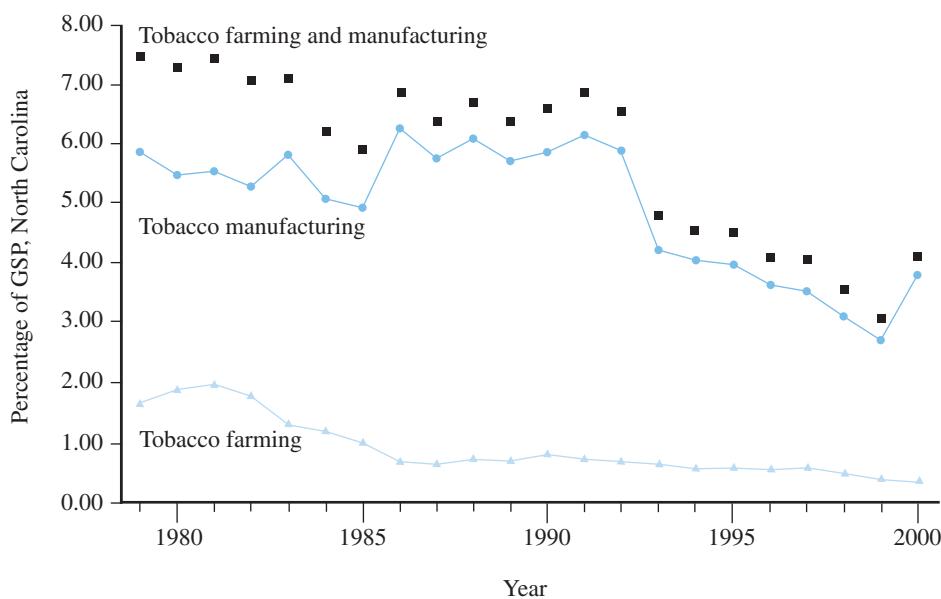
Figure 6.7. Tobacco Growing and Manufacturing as Share of Gross State Product (GSP), Kentucky
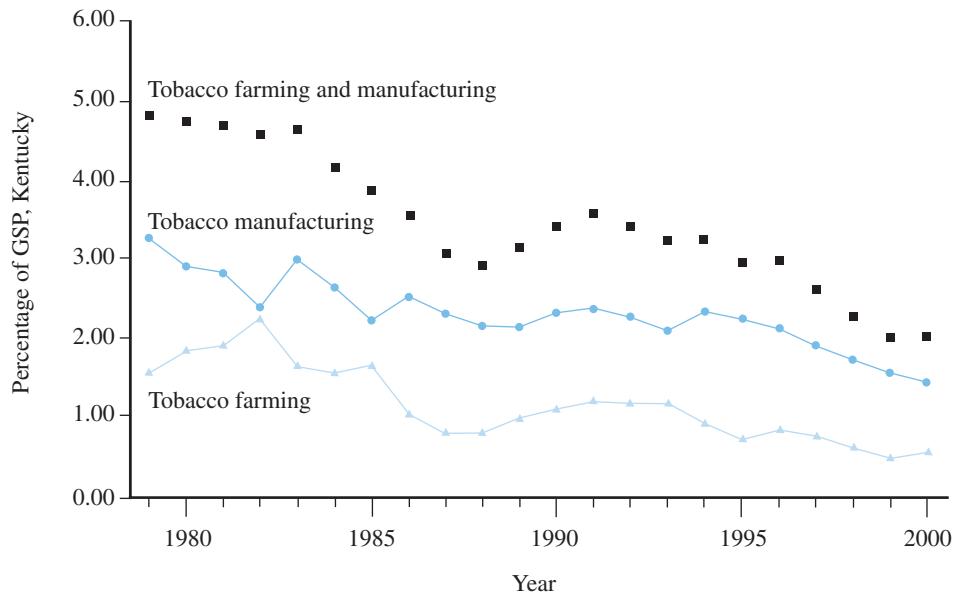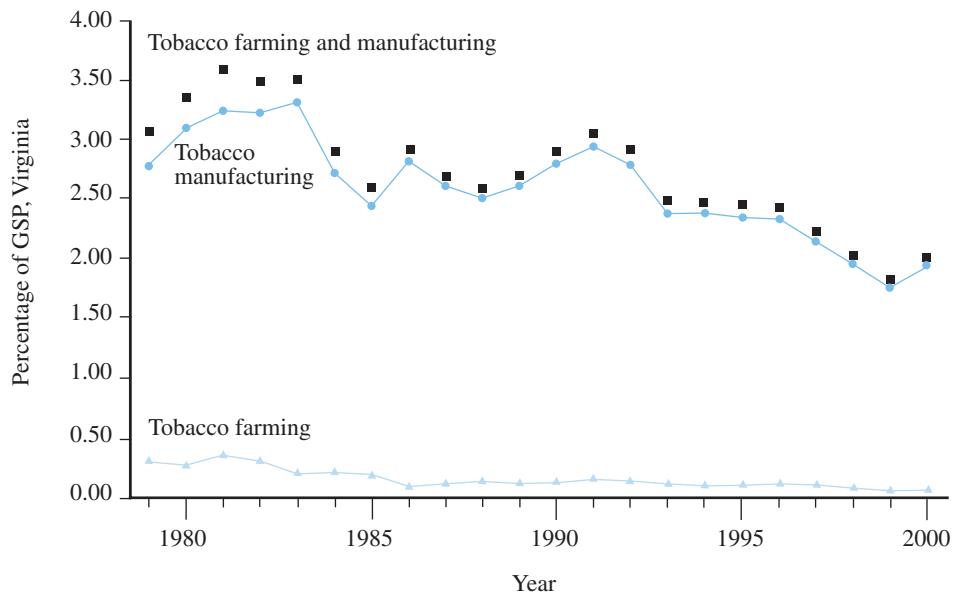
Figure 6.8. Tobacco Farming and Manufacturing as Share of Gross State Product (GSP), Virginia

Figure 6.9. Tobacco Farming and Manufacturing as Share of Gross State Product (GSP), Georgia
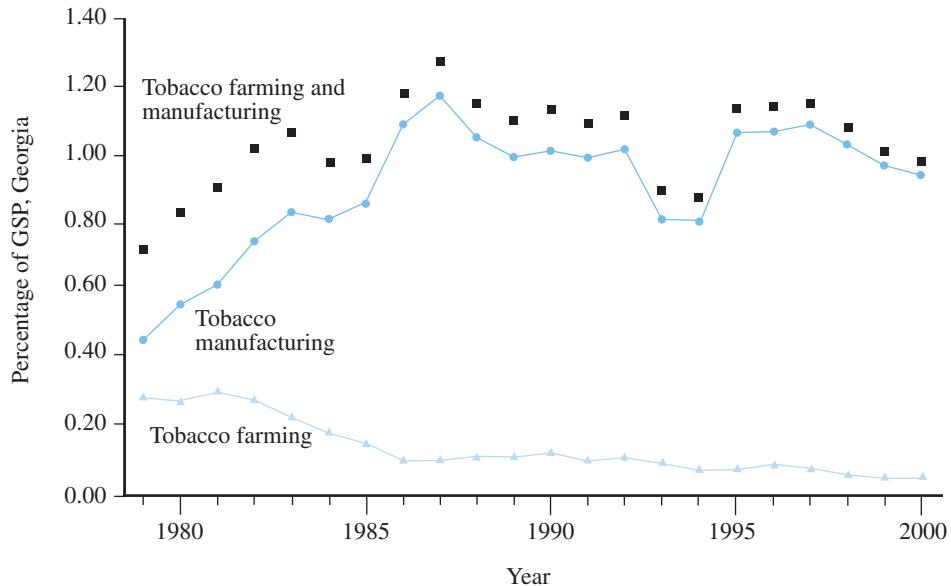
Figure 6.10. Tobacco Farming and Manufacturing as Share of Gross State Product (GSP), South Carolina
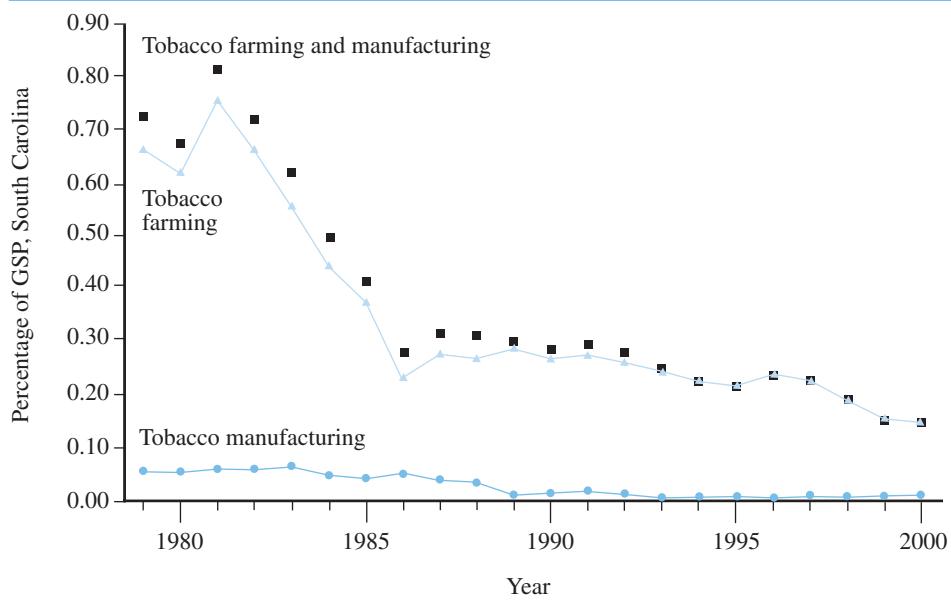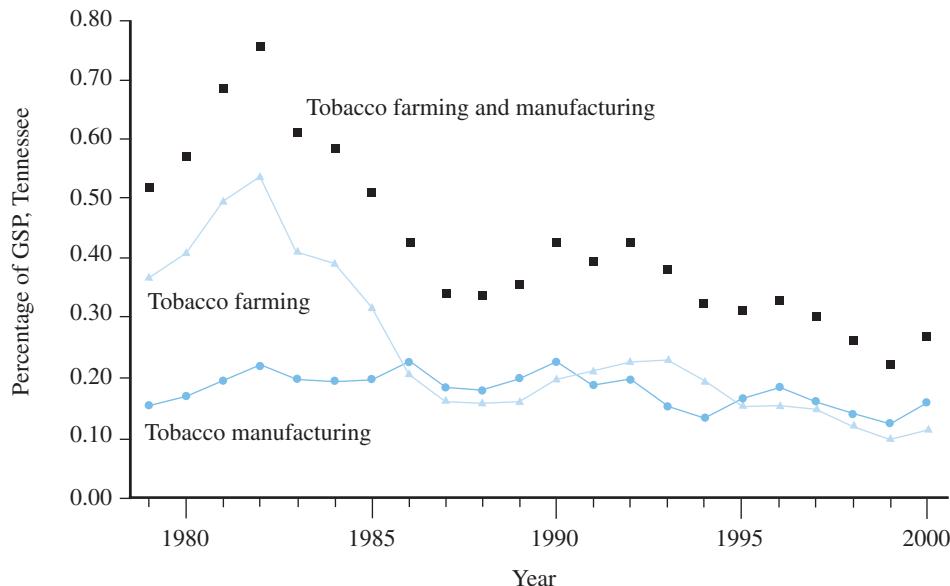
Figure 6.11. Tobacco Farming and Manufacturing as Share of Gross State Product (GSP), Tennessee

led to a renewal of the downward trend in the economic impact of tobacco manufacturing on the U.S. economy.

Finally, even in the states where tobacco growing and manufacturing have had a significant impact on the state economy, their importance has diminished over time (see figures 6.6 through 6.11). For example, in North Carolina and Kentucky, the states where tobacco has historically had the greatest economic impact, the share of GSP accounted for by tobacco growing and manufacturing fell by nearly 60% from 1979 through 1999. Similarly, tobacco's share of GSP in Virginia fell by more than 40% during this period. The only exception to this trend is Georgia, which experienced an increase in tobacco manufacturing's contribution to its GSP in the early 1980s, followed by relative stability; recent trends in Georgia, however, suggest that the economic impact of tobacco is beginning to fall there as well.

Summary

Tobacco growing and manufacturing have played important roles in the development and growth of the U.S. economy for many years. While tobacco growing and manufacturing take place in more than half of U.S. states, the economic impact of these activities is concentrated in a small number of states, most notably North Carolina, Kentucky, and Virginia. Moreover, the economic contribution of tobacco to state economies has been falling for many years, the result of declines in tobacco use in the United States, increased use of foreign-grown

tobacco, reduced exports of tobacco leaf and tobacco products, increased automation of tobacco product production processes, and the shift of production facilities to overseas locations.

While the economic influence of tobacco continues to decline, there is still evidence to support its impact on upstream tobacco control interventions such as taxes and legislation—therefore, an accurate evaluation of such interventions must take these economic factors into account. By developing a measure that accounts for tobacco-related state economic conditions, we can provide a more accurate picture of the impact of state-level programs such as ASSIST relative to the environment of the states themselves.

Conclusions

1. Anecdotal and empirical evidence indicates that state restrictions on smoking, and cigarette and other tobacco product excise taxes are lower in states that have relatively more visible sectors of tobacco growing and/or manufacturing.
2. While substantial gaps exist between the tobacco industry's and the public health community's interpretations of the economic impact of tobacco, studies that incorporate redistribution of tobacco spending have shown negligible employment impact at an overall national level.
3. Despite the limited and declining economic impact of tobacco, arguments about the importance of tobacco to state economies have created barriers to the adoption of effective

and comprehensive tobacco control policies in many states.
4. To factor the potential state-level economic impact of tobacco into the impact of ASSIST on policy outcomes and smoking behavior, a quantitative variable was developed for the ASSIST evaluation analyses, based on key indicators of tobacco growing and manufacturing relative to a state's gross domestic product. This variable, which was subsequently integrated as part of base-level state conditions in the analyses, helped model the relative impact of these economic dependence factors on the kinds of upstream, policy-based interventions studied as part of ASSIST.

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7. The ASSIST Newspaper Tracking System

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Appendices

7. The ASSIST Newspaper Tracking System

To determine whether media interventions and media advocacy influenced newspaper coverage of tobacco control issues, the American Stop Smoking Intervention Study (ASSIST) evaluation analyzed newspaper coverage of ASSIST priority policy areas. The ASSIST Newspaper Tracking System, a comprehensive database of newspaper coverage of tobacco control efforts in the United States from 1993 to 2000, compiled over 124,000 articles from newspapers across the country with the assistance of a national newspaper clipping service. This database was subsequently used to describe trends in media coverage for ASSIST policy areas over time as well as differences in news coverage between ASSIST and non-ASSIST states.

Articles were judged for relevance on the basis of a three-tiered key-word search of tobacco-, legislative restriction-, and policy-related terms as well as a subjective content review. These articles were then coded for subsequent analysis along indices such as policy type, topic, circulation, article type, and point of view. Four state-level metrics were produced from this scoring system: raw frequency of articles; relative (percentage) frequency; a rate variable comparing number of articles to the number of newspapers per state; and a media advocacy variable (MAV), a per capita index of prohealth coverage computed from multiple factors.

Although a subsequent trend analysis of these scoring data could not establish evidence of changes in coverage over time, this study provided evidence that ASSIST media intervention efforts had an effect on newspaper coverage of tobacco control policy activities. The ASSIST Initial Outcomes Index was used to control for baseline differences between states, revealing a significant positive difference in the rate variable between ASSIST states and non-ASSIST states, with a plausible explanation being the presence of ASSIST media interventions. This database and its associated study serve as a valuable basis for future research efforts involving media outcomes in tobacco control and how to quantify them relative to policy intervention efforts.

Introduction

This chapter describes (1) the database created to track newspaper coverage of ASSIST's four priority policy areas during the project, (2) the methods developed to code and analyze the data, and (3) a state-level scoring system created to characterize the newspaper coverage. Several analyses are presented to demonstrate the score's potential uses, including

- Trend analyses of coverage by topic, to highlight the potential use of the scoring system to determine whether media interventions are stimulating adequate newspaper coverage to engender support for the proposed policies;

- Comparison of newspaper coverage in ASSIST states with coverage in non-ASSIST states;
- A case study of newspaper coverage in one specific state, North Carolina, related to the successful promotion of stronger youth tobacco access laws.

Although this database was not ultimately used as part of the formal ASSIST evaluation analysis, it represents a valuable first effort in measuring the results of media advocacy efforts for tobacco control.

In a social-environmental public health approach, interventions that change public and private tobacco use policies are among the most powerful interventions available to tobacco control advocates. Policies that promote nonsmoking behavior lead to the development of a social norm that holds tobacco use unacceptable. One of the three principal interventions of the ASSIST model was media intervention, including media advocacy, a highly effective tool for promoting policies as part of a public health agenda. The ASSIST Newspaper Tracking System represented an effort to determine the success of the ASSIST media interventions by analyzing the amount and type of newspaper coverage

Media Advocacy

"'Media advocacy is the strategic use of mass media as a resource for advancing a social or public policy initiative.'[a] Media advocacy stimulates community involvement in defining policy initiatives that influence the social environment in which individuals make choices—for example, choices about tobacco use. Media advocates react to unexpected events and breaking news and create events to draw media attention and coverage to an issue.[b] When traditional media relations and interventions—for example, publicizing special events, marking health observances, and publicizing research results—are used strategically, not just informatively, they are tactics in the approach of media advocacy. In all the ASSIST states, ASSIST staff and volunteers were trained to use all media interventions in ways that were strategic and community based. In this way, ASSIST advanced the state of the art in media advocacy for tobacco control.

"Media advocates must know the relevant policy issues, know how to frame an issue for public debate, and know how the media function—what types of stories are deemed newsworthy, how editors decide what stories get covered, and what deadlines and logistic issues might influence coverage. Therefore, ASSIST conducted media advocacy training to impart knowledge and skills to advocates and to encourage and empower their involvement in tobacco control. A communication network among advocates for sharing information on local and national activities helped ASSIST advocates implement media advocacy efforts. Newsletters, listservs, and computer newsgroups supported timely communication and creativity among the national, state, and local advocates."

Source: National Cancer Institute. 2005. *ASSIST: Shaping the future of tobacco prevention and control* (Tobacco control monograph no. 16, NIH publication no. 05-5645). Bethesda, MD: National Cancer Institute (pp. 127, 129).

[a]National Cancer Institute. 1989. *Media strategies for smoking control: Guidelines* (NIH publication no. 89-3013). Bethesda, MD: National Institutes of Health (p. 8).

[b]Wallack, L., K. Woodruff, L. Dorfman, and I. Diaz. 1999. *News for a change: An advocate's guide to working with the media.* Thousand Oaks, CA: Sage.

of the policy areas promoted by the ASSIST intervention: clean indoor air, restrictions on minors' access to tobacco, excise tax increases, and restrictions on tobacco advertising and promotion (see Monograph 16, chapter 5, pp. 149–152).

The Challenge of Measuring the Effect of Media Interventions

The idea that news media coverage brings issues to the attention of the public and of policy makers may seem intuitive, if not obvious. The challenge in evaluation, however, is demonstrating that news media coverage does in fact influence the thinking, decisions, and behavior of the public and of policy makers. Although determining such a cause-and-effect relationship for some very focused and geographically limited topics might be possible, researchers in the field of evaluation are still grappling with how to do so for wide-scale public health interventions. When ASSIST was initiated in 1991, there was little published literature on methods for evaluating the effects of media interventions,[1] which are important interventions of the ASSIST model. Therefore, designing a method of evaluation was essential. Evaluating media intervention effects would entail determining actual news media coverage, tracking coverage trends, and comparing those trends with levels or types of media intervention efforts. National Cancer Institute (NCI) and ASSIST Coordinating Center staff members developed methods that not only measured the effects of ASSIST but

also contributed to advancing the field of evaluation in this regard.

Though an appropriate method to evaluate ASSIST media interventions was not available, the development of the newspaper tracking system was influenced by the work in media studies that documented the relationship between news media coverage of social problems and the effects of that coverage on audience perceptions of those problems. Early research was on agenda setting, and that research posited that the public's attention, over time, would be focused on issues occupying time or space in the mass media.[2] In the words of Bernard Cohen, "The press may not be successful much of the time in telling people what to think, but it is strikingly successful in telling readers what to think about."[3(p13)] However, subsequent work in media studies revealed that the model described in Wallack et al.[2] was too limited and suggested that by presenting social problems as such, the media do help individuals to think about a problem in a certain way. The media provide arguments for and against social issues and thereby define the terms in which the topics are considered.[4(p231)] This study and more recent studies suggest that the public agenda, news media coverage, and public policy are mutually influential and, of course, multifaceted.[5] If so, media advocacy interventions should be capable of influencing news media coverage. Recently and since the end of ASSIST, researchers documented the interrelationships among media, advocacy, and health promotion. They found that during the 1980s organized groups and institutions that sought to

place cardiovascular disease issues on the public agenda stimulated an increase in news media coverage of heart disease as a social problem.[6]

ASSIST conducted media advocacy for many of its media interventions. Media advocacy grew out of the work of social movement organizations in many arenas, but only recently has it become a formal element of approaches for affecting public health policy. The objective of media advocacy is to influence how the media present issues, and the goal is to thereby shape policy agendas and regulatory or legislative actions. (For a full discussion of these concepts and how they were applied in ASSIST, see Monograph 16, chapter 5.)

The steps in this first stage of developing an evaluation approach to the media interventions of a wide-scale public health intervention were the following:

- Establish a tracking system for identifying and collecting newspaper articles about ASSIST-relevant tobacco control topics.
- Code the articles for characteristics that could be used for meaningful analyses.
- Maintain a database of the coded data.
- Create indices from the database for use in analyses.
- Conduct trend analyses for the entire ASSIST implementation phase (1993–99), comparing ASSIST states with non-ASSIST states.
- Provide the 17 ASSIST states with trend analyses of newspaper coverage on a quarterly basis as feedback on their media intervention efforts.

These efforts are described in the subsequent sections of this chapter.

The newspaper tracking effort was unprecedented in scope, though it tracked only newspaper coverage. The omission of broadcast and electronic media (television, radio, and the World Wide Web, which was in its infancy when data collection began) does not detract from the overarching purpose of the tracking system. Newspaper coverage has been found to parallel coverage in the electronic media.[7] In fact, newspaper coverage of issues, especially in the *elite press* (a term used in the industry to refer to influential agenda-setting media), has been shown to be the source of much of what is covered by the electronic media. Research has also documented the importance of newspaper coverage in the decision-making process for policy makers and legislators in many areas of public policy.[5] Thus, the ASSIST Newspaper Tracking System is an important resource for additional kinds of analyses and for further hypothesis testing about tracking and evaluating news media coverage to determine the effectiveness of tobacco control interventions designed to promote a tobacco-free social norm.

Tracking the Articles

From October 1993 through December 2000, the ASSIST Coordinating Center tracked all daily newspapers in the United States for articles covering the tobacco control policy areas established in the ASSIST model: clean indoor air, restrictions on minors' access to tobacco, excise tax increases, and restrictions on tobacco advertising and promotion.

Collecting the Articles

Following a pilot study to examine the feasibility and specificity of tracking newspaper coverage of tobacco control issues in three states,[8] a national newspaper-clipping service was selected as the data collection agent. This service monitors 17,247 different publications and claims an estimated capture ratio of 80%, meaning that 80% of all articles germane to a particular search strategy will be identified and clipped by a reader.

Between October 1, 1993, and December 31, 2000, this service monitored all daily newspapers in the United States using a search strategy devised by ASSIST Coordinating Center researchers. In December 2000, 1,766 newspapers were in the sampling frame, but this number had varied over time due to newspaper openings, closings, and mergers.

National newspapers—such as *USA Today*, the *Wall Street Journal*, and the *Christian Science Monitor*—were excluded from the search strategy because determining their readership in each state would be difficult. The *New York Times* and the *Washington Post* were included in the search, even though they have national circulations, because they are primarily city newspapers with a section that covers only local news. Advertisements, movie reviews, restaurant reviews, and obituaries that had tobacco-related content were excluded from the search. Syndicated columns were counted as one article (identified by the newspaper of origin and attributed to that state) to capture an important source of editorial opinion, to credit its influence, and to limit redundancy.

The newspaper-clipping service obtained potentially relevant articles from the universe of daily newspapers. Potentially relevant news and feature articles, letters to the editor, and editorials about tobacco control policies were identified with a three-tiered search strategy. The first tier consisted of tobacco key words, the second tier consisted of legislative key words, and the third of policy-related key words. Examples of key words are listed in table 7.1. See appendix 7.A for a list of the coding topics; see appendix 7.B for a complete list of search strategies.

To enhance the likelihood of identifying the most relevant articles, this strategy required that one word from each tier appear in the article or headline in order for it to be clipped. For example, appearance of the word *tobacco* by itself did not qualify an article for selection—the article could have been about tobacco farming and not about tobacco control policy. However, the appearance of the words *tobacco* and *bill* and *tax* would qualify an article for selection. The chief advantages of the search strategy were its simplicity and replicability. No decisions about the content of the article were necessary other than to note the appearance of the key words. The above criteria could not be applied to single-paragraph articles, such as letters to the editor. In these cases, a key word from two of the three tiers was sufficient for selection.

Determining the Relevance of the Articles

The clipping service identified each clipping by the newspaper's name, cir-

Table 7.1. Examples of Key Words for Search Strategy

Tier 1: Tobacco	Tier 2: Legislative restrictions	Tier 3: Policy	
ASSIST	Ban/banned/banning	Advertising	Pharmacy
Cigarettes	Bill	Airport	Promotion
Nicotine	Law/lawsuit	Arena	Public places
Smoking	Legislation/legislative/legislator	Billboard	Restaurants
Smoke-free	Ordinance	Bowling alley	School(s)
Snuff	Policy	Buildings	Stores
Tobacco	Prohibit/prohibition	Children	Tax
	Regulation/regulatory	Coliseum	Vending machines
	Restrictions	Jail	Workplace(s)
		Mall	Youth
		Minor(s)	

culation, and date of publication. The service shipped all clipped articles in bulk to the ASSIST Coordinating Center on a monthly basis. Each article was then reviewed to ensure that it met the search criteria and that it was indeed relevant. Trained research staff of the ASSIST Coordinating Center performed this task. First, each article was screened to verify that a key word from each tier was used in it. This criterion, however, was not sufficient to determine relevance because even though an article might include the key words, it might be only tangentially related to the topic of tobacco control. For example, a story about a politician's personal life might mention his or her efforts in tobacco control but might not be about tobacco control policy. Articles that were determined to be relevant were entered into the database. See Stillman and colleagues[9] for additional details.

Coding the Articles and Maintaining a Database

The coding process began once an article was accepted as relevant and was added to the database. The challenge posed by the coding process was to characterize the information from each article sufficiently to clearly represent how the tobacco control issues were treated. The data from the ASSIST Newspaper Tracking System were most suitable for identifying what tobacco control issues were discussed across the United States. The data were less suitable for revealing details about the discussion, about the quality of the discussion, and about the approach to the discussion. The sheer volume of articles made it necessary to choose between two very different types of coding: conducting a surface analysis of the entire scope of newspaper coverage of tobacco control policy, or coding

and analyzing a small percentage of the clippings in depth.

As an example of the coding process, all hard news stories were coded as neutral, whereas editorials, letters to the editor, and editorial cartoons were coded as either neutral, prohealth, or protobacco. Such articles were coded as neutral when the author addressed both sides of an issue and expressed no dominant theme or position. The argument could be made that hard news stories express a bias even though they should be neutral, in accordance with journalistic principles; however, assessing bias in news stories would have required far greater staff resources, monetary resources, and in-depth textual analysis than were possible for this study.

The ASSIST Coordinating Center developed a codebook to provide background and instructions for coders. New tobacco control topics that appeared in the newspaper clippings and that had implications for the coding were addressed at bimonthly meetings of coders and project administrators. Addenda to the coding manual were written as needed. Coders were in a training period until they achieved an intercoder reliability rate of 100%. Every month thereafter, for quality control, the coding supervisor made spot reliability checks of 20 clips from each coder. Any clips that did not meet coding standards were recoded to meet the standards. The reliability scores remained high, at 95%–99%, throughout the project.

Each article was coded on six variables: policy type, topic code, circulation of source newspaper, type of article, front page, and origin of story. Articles that were editorial in nature were coded on a seventh variable, point of view. These variables are described in table 7.2.

Table 7.3 provides examples of the tobacco policy topics coded by the tracking system. The final coded database consists of 124,401 articles. The record of each article contains a set of coded variables and the article's identifiers—newspaper's name, circulation, and date of publication.

Developing Indices from the Database

To render the data useful for trend analyses, a number of indices were created: raw frequency, relative frequency, rate variable, and media advocacy variable. The purpose of these indices was to reduce complex data to manageable constructs for meaningful analysis and to test theoretical assumptions about the relationship between news media coverage and social-environmental outcomes. For example, agenda-setting theory proposes that the quantity and specific characteristics of coverage influence the public debate about policy issues.[1] To test such assumptions parsimoniously, an index that captured these characteristics was necessary.

The first index of the articles was raw frequency, simply the number of articles designated by one value of a specific variable (e.g., the number of articles published during 1994). The second index was relative frequency, the percentage of articles with a given characteristic, such as the percentage of stories on the front page in a year.

Table 7.2. Definitions of Coded Variables

Variable	Operational definition
Policy type	Four policy areas were coded to correspond with ASSIST objectives: clean indoor air, restrictions on minors' access to tobacco, excise tax increases, and restrictions on tobacco advertising and promotion. A fifth category, referred to as miscellaneous, includes lawsuits against the tobacco industry, national settlement talks, and proposed regulation of nicotine by the U.S. Food and Drug Administration (FDA).
Topic code	Since 1996, specific topic codes were entered to specify content of articles (e.g., state excise tax) beyond policy type.
Circulation	This variable refers to the number of copies of the publication that are distributed daily. (For the *New York Times* and the *Washington Post,* these were further divided into specific circulation figures for each adjacent state—New York/New Jersey/Connecticut, and Virginia/Maryland/District of Columbia, respectively.)
Type of article	Articles were classified as being one of three types: news story (a factual account of an event or issue), editorial (an opinion of an event or issue written by newspaper staff), or letter to the editor (usually written to the newspaper by a member of the community).
Front page	This variable was created in an attempt to identify the visibility of a specific article in the particular newspaper.
Point of view	The points of view of editorials, letters to the editor, and editorial cartoons were coded as neutral, prohealth, or protobacco. Hard news stories were coded as neutral.
Origin of story	To assess the salience of the tobacco control policy issue, the articles were coded as either national or local in focus. Stories from a national wire service (e.g., Associated Press, United Press International, Reuters) were coded as national; stories from a local journalist (whose name was stated in the byline) were coded as local. When the media analysis first started, this variable was not included in the coding protocol. This variable was added after 6 months of coding—when it became apparent that many articles in local papers were covering national tobacco policy issues taken from national wire services.

Table 7.3. Examples of Tobacco Topics

Clean indoor air	Minors' access to tobacco	Excise tax increases	Advertising and promotion	Miscellaneous
Smoke-free bowling alley	Licensing vendors	Federal excise tax	Banning billboards in a state	Cigarette package labeling
Sports arena restricts smoking	Youth purchase attempts	State excise tax	Removing billboards from sports arenas	FDA regulation of nicotine content
Restricting smoking in schools	Banning vending machines		FDA regulation of cigarette advertising	Lawsuits

Note: FDA indicates U.S. Food and Drug Administration.

Relative frequency enables comparisons among variables over time and from year to year.

Neither the raw frequency nor the relative frequency can be the basis for valid comparisons between states because the number of newspapers published varies by state. The number of newspapers would affect the number of articles published (i.e., the more newspapers in a state, the greater the number of articles published). Yet, comparisons between states are important because the unit of analysis in ASSIST is the state.

To address this problem, a third index was calculated, a rate variable: the number of articles clipped in a state divided by the number of newspapers in that state. This quotient yielded the rate variable of tobacco control articles per newspaper per state. The rate variable could be calculated for specific time units—for example, a rate per month, per quarter, or per year. Since the newspaper business is volatile (subject to new starts, mergers, and closures), the clipping service provided the number of newspapers included in the monthly set of clippings.

The fourth index was the media advocacy variable (MAV), which was created as an index of prohealth coverage. This index included the amount, prominence, and point of view of the coverage. MAV was adjusted for a state's population; thus, it could be used to make state-to-state comparisons of prohealth coverage. MAV was calculated as follows:

$$\frac{type \times point\ of\ view \times front\ page \times (circulation \times 2.2)}{state\ population}$$

where

type: 0 = cartoons; 1 = all other articles

point of view: −2 = protobacco; 1 = neutral; 2 = prohealth

front page: 2 = yes; 1 = no

circulation × 2.2: This product is an estimate of the circulated paper's total readership.

Weighting of the MAV components was based on previous media advocacy research methods[10] and expert recommendations. MAV has been applied in modeling the overall effects of ASSIST on hypothesized long-term health outcomes (such as change in tobacco use prevalence) and in modeling associations between ASSIST and tobacco control policy outcomes. Although MAV has not been incorporated into analyses presented in this monograph, it can be used to measure overall population exposure to prohealth coverage. It has significant potential for application in future news media analyses.

Trend Analyses

The ASSIST Newspaper Tracking System is the most comprehensive available record of newspaper coverage of tobacco control from 1993 to 2000. The database can be used for various types of analyses—for example, for overall news coverage trend analyses that assess changes in the quantity and characteristics of coverage over time or for detailed content analyses of news articles focused on understanding the coverage of a specific topic or set of topics.

In general, the analyses reported here were based on the frequency of articles within each of the coded variables (table 7.2). For descriptive analyses, a chi-square analysis was used to compare frequencies of articles within each of the categories, and each observation was assumed to be independent. In addition, articles grouped by years of publication were considered to be independent samples. In other words, the appearance of an article about a particular tobacco control policy or topic at a single point in time was considered independently of the appearance of another article during subsequent time periods. The tracking system did not track articles appearing in specified newspapers over time. The assumption of independence is consistent with defining the article as the unit of observation.
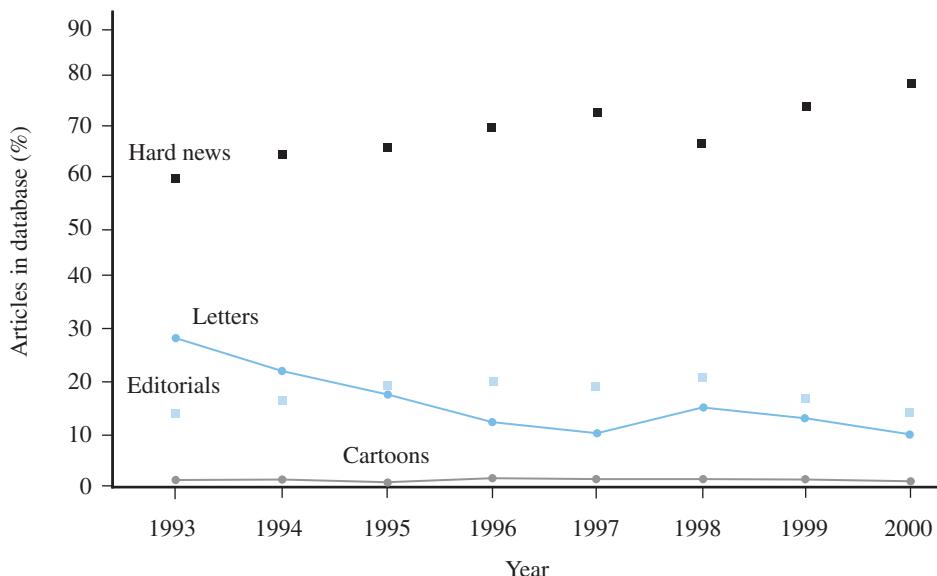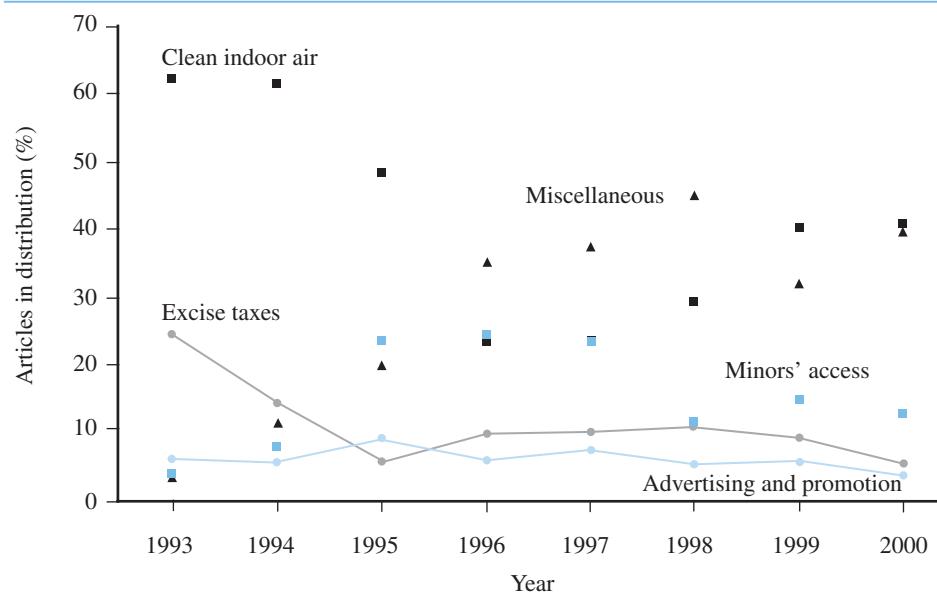
The next sections present three examples of analyses conducted during the ASSIST evaluation: (1) trend analyses of types of articles, (2) comparison of trends in ASSIST and non-ASSIST states, and (3) a case study of a specific policy initiative in an ASSIST state.

Trend Analyses of Types of Articles

Because the sampling frame of the ASSIST Newspaper Tracking System included all daily newspapers, the data can be used to assess the characteristics of coverage during the data collection period. Researchers from NCI and the ASSIST Coordinating Center conducted a series of descriptive analyses resulting in an overall characterization of trends in coverage during the implementation phase of ASSIST. Trends were characterized as changes in quantities, rates, or characteristics of coverage over time.

From October 1, 1993, through December 31, 2000, 124,401 articles were coded and entered into the database. Of those articles, 67% were news stories, 15% were letters to the editor, 17% were editorials, and 1% consisted of cartoons. Some variations in the relative frequencies of the types of articles occurred throughout the years of observation (figure 7.1). For example, the percentage of news stories gradually rose over time, whereas the percentage of letters to the editor fell. News stories constituted 58% of all articles in 1993, 71% in 1997, and 76% in 2000. Similarly, the relative frequency of editorials increased from 13% in 1993 to 21% in 1998 but declined to 16% in 1999 and to 14% in 2000. In contrast, the relative frequency of letters to the editor declined from 28% in 1993 to 10% in 1997. After a small rebound to 15% in 1998, the relative frequency of letters to editors declined to 12% in 1999 and to only 9% in 2000.

The largest proportion of newspaper articles across the data collection period concerned clean indoor air policies (40%), followed by minors' access issues (15%), tobacco excise taxes (10%), and tobacco advertising and promotion policies (6%). The miscellaneous category accounted for more than 29% of all coded articles in the database because this category included the high-attention topics of lawsuits against the tobacco industry and the Master Settlement Agreement, which affected all states (see figure 7.2), and Food and Drug Administration (FDA) regulations. The percentage of articles about each policy area varied over time. In 1993, clean indoor air accounted for 63% of all articles; this number dropped to 24% in 1996 and rose to 40% in 1999 and 2000.

Figure 7.1. Article Type by Year, 1993–2000

Figure 7.2. Policy Topic by Year, 1993–2000

The relative frequency of articles on excise taxes dropped from a high of 25% in 1993 to 5% in 1995. Coverage of minors' access issues peaked in 1996. The relative frequency of articles in the miscellaneous category steadily increased and peaked in 1998 and represented 40% of all articles in 2000.

Overall, the proportion of news stories was relatively consistent among the four policy types and ranged from 67% for clean indoor air to 71% for youth access, with advertising and promotion restrictions and miscellaneous each at 70%. However, for the excise tax issue, only 49% of coverage was news stories. The distribution of type of stories by topic was similar for all years.

In the overall database, editorials, letters to the editor, and cartoons were coded for point of view. In the following analysis, we examined only editorials and excluded those with a neutral point of view (i.e., percentage comparisons are between prohealth and protobacco editorials only). The prohealth point of view outweighed the protobacco point of view by nearly a 2:1 margin (22,282 to 12,441, with 3,087 neutral). The data also show year-by-year variations. In 1993, 58% of all editorials expressing an opinion were prohealth, and 42% were protobacco, with prohealth peaking at 76% in 1996 and dropping to 60% in 1998. All the comparisons between prohealth and protobacco percentages within individual years were statistically significant ($p < .001$). The percentages of articles voicing prohealth points of view remained relatively unchanged from 1998 to 2000.

> **Readiness for Media Interventions**
>
> "For ASSIST to conduct media interventions successfully, three elements had to be in place:
>
> 1. An infrastructure of organizational units clearly responsible for the interventions
>
> 2. A system of communication throughout the infrastructure that would enable timely implementation of media interventions
>
> 3. Technical assistance to equip ASSIST personnel and coalition volunteers with needed skills and to provide them continued support in planning and implementing media interventions
>
> "These three elements were developed and established during ASSIST's 2-year planning phase. . . . By mid-1993, the 17 states were ready to implement media intervention strategies described in their annual action plans."
>
> *Source:* National Cancer Institute. 2005. *ASSIST: Shaping the future of tobacco prevention and control* (Tobacco control monograph no. 16, NIH publication no. 05-5645). Bethesda, MD: National Cancer Institute (pp. 123–24).

Regarding tax issues, the prohealth point of view peaked at 73% in 1996, but in 1998, editorials expressing protobacco views outnumbered the prohealth position by almost 2:1 (64% versus 36%). For clean indoor air issues, the percentage of protobacco editorials ranged from 62% to 72% in 1993–97, dropped to 56% in 1998, but climbed to 70% in 2000. Editorials on the issue of youth access were consistently prohealth over time. In the miscellaneous category, the percentage of editorials on advertising and promotion policies expressing prohealth views decreased from 82% in 1994 to 59% in 1996 and rose to 71% in 1998, to 80% in 1999, and to 84% in 2000.

In terms of the visibility of the policy types, minors' access to tobacco products was most frequently found on the front page of the newspapers (17.7% versus 13.2% for all others, $p < .001$).

Analyses of ASSIST Versus Non-ASSIST States

The ASSIST Newspaper Tracking System was designed in part to assess whether newspaper coverage would follow ASSIST efforts to implement media interventions. One research question was whether newspaper coverage of tobacco control issues would be greater and more favorable to tobacco control in ASSIST states than in non-ASSIST states.

The ASSIST states were not selected randomly; rather, they were selected according to the criteria of a competitive contract review process. Thus, the analyses were based on a quasi-experimental design that would compare newspaper coverage of tobacco control in ASSIST and non-ASSIST states prior to the intervention and then at several points afterward (i.e., a pretest, multiposttest design). However, the ASSIST Newspaper Tracking System did not include data prior to the ASSIST implementation phase, and attempts to reconstruct

a baseline using electronic data sources (e.g., Lexis-Nexis) proved unsuccessful.[9]

Given these limitations, a two-step approach was used to (1) control for between-groups differences at baseline using a construct that accounted for relevant tobacco control policy variables and (2) test for an ASSIST-by-year interaction. Step 2 was based on the hypothesis of an increasing intervention effect over time: as the project progressed, ASSIST staff would gain experience in media advocacy and consequently would become more successful at media interventions.

The outcome measure used to control for baseline differences was the ASSIST Initial Outcomes Index. (See chapter 4 for details.) The Initial Outcomes Index is a summary measure of three tobacco control variables: the percentage of workers covered by 100% smoke-free workplaces, cigarette price, and rating of local and state clean indoor air policies. The Initial Outcomes Index measured at the baseline also predicted the volume of newspaper coverage of tobacco control issues.

The dependent variable was the rate variable, defined as the number of articles published in each state during the year divided by the number of newspapers. Table 7.4 presents the average rates for

Table 7.4. Average Rate Variables for Each Year Analyzed (District of Columbia Excluded)

States	1994	1995	1996	1997	1998
ASSIST					
Mean	18.31	10.80	10.95	14.73	13.78
SD	9.43	7.81	8.02	9.74	7.11
Non-ASSIST					
Mean	12.13	7.64	7.31	11.10	10.25
SD	8.05	5.57	4.91	9.25	9.16

each year analyzed. Data from the District of Columbia were considered outliers and were omitted from these analyses because it is the home of *The Washington Post,* which is not only a "local" newspaper, but is one of the premier national newspapers. In addition, the District of Columbia is not a state.

The analytic methods were as follows (see Stillman and colleagues[9] for additional details):

- Conduct a repeated-measures analysis to account for the presence of correlations between the observations for the same state over time.
- Use the PROC MIXED procedure in the statistical computer package SAS[11] for mixed linear regression equations. (Mixed models are more general than standard linear regression models in that they allow for the modeling of the variances and covariance of the observations and the means.)
- Perform a log transformation of the dependent variable, and calculate an average article rate for each state to normalize the error terms.
- Enter ASSIST status, Initial Outcomes Index rate, year, and interactions between these terms into the model.

The primary results of these analyses were as follows:

- Main effects for the Initial Outcomes Index ($p < .0003$) and year ($p < .0003$)
- No observed ASSIST-by-year interaction, contrary to what was hypothesized
- An observed main effect for ASSIST ($p < .0007$), indicating greater news coverage in ASSIST states than in non-ASSIST states

The hypothesis of a change in coverage over time was not confirmed, but the analyses provided evidence that ASSIST media intervention efforts had an effect on newspaper coverage of tobacco control. While the quasi-experimental design does not allow causal conclusions, a plausible explanation of the greater newspaper coverage of tobacco control efforts in ASSIST states is the presence of the ASSIST media interventions. See Stillman and colleagues[9] for details on methods and findings.

A Case Study of Newspaper Coverage in North Carolina

The data in the ASSIST Newspaper Tracking System database can be analyzed at the individual state level with a case study approach. Data on the coverage of a specific event or sequence of events can be combined with firsthand accounts of tobacco control activities to explain the observed patterns of coverage. Reports of such analyses to program managers can help them determine the effectiveness of specific media interventions and media advocacy efforts and can guide them in developing their annual strategic action plans. Case study 7.1, from North Carolina, illustrates how newspaper coverage can be related to specific events and issues. The frequencies of editorials on youth access policy were assessed for 90 days before and 90 days after the passage of two youth access laws by the North Carolina General Assembly, the first in 1995 and the second in 1997.

Case Study 7.1
Editorials Promote a Stronger Youth Access Law in North Carolina

In April 1995, North Carolina passed a relatively weak law to restrict the sale of tobacco products to minors. The law contained the word *knowingly* and thereby gave retailers an escape hatch if they were caught selling to minors. At this point, ASSIST had been in its implementation phase in North Carolina for about 18 months. Media advocacy activities were in their early developmental phase at the time.

The data show that eight editorials appeared in newspapers across the state in the 6-month period surrounding the passage of the law. One editorial appeared before the passage of the law, and seven appeared after passage. The point of view of the editorials was overwhelmingly prohealth. Only one editorial written after passage of the law was protobacco.

Anecdotal evidence from tobacco control advocates in the state indicates that health groups in North Carolina were outraged at the passage of such a weak youth protection law. Tobacco control activists met with the editorial boards of several North Carolina newspapers to inform them about the dangers of allowing the word *knowingly* to remain in the law. These activities may account for the high percentage of prohealth editorials that appeared after the law was passed.

Nearly 2 years later, in February 1997, tobacco control advocates in North Carolina were successful in getting the legislature to pass a youth access bill that was stronger than the 1995 measure. The 1997 bill removed the word *knowingly* and required retailers to check the identification of anyone appearing to be younger than 18 years of age. By this time, ASSIST had been in its implementation phase for almost 4 years, and media advocacy training and practice were in full swing throughout the state.

During the 90 days before and after the passage of the second bill, 42 editorials were published—21 before and 21 after the law was passed. Before the law was passed, the editorials were overwhelmingly prohealth (91%). After the law was passed, the point of view of the editorials was almost evenly split: 52% prohealth and 48% protobacco.

Tobacco control advocates reported that the tobacco industry and the retail merchants' lobby tried to influence the language of this stronger law. The industry framed the issue of youth access as an equal responsibility between retailers and minors. Thus, they sought to include language making it illegal for minors to possess tobacco products as well as to purchase or attempt to purchase them. Not only would retailers be legally responsible for selling tobacco products to minors, but also minors would be legally responsible for attempting to purchase those products. Additional analyses could determine whether the prohealth editorials after the passage of the law reflected these lobbying efforts of the tobacco industry.

Source: Ulasevich, A., and W. D. Evans. 2001. *Tale of two laws: Case study approach using the ASSIST Media Analysis System.* Poster presented at the 129th annual meeting of the American Public Health Association, Atlanta.

Summary

The ASSIST Newspaper Tracking System is a rich source of data on tobacco control newspaper coverage and can serve as a resource for future quantitative and qualitative analyses. Analyses of the data have numerous applications—for example, to reveal needs and opportunities for program improvement, to help program planners develop more effective strategic plans, and to identify trends in coverage of specific issues that might require counteractions. In addition, the system is an important step toward

developing methodologies that can be applied by other public health programs relying on changing social norms about health behaviors.

The ASSIST Newspaper Tracking System also is a major contribution to the field of news media analysis. In addition to content analysis, this system offers the opportunity to evaluate correlations between news media coverage and changes in the social environment surrounding a public health issue. A major contribution of the system is a demonstration of how to monitor news coverage on a continuous basis and in tandem with the implementation of a large-scale public health intervention. The system now serves as a model that can be expanded further or revised, based on insights from its applications to ASSIST. Building on the model, new initiatives might seek to extend the system to capture additional variables on important concepts[12] and to test previously held assumptions about the need for census (or near census) sampling and coding methods.[13] The ASSIST newspaper tracking system was the first such tracking system in which newspaper coverage of tobacco control efforts was systematically collected, analyzed, and used as part of an evaluation effort. As a result, analysis of newspaper coverage is now a component of other tobacco control program evaluations, including the current evaluation of the Robert Wood Johnson Foundation's SmokeLess States National Tobacco Policy Initiative.[14]

Limitations

In advancing to the next development in methods for tracking and evaluating media, it is important to take into consideration the limitations of the ASSIST Newspaper Tracking System and changing context. For example, limited resources required a somewhat superficial classification of the article variables rather than an in-depth assessment of the content. In particular, the purpose of providing ongoing feedback to activists would be served better if analyses could be made of the arguments in editorial materials. Also, fine-tuning the coding categories might be considered. Although recent evidence suggests that newspaper-clipping services appear to miss a significant proportion of relevant articles,[15] during the intervention period there was high consistency between the national clipping service reports and ASSIST state reports of newspaper coverage.

The goal of this project was to capture the universe of newspaper articles on ASSIST-relevant tobacco issues across all daily newspapers in the United States and thereby establish a database from which analyses could be conducted to identify trends in coverage and correlations to ASSIST media interventions. Because newspaper editorial boards control which stories are actually published, newspaper editorial policies are an important variable in a full evaluation of the data. For example, one might argue that editorial policy is a mediating variable capable of explaining some portion of a variance between media advocacy efforts (independent variable) and amount or characteristics of newspaper coverage (dependent variable). The ASSIST Newspaper Tracking System does not contain an editorial policy variable, so no analysis of the effect of editorial policy has been conducted.

Strategic Elements for Success

Through media advocacy and other media interventions, the 17 ASSIST states made tobacco and health an issue of public priority. The media interventions brought media attention to the four priority policy areas of the ASSIST model: clean indoor air, restrictions on minors' access to tobacco, excise tax increases, and restrictions on tobacco advertising and promotion. "Although no single strategy worked in every state, the following important elements were in place throughout the project and contributed to the success of the media interventions:

- Technical assistance and training in media communications
- Strategic communication plans
- Mechanisms for sharing information, ideas, and successes
- Communications with the ASSIST Coordinating Center, which provided a national perspective on tobacco issues
- A dedicated media staff person at the local level
- Access to national experts
- Access to materials that could be adapted locally for news stories, editorials, press releases, and other formats
- A clear understanding of the audiences to be reached
- Familiarity with the media markets
- Well-established media relations
- Skills in media advocacy"

Source: National Cancer Institute. 2005. *ASSIST: Shaping the future of tobacco prevention and control* (Tobacco control monograph no. 16, NIH publication no. 05-5645). Bethesda, MD: National Cancer Institute (p. 152).

Future Directions

Challenges for future analyses include the following:

- How can editorial policy be captured? Are there regional or state variations in media bias? Could these variations be coded?
- How can one assess whether policy makers read the newspaper coverage and whether the articles influence their thinking and policy decisions on tobacco control issues?
- Can the readership of specific newspapers be measured and coded by meaningful demographic characteristics?
- How can program intervention activities be captured for a later analysis of their relationship to media output?
- How can coding terms for articles be related to program intervention activities?
- Can the quality of program media interventions be assessed and coded, and can an analysis be conducted to determine whether certain types of interventions yield more newspaper coverage of the desired sort? In Indiana, a study synchronizing the process evaluation tracking system of a program with a news media tracking system is under way.
- Is there a theoretical base on which to build and test a model of the relationship between newspaper coverage and policy change?
- What would be the measure of an appropriate time lag between newspaper coverage and expected policy change?

- Are there elements of the newspaper tracking system that can be extrapolated to a model for other types of media (broadcast and Internet)?
- Is there a direct relationship between the amount of newspaper coverage of tobacco control issues and reported awareness of those issues?
- To what extent do changes in the amount of news media coverage of tobacco control lead to changes in knowledge, attitudes, or beliefs about specific tobacco control issues?

Conclusions

1. The ASSIST Newspaper Tracking System established a method to systematically identify and collect newspaper coverage from all daily newspapers across the United States about ASSIST-relevant tobacco control policy topics. These articles were subsequently coded and entered into a database.
2. Newspaper articles were coded for policy type covered, topic covered, newspaper circulation, article type, front page story location, point of view, and origin.
3. An assessment of changes in media coverage over time reflected changing interest in various tobacco control policy areas, such as clean indoor air, taxation, and advertising, as well as tobacco industry lawsuits, the Master Settlement Agreement, and U.S. Food and Drug Administration regulations.
4. Additional research conducted as part of the ASSIST evaluation found that ASSIST media advocacy efforts were associated with higher levels of newspaper coverage and coverage that was more positive toward tobacco control.
5. While the newspaper tracking system data were not a part of the final ASSIST evaluation model, such data served important functions. The data provided valuable information to the ASSIST states that allowed them to track their own progress in obtaining positive media coverage for their tobacco control policy initiatives. In addition, the data documented the entire history of tobacco control policy coverage from 1993 through 1999. This leaves a legacy for future researchers to delve into more deeply and analyze the complex factors associated with newspaper coverage.

Appendix 7.A. Coding Topics

Policy 1

1. Ban smoking in worksites/public buildings/prisons
2. Ban smoking in bars/gaming clubs/parlors
3. Ban smoking in recreation buildings
4. Ban smoking in airports
5. Ban smoking on transportation/metro
6. Ban smoking in malls
7. Ban smoking in parks/beaches/playgrounds
8. Ban smoking in restaurants
9. Ban smoking in schools/daycare centers
10. Ban smoking in stadiums/arenas
11. Ban smoking around entrances/on grounds and outdoors in general
12. Secondhand smoke/lawsuits due to secondhand smoke (i.e., flight attendants or prisoners)
13. Secondhand smoke in multiple family dwellings/nursing homes

Policy 2

1. ASSIST mention (coded as policy 5)
2. Access to minors regulation
3. Sting operations/compliance checks (includes smokeless)
4. Student fines/suspensions/policies for possession by a minor
5. Banning vending machines
6. Regulating the licensing of vendors/sales/violations/Internet sales
7. Banning the selling of "loosies" single cigarettes
8. "Underage Sales Prohibited" labels
9. Sales banned near schools
10. Lawsuits dealing w/selling tobacco to minors (California…)
11. Banning sales of cigars to minors

Policy 3

1. Federal tax on tobacco
2. State tax on tobacco

Policy 4

1. Banning billboards/advertising in a state or metropolitan area
2. Banning billboards/advertising from sports arenas
3. Banning billboards around schools/playgrounds/parks
4. Restricting tobacco company sponsorship of sport/entertainment events
5. Banning advertising on race cars

6. Banning tobacco advertising on clothes
7. FDA regulating advertising of cigarettes/voluntary
8. Banning cigarette displays in stores/self-service/window ads
9. Regulation of cyber (Internet) tobacco ads
10. Banning free samples
11. Banning advertising ads in magazines, newspapers, TV, radio (any media)/transportation
12. Banning Joe Camel/Marlboro Man/cartoon characters (including lawsuits against these characters)
13. Foreign banning or phase out of advertising overseas

Policy 5

1. Regulating tobacco package labeling/ingredient disclosure law
2. FDA regulating/banning nicotine content/as a drug delivery system/prohibition/ prohibit retail sales/tobacco legislation mentions/National Tobacco Policy mentions
3. Lawsuits dealing with states/insurance companies [i.e., Medicare/Medicaid suing tobacco companies] as well as class action lawsuits
4. Lawsuit dealing with discrimination [employers not hiring smokers]/firing employees/law prohibiting employees to smoke at all
5. Pharmacies and stores banning tobacco products
6. Banning smokeless tobacco products
7. Cigarette price increases by manufacturers/government tobacco bills to increase prices (no mention of it as a tax)
8. Tobacco industry contributions to state politicians
9. Tobacco industry contributions to national (House and Senate) politicians
10. National Center/Campaign for Tobacco-Free Kids
11. Centers for Disease Control/IMPACT
12. Centers for Disease Control/Office on Smoking and Health
13. Overseas/International tobacco marketing/promotion
14. Settlement talks
15. Cigar/cigarette disposal laws
16. International lawsuits
17. Supreme Court debates/decisions on tobacco

Subjects Not Included in the Search

Articles related to tobacco farming
Financial position of tobacco companies
Cessation counseling
Tobacco tax revenues and their use (e.g., tobacco tax used for cancer research)
Lawsuits involving tobacco companies suing another party (e.g., ABC, EPA)
How Settlement money is to be spent
Lawyers' fees lawsuits/discussions
Veterans' issue with VA

Appendix 7.B. Search Strategies

ASSIST Media Analysis

All references from all dailies. Exclude radio and television.
ASSIST (Amer. Stop Smoking Intervention Study)

Amer. Stop Smoking Intervention Study

Original features from all dailies. Confine syndication to the 10 largest cities. Include all references from dailies (no exclusions) in connection with ASSIST (Amer. Stop Smoking Intervention Study). Exclude radio, television, photos without stories, syndicated columns, syndicated Sunday supplements, police reports, foreign publications, *Christian Science Monitor, USA Today, Wall Street Journal.*

ATF (Bureau of Alcohol, Tobacco & Firearms) in connection with tobacco control laws & policies re: sting operations, licensing of retail stores, or youth buying operations

BATF (Bureau of Alcohol, Tobacco & Firearms) in connection with tobacco control laws & policies re: sting operations, licensing of retail stores, or youth buying operations

Bureau of Alcohol, Tobacco & Firearms in connection with tobacco control laws & policies re: sting operations, licensing of retail stores, or youth buying operations

Cigarettes in connection with tobacco control laws re: sting operations, licensing of retail stores, or youth buying operations

FBI (Fed. Bureau of Investigation) in connection with tobacco control laws re: sting operations, licensing of retail stores, or youth buying operations

Law enforcement in connection with tobacco control laws re: sting operations, licensing of retail stores, or youth buying operations

Nicotine in connection with tobacco control laws re: sting operations, licensing of retail stores, or youth buying operations

Police in connection with tobacco control laws re: sting operations, licensing of retail stores, or youth buying operations

Smokeless tobacco in connection with tobacco control laws re: sting operations, licensing of retail stores, or youth buying operations

Smoking in connection with tobacco control laws re: sting operations, licensing of retail stores, or youth buying operations

Snuff in connection with tobacco control laws re: sting operations, licensing of retail stores, or youth buying operations

Tobacco in connection with tobacco control laws re: sting operations, licensing of retail stores, or youth buying operations

Tobacco, smokeless in connection with tobacco control laws re: sting operations, licensing of retail stores, or youth buying operations

Original features from all dailies. Confine syndication to the 10 largest cities. Include all references from dailies (no exclusions) in connection with ASSIST (Amer. Stop Smoking Intervention Study). Exclude radio, television, photos without stories, syndicated columns, syndicated Sunday supplements, movie reviews, obituaries, weddings, police reports, restaurant reviews, foreign publications, *Christian Science Monitor, USA Today, Wall Street Journal.*

Advertising in connection with bans re: cigarettes, nicotine, smoking, snuff, or tobacco

Cigarettes in connection with advertising bans

Cigarettes in connection with bans re: public places (i.e., airports, restaurants)

Cigarettes in connection with lawsuits

Cigarettes in connection with legislation

Cigarettes in connection with limiting availability to minors (i.e., vending machines, retail stores)

Cigarettes in connection with prisons re: banning of

Cigarettes in connection with prohibitions

Cigarettes in connection with taxes

Nicotine in connection with advertising bans

Nicotine in connection with bans re: public places (i.e., airports, restaurants)

Nicotine in connection with lawsuits

Nicotine in connection with legislation

Nicotine in connection with limiting availability to minors (i.e., vending machines, retail stores)

Nicotine in connection with prisons re: banning of

Nicotine in connection with prohibitions

Nicotine in connection with taxes

Prisons in connection with cigarettes, nicotine, smoking, snuff, or tobacco re: banning of

Prisons in connection with smokeless tobacco re: banning of

Smokeless tobacco in connection with advertising bans

Smokeless tobacco in connection with bans re: public places (i.e., airports, restaurants)

Smokeless tobacco in connection with lawsuits

Smokeless tobacco in connection with legislation

Smokeless tobacco in connection with limiting availability to minors (i.e., vending machines, retail stores)

Smokeless tobacco in connection with prisons re: banning of

Smokeless tobacco in connection with prohibitions

Smokeless tobacco in connection with taxes

Tobacco, smokeless in connection with limiting availability to minors (i.e., vending machines, retail stores)

Tobacco, smokeless in connection with prisons re: banning of

Tobacco, smokeless in connection with prohibitions

Tobacco, smokeless in connection with taxes

Tobacco, smokeless in connection with workplace

Workplace in connection with smokeless tobacco re: bans

Original features from all dailies. Confine syndication to the 10 largest cities. Include all references from dailies (no exclusions) in connection with ASSIST (Amer. Stop Smoking Intervention Study). Exclude radio, television, photos without stories, syndicated columns, syndicated Sunday supplements, movie reviews, police reports, restaurant reviews, foreign publications, *Christian Science Monitor, USA Today, Wall Street Journal*.

Americans With Disabilities Act—fed. legis. in connection with tobacco control laws and policies

Camel Cigarettes in connection with Joe Camel—advertising character re: advertising ban

Camel, Joe—advertising character in connection with cigarettes re: advertising ban

Cigarettes in connection with bans re: public transportation

Joe Camel—advertising character in connection with cigarettes re: advertising ban

Nicotine in connection with bans re: public transportation

Public transportation in connection with bans re: smoking, snuff, tobacco, cigarettes, nicotine, or smokeless tobacco

Smokeless tobacco in connection with bans re: public transportation

Smoking in connection with bans re: public transportation

Snuff in connection with bans re: public transportation

Tobacco in connection with bans re: public transportation

Tobacco in connection with restrictions re: indoor air quality

Tobacco companies in connection with sponsorship of sporting or cultural events re: advertising ban

Tobacco, smokeless in connection with bans re: public transportation

Transportation, public in connection with bans re: smoking, snuff, tobacco, cigarettes, nicotine, or smokeless tobacco

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8. Evaluating Tobacco Industry Tactics as a Counterforce to ASSIST

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8. Evaluating Tobacco Industry Tactics as a Counterforce to ASSIST

Tobacco use prevention and control faces a challenge common to several public health issues: the existence of a profit-making industry that actively works to counter its efforts. Consequently, one of the original goals of the evaluation of the American Stop Smoking Intervention Study (ASSIST) was to define an index of protobacco activity as part of its analytic database. Formal efforts toward this goal included a concept-mapping process among key stakeholders, a review of the published literature on tobacco industry tactics, and a review of tobacco industry documents. The concept mapping process yielded eight categories of tobacco industry tactics used to counter tobacco control: lobbying and legislative strategies, legal and economic intimidation, creating the illusion of support, usurping the agenda, harassment, undermining science, media manipulation, and public relations. A review of the published literature and of the tobacco industry documents provided evidence of these tactics.

Significant issues remain for identifying data sources to measure these activities and designing systematic methods to collect data. A quantifiable index of protobacco activity was not completed for the ASSIST evaluation, but progress was made toward developing such an index. While the ASSIST concept-mapping exercise yielded potential categories and weighting data for future metrics efforts and correlated well with the core areas identified above, the development of dynamic quantitative measures of protobacco efforts remains a goal for future tobacco control assessment efforts.

Introduction

In the ASSIST evaluation, the Strength of Tobacco Control index (chapter 2) was developed to represent the public health effort. The original evaluation model also called for an index to represent tobacco industry* efforts, a countervailing force to state tobacco control efforts.[1] White and Bero (Monograph 16, chapter 8) provide in-depth documentation that the tobacco industry did work to counter ASSIST, perceived ASSIST as a significant threat, made and executed plans to counter it, and even evaluated their own efforts. Unfortunately, this analysis could not be used as the basis for a measure of tobacco industry efforts because its purpose was limited to a description of tobacco

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*The term *tobacco industry* in this chapter refers to a group of private corporations in the business of selling tobacco products and to their affiliates, who share an incentive to promote the overall use of tobacco. It is not necessarily intended to imply that these companies are working in concert, or that any particular company engages in the use of any particular tactic, or that the tactics represent illegal behavior.

industry responses to ASSIST and it was performed after the ASSIST evaluation had been completed.

The goal of the analyses described in this chapter was to create the tobacco industry counterforce measure described in the ASSIST evaluation conceptual model,[1] a counterforce that "had a dampening effect on the program" (see Monograph 16, chapter 8, page 371). The approach to creating this measure was a "top down" one. That is, a concept mapping study was used to create categories of tobacco industry efforts a priori. Subsequently, these categories were investigated to assess whether they could encompass the extant literature and the tobacco industry documents available during the time in which the search was conducted (1999–2000) and, additionally, whether these sources could become a source of data for the measure of protobacco forces metric described by Stillman and colleagues.[1] Challenges to creating and measuring this index were not surmounted during the period of the ASSIST evaluation, and the evaluation was not able to account for the tobacco industry's countervailing efforts. However, the work described here will serve as a foundation for those who continue to work on developing a valid and reliable measure of tobacco industry tactics.

Background

At the time of the ASSIST evaluation, it was unknown whether the publicly available tobacco industry documents provided a comprehensive and representative sample of all the actions the industry took to counter tobacco control efforts. Therefore, other sources of information

were looked for to use as a conceptual framework of tobacco industry tactics. A review of the literature yielded two reviews of the tobacco industry's national and international tactics. Both reviews organize individual tobacco industry efforts against tobacco control into larger categories of tactics. Sweda and Daynard[2] analyzed how the size, concentration, and wealth of the tobacco industry allowed it to use numerous strategies to interfere with public health. The strategies Sweda and Daynard identify were influencing legislative bodies through political contributions, threatening lawsuits against whistle-blowing media, using front groups, reframing the public debate from the health issue to economic and personal freedoms issues, and attempting to confuse the scientific record.

Saloojee and Dagli[3] describe various methods used by the tobacco industry to counter tobacco control efforts and discuss these tactics within the context of the ongoing globalization of tobacco use. Saloojee and Dagli identify nine focal points of the industry's efforts: engineering consent, mobilizing corporate resources, manufacturing doubt, protecting corporate rights, gathering intelligence, controlling the agenda, peddling influence, promoting voluntary codes and preemptive legislation, and opening markets through trade sanctions and corruption.

These two reviews were useful for understanding the scope of the tobacco industry tactics and validating the underlying principle that protobacco forces exist to disrupt public health programming. Neither review, however, was conducted with an eye toward creating a comprehensive and measurable metric

of industry activity. In addition, on the basis of the tobacco industry documents available at that time, it was impossible to determine how well those tobacco industry efforts represented all that was occurring. Therefore, the experiential knowledge of tobacco control professionals was used to guide development of an index variable for industry tactics.

Expert-based Conceptual Map of Industry Tactics

The first method used to identify tobacco control counterefforts was concept mapping. This mapping project involved a Web-based collaboration that engaged tobacco control experts from across the country; they provided input on the various tobacco industry tactics. Participant input was analyzed with a sequence of multivariate statistical analyses, and the resulting output, including a variety of conceptual maps, was interpreted by a group of experts. This section describes the methods used to develop the conceptual framework and presents the basic results.

Methods

Concept mapping was used to develop the conceptual model of tobacco industry tactics. Concept mapping is a participatory mixed-methods approach that integrates group process activities with several multivariate statistical analyses to yield both a statistical and a visual representation of a conceptual domain. Concept mapping was first described by Trochim and Linton.[4] Trochim[5] presents a wide range of example projects.

Participants

Participants in the concept mapping process were those who fulfilled the following criteria: had encounters with tobacco industry resistance to tobacco control programming; had an understanding of tobacco industry challenges to tobacco control; or had published research on tobacco industry documents or behavior. A panel of 34 tobacco control experts was selected to participate. Tobacco industry representatives were not included because their participation could be deemed contrary to the interests of the tobacco companies, making it difficult to confirm the reliability of their responses.

Procedures

The procedure for concept mapping is described in detail by Trochim.[6] The concept-mapping process took place from July 2000 through September 2000. All data were collected from the participants over the World Wide Web. There were four distinct phases in the process: brainstorming, sorting and rating, data analyses and generation of the maps, and expert panel interpretation of the maps.

Brainstorming. Each of the 34 experts logged on to a private Web page at least once during a 4-week period and responded to the following prompt: "One specific activity/tactic the tobacco industry uses to oppose tobacco control is . . . " Each participant could make as many response statements to the prompt as warranted. The statements were compiled in a list as entered, sequentially. The process generated a total of 226 statements from the 34 participants.

Sorting and Rating. In preparation for the sorting and rating task, similar statements were consolidated into a single representative statement. The objective was to have a final set of mutually exclusive statements, with only one main idea in each, and with no loss of content from the original list. The 226 statements were edited into a final set of 88 statements.

Participants were asked to log on to another Web page for the sorting and rating tasks. Twenty-two of the 34 experts participated in this phase. Each participant conducted an unstructured pile sorting of the statements by grouping the brainstormed statements into piles in a way that made sense to him or her.[7–9] Three restrictions were applied to this sorting task:

1. No statement could be its own pile (each pile had to contain at least two statements).
2. There could not be a pile consisting of all the statements.
3. There could be no pile called "miscellaneous" containing unrelated statements.

Each participant was asked to provide a brief label that summarized the contents of each pile. Each participant was asked to rate the 88 statements according to the following instructions:

> Rate each statement on a 1-to-5 scale for its relative importance in undermining tobacco control efforts. Use a 1 if the statement is relatively unimportant (compared to the rest of the statements) in undermining tobacco control efforts; use a 5 if it is extremely important. Although every statement probably has some

importance (or it wouldn't have been brainstormed), try to spread out your ratings and use each of the 5 rating values at least several times.

Data Analyses and Generation of the Maps. The analysis[*] began with construction of a binary square symmetric matrix of similarities for each sort. For any two statements, a 1 was assigned to the corresponding cell if the participant placed them in the same pile; otherwise, a 0 was entered.[8] A total similarity matrix was obtained by summing across the separate sort matrices. Thus, any cell in this total matrix could have integer values between 0 and 22 (the number of people who sorted the statements), where the value indicates the number of people who placed the pair in the same pile. In addition, in this analysis the final matrix was filtered by changing any matrix values of 1 to a 0. In effect, this means that, for the two statements to be considered at all similar, at least two participants had to have placed the two statements together. This filtering helps minimize the effects of any sorting errors or spuriousness in sorting on the final results.

The total similarity matrix was analyzed with nonmetric multidimensional scaling (MDS) analysis[10] with a two-dimensional solution. The solution was limited to two dimensions primarily for ease of use considerations[11] and because it was used as the basis for cluster analysis.

The x,y MDS configuration was the input for the agglomerative hierarchical cluster analysis using Ward's algorithm

[*]All analyses were made with The Concept System© software, version 1.75 (www.conceptsystems.com).

as the basis for defining a cluster.[12] Using the MDS configuration as input to the cluster analysis in effect forces the cluster analysis to partition the MDS configuration into non-overlapping clusters in two-dimensional space. There is no simple mathematical criterion by which a final number of clusters can be selected. The procedure followed here was to examine an initial cluster solution that was the maximum that was felt to be desirable for interpretation in this context. Then successively lower cluster solutions were examined, with a judgment made at each level regarding whether the merger seemed substantively reasonable. The suitability of different cluster solutions was examined and resulted in acceptance of the eight-cluster solution as the pattern that both preserved the most detail and yielded substantively interpretable clusters of statements.

The MDS configuration of the statement points was graphed in two dimensions. This point map shows the location of all the brainstormed statements; the statements closer to one another are generally expected to be more similar in meaning. A cluster map was also generated. It shows the original statement points enclosed by polygon-shaped boundaries for the eight clusters.

The 1-to-5 importance rating variable was averaged across persons for each statement and across statements for each cluster. Two graphs were developed to display the rating information. The first depicted is a point rating map, which shows the original point map with the average rating per item displayed as vertical columns in the third dimension.

The second is a cluster rating map, which shows the cluster average rating in the third dimension.

Expert Panel Interpretation of the Maps. Thirteen of the original panel of participants were convened for a face-to-face meeting to review and interpret the results of the mapping process. The interpretation session followed a structured process described in detail by Trochim.[6] The participants examined the maps to determine whether they made intuitive and rational sense and to discuss what the maps might imply about tobacco industry tactics to disrupt public health programs. They discussed each cluster until a consensus was reached on an acceptable cluster label. The participants then examined the labeled cluster map to determine if any clusters could be grouped into regions. These were discussed, and partitions were drawn on the map to indicate the different regions. Just as in labeling the clusters, the group then arrived at a consensus label for each of the identified regions.

This step-by-step interpretation culminated in a discussion of the overall meaning of the various maps and representations. This discussion resulted in the articulation of the conceptual model of tobacco industry tactics; this model is described below.

Results

In MDS analyses, the *stress value* is the statistic that is commonly reported to indicate the goodness-of-fit of the two-dimensional configuration to the original similarity matrix. A lower stress value

indicates a better fit. In a study of the reliability of concept mapping, Trochim reports that the average stress value across 33 projects was .285 with a range from .155 to .352.[13] The stress value in our analysis was .237, which is better (i.e., lower) than that average.

In the analyses, an eight-cluster solution best fit the data. The 88 statements and their rankings by perceived importance within clusters are listed in table 8.1. The point-cluster map in figure 8.1 shows all of the tobacco industry tactics statements (points) in relation to one another. Figure 8.2 shows the cluster-rating map, where the layers of each cluster depict the average importance rating, with more layers indicating higher importance. Note that the average represented by the layers in the map is actually a double averaging—across all of the participants and across all of the factors in each cluster. Consequently, even slight differences in averages between clusters are likely to be meaningful. The map clearly shows that, in general, the clusters along the bottom were judged to be more important for undermining antitobacco efforts.

The 13 participants interpreted the map and table in terms of several patterns. The four clusters across the top were thought to describe the tactics that the tobacco industry uses to control tobacco-related messages and issues. These include attempts to undermine legitimate messages from scientific studies ("Undermining Science"), attempts to manipulate the media ("Media Manipulation"), the industry's public relations efforts ("Public Relations"), and

activities to gain control of the popular agenda ("Usurping the Agenda"). The four clusters across the bottom describe industry actions—what the tobacco industry does. This includes lobbying efforts ("Lobbying and Legislative Strategy"), the use of front groups and artificially created grassroots movements ("Creating the Illusion of Support"), intimidation ("Legal and Economic Intimidation"), and harassment of tobacco control professionals ("Harassment").

The participants also interpreted a horizontal dimension. Toward the left on the map are clusters that represent tactics that are more hidden or covert in nature. On the right are tactics that tend to be more overt or public in nature. The participants also suggested that the two dimensions can be viewed as forming four quadrants based on the 2×2 combination of these dimensions, and they provided a short label for each quadrant:

Issue Framing = Public + Messages
Lobbying Tactics = Public + Action
Science Public Relations = Covert + Messages
Harassment = Covert + Action

Last, the expert panel agreed on a final labeling for all areas of the map (see figure 8.3).

Lessons from the Concept Map

The concept map represents an empirically derived consensus of a panel of tobacco control experts and may serve as the basis for subsequent measurement development. For example, the individual statements generated by the expert panel may serve as the basis for individual

Table 8.1. Clusters and Statements in Descending Order, by Average Importance Rating

Item #	Statement	Mean
	Lobbying and legislative strategies	3.71
85	Writing and pushing preemptive legislation at state level	4.67
8	Creating loopholes in laws and agreements (e.g., the MSA) to allow business as usual	4.57
26	Contributing funds to political groups at federal, state, and local levels to support industry goals	4.43
53	Using clout to influence introduction, advancement, modification, or suppression of bills in legislative bodies	4.38
87	Lobbying to ensure that funds directed to tobacco control are diverted to nontobacco control initiatives	4.33
27	Using clout to limit powers of regulatory agencies (jurisdiction, procedures, budgets)	4.29
63	Providing legislators with contributions, gifts, and other perks	4.10
44	Promoting partial or weak measures as an alternative to effective measures	4.10
52	Inserting limiting language in legislation, such as "knowingly" sell tobacco to minors	4.05
13	Writing weak tobacco control legislation, then arguing that tobacco control measures are ineffective	3.86
17	Ghost writing nontobacco bills (e.g., sewage) with clauses that if enacted, would bring preemption via the backdoor	3.71
7	Lobbying government officials to set unrealistic tobacco control goals to ensure program failure	3.67
61	Using political and/or monetary clout to delay funding of tobacco control programs	3.67
36	Lobbying to ensure that funds are diverted to ineffective tobacco control activities	3.67
62	Working against campaign finance reform to maintain influence	3.62
21	Working against strengthening campaign and lobbying disclosure laws	3.57
19	Promoting tort reform	3.38
41	Using clout to assign tobacco control programs to hostile/apathetic agencies for implementation	3.19
76	Conducting "briefings" of members of Congress, allies, and consultants to sway opinion on an issue	3.14
1	Promoting smokers' rights legislation	3.05
29	Using tobacco companies' subsidiaries (i.e., Miller and Kraft) in political opposition to tobacco control legislation	3.05
10	Ensuring supportive legislators will lob soft questions during testimony	2.38
2	Using tobacco employees to lobby against legislation with the excuse that it threatens their job security	2.38
	Legal and economic intimidation	3.46
16	Devoting considerable resources to legal fights	4.76
65	Creating and funding front groups	3.81
46	Ensuring that court battles are fought in favorable jurisdictions	3.76
64	Infiltrating official and de facto regulatory organizations (like ASHRAE)	3.43
58	Filtering documentation through their attorneys in order to hide behind attorney work product [privilege]	3.29
9	Encouraging (or failing to discourage) smuggling as a way to counter tax hikes	3.10
4	Countering tax increases with promotions and cents off	3.05
48	Threatening to withdraw support from credible groups to control [them]	2.48
	Usurping the agenda	3.39
42	Developing alliances with retailers, vendors, and the hospitality industry in opposition to public health policies	3.90
40	Usurping the public health process, such as creating their own youth tobacco prevention programs	3.33
22	Avoiding regulatory and legislative interventions by establishing their own programs, such as "We Card"	3.24
66	Promoting a tobacco-control focus that is limited to youth issues	3.24
35	Shifting blame to the victims (e.g., passing youth possession laws to punish youths)	3.24
	Creating illusion of support	3.27
54	Using legal and constitutional challenges to undermine federal, state, and local legislative and regulatory initiatives	4.52
81	Using antilobbying legislation to suppress tobacco control advocacy	3.57
68	Flying in cadre of "experts" to fight local/state legislation	3.43
39	Creating the illusion of a protobacco grassroots movement through direct mail database and paid-for petition names	3.19
60	Using international activities to avoid domestic rules on ads, taxation, etc.	3.05
33	Entering false testimony and false data into the public record	2.95
75	Tying states' MSA money to increases/decreases of smoking prevalence	2.95
59	Using employees and their families to make campaign contibutions that are difficult to track	2.52
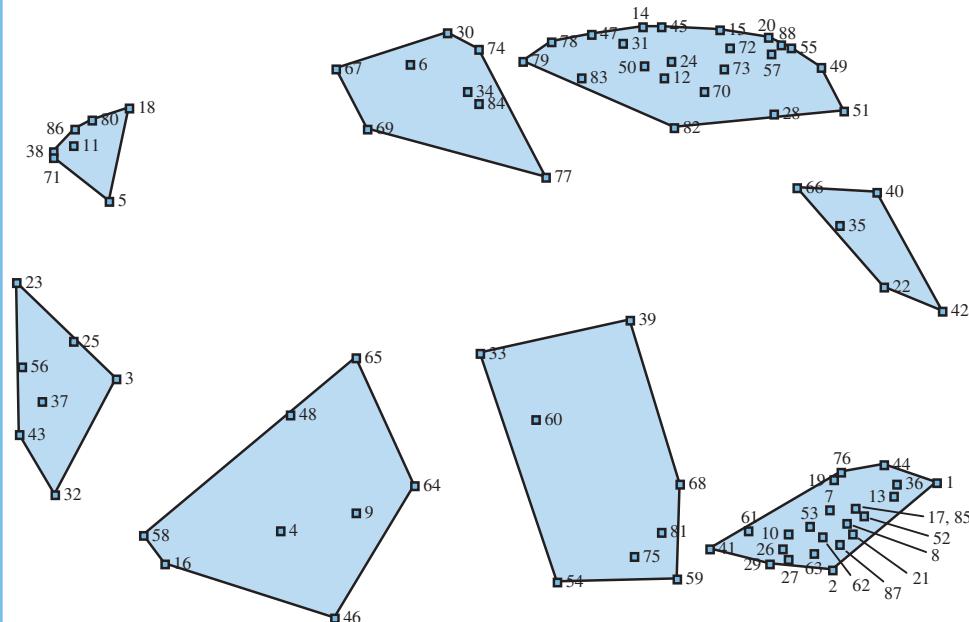
Table 8.1. (continued)

Item #	Statement	Mean
Harassment		3.26
43	Intimidating opponents with overwhelming resources	4.38
32	Using the courts and threats of legal action to silence opponents	4.19
37	Harassing tobacco control workers via letters, FOIAs, and legal action	3.43
56	Silencing industry insiders	3.19
23	Hassling prominent tobacco control scientists for their advocacy work	3.00
3	Infiltrating tobacco prevention and control groups	2.81
25	Trying to undermine those selling effective cessation products	1.81
Undermining science		3.26
11	Creating doubt about the credibility of science by paying scientists to disseminate protobacco information	3.76
18	Sowing confusion about the meaning of statistical significance and research methods	3.57
38	Creating scientific forums to get protobacco information into the scientific literature	3.33
5	Influencing scientific publication by paying journal editors to write editorials opposing tobacco restrictions	3.10
71	Creating doubt about the credibility of science by paying scientists to provide expert testimony	3.10
80	Creating doubt about the credibility of legitimate science by paying scientists to conduct research	3.05
86	Conducting studies that, by design, cannot achieve a significant result	2.90
Media manipulation		2.91
77	Using advertising dollars to control content of media	3.71
34	Putting own "spin" on the issues by manufacturing information sources	3.43
67	Taking advantage of the "balanced reporting" concept to get equal time for junk science	2.86
69	Ghost writing protobacco articles	2.76
6	Avoiding the key health questions by saying they are not experts and then not agreeing with the experts	2.71
84	Misrepresenting facts in situations where there is no time to verify	2.67
74	Publicly acknowledging the risk of tobacco use, but minimizing the magnitude	2.67
30	Publicizing research into "safe cigarettes"	2.48
Public relations		2.85
12	Using philanthropy to link their public image with positive causes	4.00
28	Using philanthropy to build a constituency of support among credible groups	3.62
73	Diverting attention from the health issues by focusing attention on the economic issues	3.48
51	Distracting attention from the real issues with alternative stances such as accommodation and ventilation	3.38
88	Asserting that restrictions on tobacco could lead to restrictions on other industries and products	3.38
14	Minimizing importance of misdeeds in the past by claiming they've changed	3.24
20	Arguing that tobacco control policies are antibusiness	3.19
72	Maintaining that the tobacco industry is of critical importance to the economy	3.19
45	Portraying themselves as "responsible," "reasonable," and willing to engage in a "dialogue"	2.90
78	Misrepresenting legal issues to naive reporters and stock analysts	2.86
79	Feeding protobacco information to market analysts who are predisposed to accepting and transmitting it	2.86
15	Representing people as "antismoker" instead of antismoking	2.81
82	Developing protobacco media content, such as videos and press releases	2.67
83	Painting tobacco control activists as extremists	2.67
55	Pretending that the "real" tobacco control agenda is prohibition	2.57
57	Casting tobacco control as a civil rights threat	2.52
49	Portraying tobacco control as a class struggle against poor and minority groups	2.48
24	Providing extensive media training for executives who will be in the public eye	2.43
70	Shifting attention toward lawyers' monetary gains and away from tobacco litigation	2.38
47	Avoiding losing public debates by overcomplicating simple issues	2.29
31	Blaming it on "fall-guys" (past or rogue employees) when the industry is caught misbehaving	2.00
50	Refusing or avoiding media debates where they think they will do poorly	1.71

Note: MSA indicates Master Settlement Agreement. ASHRAE indicates American Society of Heating, Refrigerating and Air-Conditioning Engineers. FOIAs indicates requests made under the Freedom of Information Act.
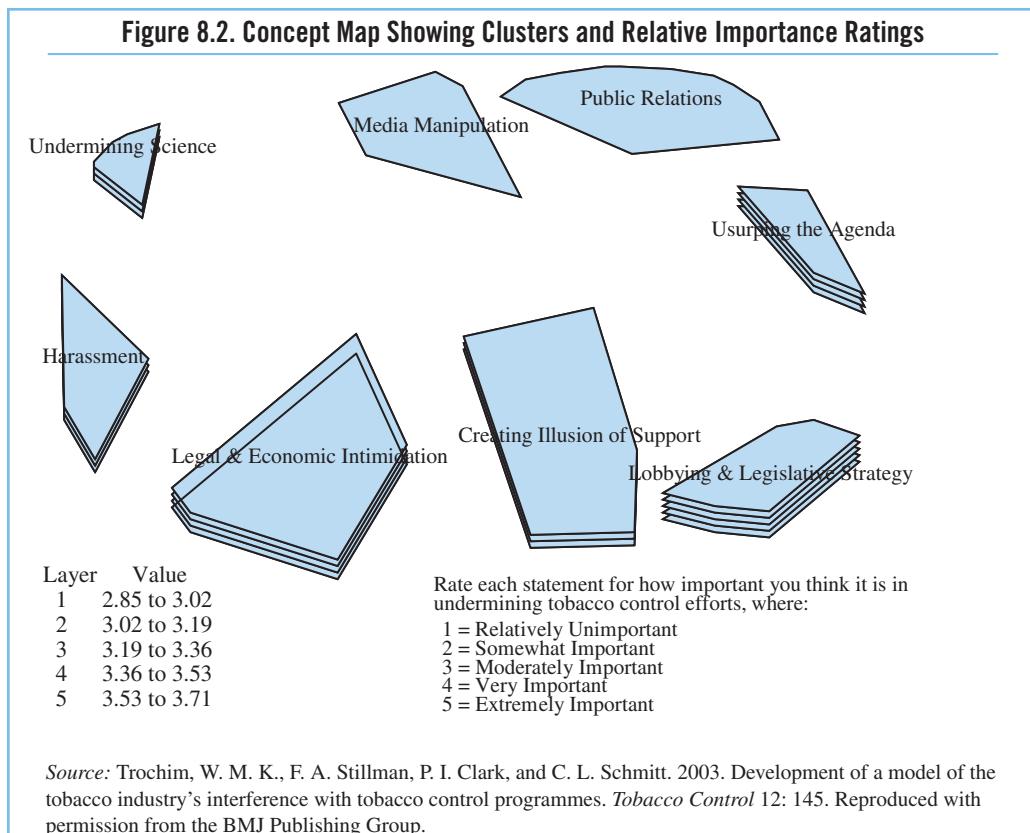
Figure 8.1. Point-cluster Map Showing the Multidimensional Scaling Arrangement of the 88 Statements with the Eight-cluster Solution Superimposed

Source: Trochim, W. M. K., F. A. Stillman, P. I. Clark, and C. L. Schmitt. 2003. Development of a model of the tobacco industry's interference with tobacco control programmes. *Tobacco Control* 12: 144. Reproduced with permission from the BMJ Publishing Group.

measures. It is anticipated that a proto-bacco index might be aggregated from the structural units of the map. For instance, it may make sense to aggregate subindex scores for the clusters "Public Relations and Usurping the Agenda" into a total score that represents "Issue Framing." Carrying this notion up the hierarchy, one might then aggregate the fourfold index scores that represent the quadrants into an overall index of tobacco industry tactics in a manner analogous to the hierarchical index construction used in the Strength of Tobacco Control index (see chapter 2).

However, additional empirical work is needed to validate the results and to explore the classifications inherent in the map. The next sections of this chapter describe two sources of data used to validate the categories identified in the concept map—a review of the litera-ture covering tobacco industry actions against tobacco control efforts and a re-view of the tobacco industry documents. These reviews were performed to deter-mine whether the categories of tactics described by concept mapping can also be identified from these sources.

Figure 8.2. Concept Map Showing Clusters and Relative Importance Ratings

Layer	Value
1	2.85 to 3.02
2	3.02 to 3.19
3	3.19 to 3.36
4	3.36 to 3.53
5	3.53 to 3.71

Rate each statement for how important you think it is in undermining tobacco control efforts, where:

1 = Relatively Unimportant
2 = Somewhat Important
3 = Moderately Important
4 = Very Important
5 = Extremely Important

Source: Trochim, W. M. K., F. A. Stillman, P. I. Clark, and C. L. Schmitt. 2003. Development of a model of the tobacco industry's interference with tobacco control programmes. *Tobacco Control* 12: 145. Reproduced with permission from the BMJ Publishing Group.

Review of the Published Literature on Tobacco Industry Tactics

The concept mapping provided a basis for measuring tobacco industry strategies. Subsequently, the published scientific literature on tobacco industry activities was reviewed to determine whether the tobacco industry actually used these or similar tactics when confronting public health initiatives at the local, state, and national levels and whether the tactics described in the literature could be subsumed under the categorization scheme described by the concept mapping project. While these eight categories did effectively represent those described in the extant literature, we found no existing source of data from which a valid quantitative measure could be constructed for every state.

The first part of this section provides a brief description of the method used to identify and select articles for inclusion in the review. It subsequently presents articles illustrative of each category of tobacco industry tactic described by the concept mapping analysis. Finally, studies are presented that illustrate that the tobacco industry employed a combination of tactics to counter specific public health initiatives.

Figure 8.3. Experts' Interpretation of the Industry Tactics Concept Map

Source: Trochim, W. M. K., F. A. Stillman, P. I. Clark, and C. L. Schmitt. 2003. Development of a model of the tobacco industry's interference with tobacco control programmes. *Tobacco Control* 12: 145. Reproduced with permission from the BMJ Publishing Group.

Methods

The peer-reviewed literature was searched for articles examining the tactics the tobacco industry has used to oppose tobacco control. A broad search strategy was used to capture articles published from 1955 through October 2001. The search was limited to English-language and human studies. The MEDLINE database was queried with multiple search term combinations with Boolean operators. The general search category *tobacco industry* was combined with a series of search terms related to possible tobacco industry tactics. Terms included *harassment, public relations, intimidation, illusion, legislat**, lobby**, media, science, undermin**, agenda, support, legal, illegal, econom**, NCI, ASSIST, interfer**,* and *strategy*.

In an initial screening of the search results, the first screener (KK) identified 173 articles for potential inclusion in the review. Two additional screeners (BF, SB) reviewed the search protocol and list of captured articles for completeness and relevance. The articles were then reviewed for relevance to the question posed, and any clearly irrelevant articles were excluded from further analysis. Fifty-one articles

lobbying, and other efforts to affect legislation passage, implementation, and enforcement (see table 8.2).

It is clear from the studies reviewed that the tobacco industry engages in tactics identified as Lobbying and Legislative Strategies. They are able to influence legislation, because their monetary contributions to politicians give them access to the legislative process. The high importance ratings that the concept mapping participants assigned to this strategy's role in undermining tobacco control is supported by the published literature.

Legal and Economic Intimidation and Creating the Illusion of Support

The tobacco industry devotes considerable resources to policy battles and seeks to portray substantial support by the community at large for its positions. This support can exert political pressure on lawmakers, who mistake it for a true grassroots movement.

The two concept map domains Legal and Economic Intimidation and Creating the Illusion of Support are combined here because of shared aspects of tobacco industry association with front groups and engineered constituencies. While the major focus of Legal and Economic Intimidation is *disempowering* groups that promote tobacco control through financing and/or creating adversarial front groups, such as retailer alliances, Creating the Illusion of Support strategies focus on *empowering* groups that support the tobacco industry agenda (see table 8.3).

As the public has become aware and resistant to the tobacco industry's direct tactics, the industry has employed tactics that minimize their own public exposure. Many of these less direct tactics are those included in the Legal and Economic Intimidation and Creating Illusion of Support constructs.

Usurping the Agenda

This concept map domain encompasses tactics characterized by the tobacco industry's apparent championship of another group's cause. For example, their widely publicized youth smoking prevention programs and support of laws that punish youth for the purchase, use, and possession of tobacco products appear to serve the public health agenda. In reality, however, the tobacco industry's active participation in these issues allows them to control the agenda, rather than be controlled by it, and divert attention from issues they cannot directly address or counter (see table 8.4).

The Usurping the Agenda tactics most frequently identified are the use of industry alliances to present a protobacco position and the creation of youth access programs, where it has been particularly successful. This group of tactics allows the tobacco industry to control the public health agenda instead of being controlled by it.

Harassment

The tobacco industry uses other tactics to frighten and overwhelm opponents. The tactics include threatening to sue or actually suing tobacco control advocates. Alternatively, the industry makes burdensome requests for information under the Freedom of Information Act (FOIA). As a result, people targeted by

Table 8.3. Legal and Economic Intimidation and Creating the Illusion of Support

Authors	Short description
Traynor, Begay, and Glantz[20]	During 1991–92 in California, the tobacco industry used front groups and links to restaurant and merchant associations to conceal direct lobbying efforts in local policy debates. These groups monitored legislation and organized local initiative campaigns against tobacco control regulations. Telephone hotlines and public relations firms kept track of local policy developments and organized consumer lobbying efforts.
Ellis, Hobart, and Reed[21]	In the late 1980s and early 1990s in Contra Costa County, CA, industry associations used direct mailing campaigns, front groups, public relations firms, and lobbying for "smokers' rights" to create the illusion of a genuine protobacco grassroots movement.

Table 8.4. Usurping the Agenda

Authors	Short description
Bidell, Furlong, Dunn, and Koegler[22]	In Santa Barbara County, CA, the tobacco industry, retailers, and industry associations worked together to attempt to defeat local legislation banning self-service tobacco displays. When the bill passed, those groups worked to delay the enactment and impede the enforcement of the bans.
Ritch and Begay[23]	The tobacco industry made alliances with retailers, vendors, restaurateurs, tavern proprietors, and the general hospitality industry. A trade association advocating protobacco-industry policies claimed that proposed clean indoor air legislation would have negative economic consequences.
DiFranza and Godshall[24]	The tobacco industry created a "model" state bill for underage tobacco sales that would undermine enforcement efforts.

Table 8.5. Harassment

Authors	Short description
Aguinaga and Glantz[25]	The tobacco industry filed burdensome FOIA requests with public health agencies to slow agency action.
Nicholl[26]	The tobacco industry accused tobacco-control advocates and program managers of illegal lobbying to further inflate the perception that the industry position was the public's position.
Bialous, Fox, and Glantz[27]	Managers from the 17 ASSIST states were interviewed about formal complaints from the industry alleging illegal lobbying activities. Managers in ASSIST states that had not been targets of these industry complaints reported limiting their tobacco control interventions because they feared they would also be accused of illegal lobbying.

Note: FOIA indicates Freedom of Information Act.

these tactics may be afraid to pursue an aggressive tobacco control agenda, or an agency may become so overburdened complying with information requests that its employees cannot accomplish their tobacco control duties (see table 8.5).

This tactic not only compels agencies to devote limited resources to a response, but it also creates an atmosphere in which all tobacco control managers, even those who have never been the direct target of these tactics, must become hypervigilant about their involvement in any policy interventions.

Undermining Science

The tobacco industry has made extraordinary efforts to confuse the public about the science of the health risks of smoking and environmental tobacco smoke. While industry executives and scientists have known about and accepted the scientific evidence about health risks from tobacco use and secondhand smoke for decades,[28] they have actively resisted the public disclosure of this information. In addition, they have initiated and supported a research agenda designed to counter legitimate negative findings about tobacco's health effects. Outcomes from this research agenda are, in turn, finely tuned to minimize or negate negative findings and are released to the public by forums allegedly unrelated to the industry. Tobacco company efforts to control the focus of tobacco research, counter already-published negative research, and actively work to confuse the public are well represented in the industry documents and subsequently in the published literature (see table 8.6).

The tobacco industry's use of tactics under this domain is well documented. These tactics included designing studies to yield results that support tobacco industry positions, paying scientists to perform these studies, and creating quasi-legitimate forums to publicize those results. Lawyers with an eye to potential litigation at every level controlled research agendas. The tobacco industry successfully kept information from the public for many years. When this information became public knowledge, they attacked its veracity.

Media Manipulation and Public Relations

The Media Manipulation and Public Relations domains use similar tactics and will therefore be discussed together. The primary difference is that media manipulation tactics are more likely to be indirect and public relations tactics are more likely to be direct. For example, media manipulation tactics include situations in which the tobacco industry does not pay for positive media attention but can direct messages by threatening to withhold advertising revenues from a magazine that runs antitobacco stories. Public relationships tactics, in comparison, distract the public from health issues by focusing attention on alternative issues. Threats to the tobacco industry are reframed as threats to the economy of the state or nation, other businesses, or minority citizens. The common theme that connects the two domains is that they both involve presenting a manufactured image of the tobacco industry to the public (see table 8.7).

Media manipulation and public relations tactics are well used by the tobacco

Table 8.6. Undermining Science

Authors	Short description
Glantz, Barnes, Bero, Hanauer, and Slade[29]	In the mid-1970s, Brown & Williamson scientists determined that secondhand smoke causes irritation, contains toxins, and is carcinogenic, but those scientists did not release the information. They also confirmed that nicotine is addictive and that tobacco use causes disease. Company scientists were not allowed to pursue research that might make the company subject to litigation.
Bero, Barnes, Hanauer, Slade, and Glantz[30]	Brown & Williamson funded external research projects for their potential public relations value, for potential use in undermining legitimate research, or to support industry objectives relating to such areas as ventilation and accommodation.
Barnes, Hanauer, Slade, Bero, and Glantz[31]	Brown & Williamson funded research intended to prove that environmental tobacco smoke is not harmful.
Hanauer, Slade, Barnes, Bero, and Glantz[32]	Internal research by Brown & Williamson that would have been disadvantageous in liability lawsuits was kept confidential. Internal documentation of practices and research was reviewed by attorneys in order to invoke attorney work product privilege in discovery.
Barnes and Bero[33]	The Center for Indoor Air Research was established and funded by three U.S. tobacco companies to research indoor air, including secondhand smoke.
Hirschhorn[34]	Programs to fund and disseminate research intended to prove that secondhand smoke is safe were initiated by Philip Morris, R.J. Reynolds, and British American Tobacco in Germany, influencing policy in that nation and elsewhere in Europe.
Ong and Glantz[35]	Philip Morris developed research and dissemination strategies to combat the results of a study conducted by the International Agency for Research on Cancer that connected secondhand smoke with lung cancer.
Drope and Chapman[36]	U.S. tobacco companies retained scientists to create and publicize doubt about the health risks of secondhand smoke. Scientists were organized and forums for dissemination were sponsored. Unfavorable results were kept from public release, and all studies contained contractual clauses requiring attorney review.
Muggli, Forster, Hurt, and Repace[37]	Studies were explicitly designed to refute the Environmental Protection Agency report connecting secondhand smoke and lung cancer. Resulting information was disseminated at industry-sponsored forums and in popular print media.
Ong and Glantz[38]	Philip Morris used the concept of "sound science" to attack the Environmental Protection Agency report implicating secondhand smoke in lung cancer. It also funded research to prove that secondhand smoke is not harmful.

industry. With these tactics, the industry shapes public opinion. Public opinion, in turn, affects whether legislation favorable to the tobacco industry is enacted and enforced.

Case Studies that Examine Tobacco Industry Tactics

The research reviewed above corresponds largely, though not precisely, to the concept map headings. The extant

Table 8.7. Media Manipulation and Public Relations

Authors	Short description
Richards, Tye, and Fischer[39]	A disparity was found between the tobacco industry's pronouncements and practices regarding advertising. As broadcast advertising was restricted to reduce youth consumption, funds were moved to billboard and print advertisements. These advertisements also appeared to target youths despite industry statements to the contrary.
Hurt and Robertson[40]	The industry marketed low-nicotine and low-tar cigarettes as healthier for smokers than traditional cigarettes despite evidence to the contrary. As a result, the public became confused about the overall dangers of tobacco use.
Kennedy and Bero[41]	Newspapers and periodicals in 1981–94 characterized the health effects of secondhand smoke as controversial despite few research citations supporting this claim. A positive correlation was found between the amount of tobacco advertisements in a given magazine and the likelihood that the magazine would frame tobacco issues as controversial.
Mangurian and Bero[42]	Unfavorable media coverage of a smoke-free workplace ordinance increased after speakers supporting the industry spoke at public hearings.
Magzamen, Charlesworth, and Glantz[43]	Disproportionate coverage of industry-promoted topics, including economic cost/benefit analyses, ventilation utility, and smokers' rights, was found in news and opinion pieces on passage of a smoke-free workplace law in California in 1997–98.

literature also includes case studies that focus on tobacco industry responses to particular legislative or regulatory efforts. These studies cannot be sorted and reviewed under separate concept map headings because each one describes multiple tactics the industry used to achieve their goals. These efforts are therefore grouped loosely under two categories: constellations of tactics that the industry uses to oppose a specific public health program and constellations of tactics the industry uses at the state and local levels to oppose tobacco control (see table 8.8).

General State-level Industry Behavior

Four papers have examined tobacco industry behavior at the state level and one paper examined industry behavior at the local level. These studies provide a general overview of the tactics the industry employs as it faces increasing challenges in the business environment. These reviews are based on industry documents, public records, and interviews (see table 8.9).

Taken together, these case studies show that the tobacco industry relies on direct and indirect political pressure to counter tobacco control efforts at the state and local levels. Direct pressure is exerted through lobbying efforts, and access to politicians is ensured through generous political contributions. Indirect pressure is applied through the manipulation of public opinion. A combination of strategies, including legislative and legal intimidation, usurping the agenda, creating an illusion of support, and harassment, harness other individuals and groups to present protobacco

Table 8.8. Industry Tactics to Oppose Specific Public Health Initiatives

Authors	Short description
Samuels, Begay, Hazan, and Glantz[44]	In response to Pittsburgh's proposed health policies in 1987, the tobacco industry formed alliances with business and labor organizations to oppose a proposed ordinance that would restrict smoking in some restaurants, workplaces, and public areas. In addition, a public debate on accommodation, spearheaded by Philip Morris, served to distract attention from the public health issues of clean indoor air.
MacDonald and Glantz[45] (see also Magzamen and Glantz[46])	The tobacco industry relied on multiple tactics as it opposed the smoking restrictions in California Assembly Bill 13 and its subsequent proposed extension to bars, while supporting preemption amendments and weaker alternative legislation.
Goldman and Glantz[47]	The tobacco industry used multiple strategies to oppose Oregon's Measure 44 in 1996.
Koh[48]	The tobacco industry used multiple strategies to oppose the 1992 Massachusetts Question 1 tobacco tax initiative.
Traynor and Glantz[49]	The tobacco industry used a variety of tactics, including front groups, legal challenges, government lobbying, and media saturation, to halt, delay, or subvert passage of California's Proposition 99 in 1989.

Table 8.9. Tobacco Industry Behavior at State and Local Levels

Authors	Short description
Nicholl[26]	This study identifies tobacco industry tactics in eight statewide tobacco tax initiative campaigns (California, Massachusetts, Arizona, Oregon, Montana, Nebraska, Arkansas, and Colorado). These tactics were characterized by the ability to apply direct and indirect pressure on the legislature through the use of front groups, manufactured grassroots constituents, and media saturation. Other tactics, such as hiring professional signature gatherers at higher than market wages, were used to defeat petitioning on the part of tobacco control coalitions.
Jacobson, Wasserman, and Raube[50]; Jacobson and Wasserman[51]	The tobacco industry favored preemption clauses in six states (Arizona, Florida, Illinois, Minnesota, New York, and Texas), in part because they could weaken coalition support for the proposed legislation. Monetary contributions to politicians, combined with direct lobbying efforts, promoted the tobacco industry's interests in the legislature. After tobacco control legislation was passed, the industry continued its efforts to impede implementation and enforcement of the laws.
Givel and Glantz[52]	In the 1990s, tobacco industry tactics included contributions and gift giving to legislators, creation and maintenance of front groups, affiliation with business associations and smokers' rights groups, and accusations of illegal lobbying directed at public health workers. Statewide preemption clauses were often the tobacco industry's objective, and the industry focused lobbying efforts and financial contributions on influencing committee processes and vote scheduling.
Samuels and Glantz[53]	The industry used multiple tactics against tobacco control ordinances as policy debates moved to the municipal level in the late 1980s.

arguments using public relations tactics. At the same time that political pressure is being applied, other lobbying and legislative strategies, such as clauses including preemption and support for smokers' rights, are employed to weaken coalition support for proposed legislation and make that legislation more congruent with tobacco industry goals. These tactics continue during the implementation and enforcement phase of any legislation adopted.

Gaps in the Literature

The gaps in the literature researching tobacco industry tactics are mostly describable via the concept map. Some map clusters, such as Lobbying and Legislative Strategy and Undermining Science, are well represented in the literature. Others, such as Media Manipulation, are not. Generally, tactics that are either quantifiable via dollars spent or well described within the context of a particular policy debate are better represented. In contrast, tactics that can be inferred from a source, but not necessarily documented, are less well represented. For example, when manufacturing information sources or using advertising dollars to control content of the media, the tobacco industry takes great pains to hide their footprints. Likewise, tactics that are more diffuse and tend to be standard business practices, like front groups, mobilization of grassroots support, or public-relations-aided issue framing, are not as well researched. There are disparities within the clusters as well. While the lobbying and legislative efforts of the industry have been

well studied, particularly in the area of state initiative campaigns, research focusing on local or national debates or campaigns is needed. In addition, as the current literature suggests, the industry continues to develop new strategies and combinations of strategies, and these should be monitored.

Lessons from the Literature Review

The review of the published scientific literature verifies that the tobacco industry uses tactics to disrupt public health initiatives. This review further validates the inclusion of protobacco forces in the ASSIST evaluation design and for the use of the concept map as a basis for this metric. However, the review does not identify a data set that would easily lead to the development of an index. The primary data sources used in the underlying literature, such as public records and interviews, provide valid information for case studies but pose challenges to a systematic and reliable data-collection effort. For example, since states have different reporting requirements for lobbyists and lobbying expenses, state-level comparisons on this measure are not possible, although these data could be used to track these tobacco-related activities within a state. Similarly, corporate advertising expenditures are not reported in sufficient detail to inform an index. In addition, some of the described tactics, particularly those that are more implicit or covert (such as attempting to confuse and reframe policy debates and construct the illusion of widespread popular support), are by definition difficult to document, measure, and include in a metric.

Quantifying Tobacco Industry Policy-related Activity

While tobacco industry efforts range from advocacy to advertising and promotion, policy-related activities represent an important area for metrics of protobacco activities. According to Stanton A. Glantz, University of California professor and co-author of *The Tobacco War*[a] and *The Cigarette Papers,*[b] channels for the tobacco industry to exercise influence over policy-making efforts include the following:[c]

Campaign contributions to individual politicians. Relationships between campaign contributions and legislative behavior have been demonstrated at both the state and federal levels.[d,e,f] While public disclosure is generally required for campaign contributions, accessibility of these data varies from state to state, and in the wake of reduced contribution limits, many contributions originate from employees and business partners who cannot be directly traced to tobacco interests.

Campaign contributions to political parties and "friends" committees. These contributions are frequently exempt from contribution limits and make it more difficult to track the flow of money and its concomitant influence. Such contributions also benefit legislators while not putting them on record as directly accepting tobacco industry money.

Lobbying. Tobacco companies have conducted lobbying efforts through numerous trade organizations as well as their own individual efforts. Firms have also channeled lobbying activities through secondary organizations such as nontobacco subsidiaries and supported affinity groups.[e] Tracking this activity is prone to much of the same state-to-state variability as tracking campaign contributions, and secondary lobbying poses additional difficulties for meaningful data collection.

Referenda and initiative campaigns. A common legal strategy of tobacco companies is to support a *referendum* opposing tobacco control legislation in those states that allow citizen-initiated challenges to passed legislation. Similarly, tobacco companies often oppose citizen-based *initiatives* to propose and vote on laws outside of normal legislative channels, a mechanism commonly used by tobacco control advocates. These efforts are frequently unsuccessful.[g,h,i,j,k,l,m,n,o]

"Smokers' rights," "accommodation," and related public relations campaigns. Indirect policy-related efforts by the tobacco industry include (1) forming "smokers' rights" groups, often organized through public relations firms; (2) forming coalitions with the hospitality and restaurant industry aimed at accommodating smokers and challenging smoke-free ordinances; and (3) disseminating industry-developed "educational" programs designed to supplant public health efforts in schools.[h,i,p,q,r]

Litigation. The tobacco industry frequently engages in legal challenges to tobacco control measures and their advocates, particularly at the local level, often with "concerned citizens" rather than the tobacco companies themselves as plaintiffs.[k,s,t]

While Glantz[c] echoes the view of the authors of this chapter that much of these data may be difficult or impossible to accurately quantify, particularly given state variations and the quality of data sources, a potential future direction lies in *indirect* measures of these activities.[d,e,n,u,v]

- Because disclosure requirements have remained relatively constant, the potential exists to track *changes* in industry activity over time, using existing disclosure channels—particularly regarding within-state behavior.
- Several studies of individual states have shown a relationship between industry expenditures and the efforts of tobacco control activists, providing an important covariate relationship that should be tracked and measured over time.
- There is a consistent relationship between campaign contribution levels and legislative behavior—and legislative behavior can be measured as a matter of public record. To quantify the records of specific legislators, Glantz[c] has used a "tobacco policy score," representing a 0 through 10 ranking of the level of protobacco legislative activity.

These factors all point toward the possibility of quantifying tobacco industry political activity based on metrics, which, in turn, may ultimately represent indicators of the many tacit activities that currently elude direct measurement.

[a]Glantz, S. A., and E. D. Balbach. 2000. *The tobacco war.* Los Angeles: Univ. of California Press.

[b]Glantz, S. A., J. Slade, L. A. Bero, P. Hanauer, and D. E. Barnes. 1996. *The cigarette papers.* Los Angeles: Univ. of California Press.

[c]Glantz, S. A. 2004. Measuring tobacco industry policy-related activity (Report to the National Cancer Institute). Internal document, ASSIST Coordinating Center, Rockville, MD.

[d]Glantz, S. A., and M. E. Begay. 1994. Tobacco industry campaign contributions are affecting tobacco control policymaking in California. *Journal of the American Medical Association* 272 (15): 1176–82.

[e]Monardi, F., and S. A. Glantz. 1998. Are tobacco industry campaign contributions influencing state legislative behavior? *American Journal of Public Health* 88 (6): 918–23.

[f]Moore, S., S. M. Wolfe, D. Lindes, and C. E. Douglas. 1994. Epidemiology of failed tobacco control legislation. *Journal of the American Medical Association* 272 (15): 1171–75.

[g]Hanauer, P. 1985. Proposition P: Anatomy of a nonsmokers' rights ordinance. *New York State Journal of Medicine* 85 (7): 369–74.

[h]Samuels, B., and S. A. Glantz. 1991. The politics of local tobacco control. *Journal of the American Medical Association* 266 (15): 2110–17.

[i]Traynor, M. P., M. E. Begay, and S. A. Glantz. 1993. New tobacco industry strategy to prevent local tobacco control. *Journal of the American Medical Association* 270 (4): 479–86.

[j]Traynor, M. P., and S. A. Glantz. 1996. California's tobacco tax initiative: The development and passage of Proposition 99. *Journal of Health Politics, Policy and Law* 21 (3): 543–85.

[k]Monardi, F., and S. A. Glantz. 1996. *Tobacco industry political activity and tobacco control policymaking in Washington: 1983–1996* (Center for Tobacco Control Research and Education, Report WA1996). San Francisco: University of California San Francisco, Institute for Health Policy Studies. http://www.library.ucsf.edu/tobacco/wa.

[l]Aguinaga Bialous, S., and S. A. Glantz. 1997. *Tobacco control in Arizona, 1973–1997* (Center for Tobacco Control Research and Education, Report AZ1997). San Francisco: University of California at San Francisco, Institute for Health Policy Studies. http://www.library.ucsf.edu/tobacco/az.

[m]Goldman, L. K., and S. A. Glantz. 1998. *Industry political expenditures and tobacco policy making in Oregon: 1985–1997* (Center for Tobacco Control Research and Education, Report OR1998). San Francisco: University of California at San Francisco, Institute for Health Policy Studies. http://www.library.ucsf.edu/tobacco/or.

[n]Begay, M. E., and S. A. Glantz. 1997. Question 1 tobacco education expenditures in Massachusetts. *Tobacco Control* 6 (3): 213–18.

[o]Koh, H. K. 1996. An analysis of the successful 1992 Massachusetts tobacco tax initiative. *Tobacco Control* 5 (3): 220–25.

[p]Samuels, B. E., M. E. Begay, A. R. Hazan, and S. A. Glantz. 1992. Philip Morris's failed experiment in Pittsburgh. *Journal of Health Politics, Policy and Law* 17 (2): 329–51.

[q]Cardador, M., A. R. Hazan, and S. A. Glantz. 1995. Tobacco industry smokers' rights publications: A content analysis. *American Journal of Public Health* 85 (9): 1212–17.

[r]Stauber, J., and S. Rampton. 1995. *Toxic sludge is good for you.* Monroe, ME: Common Courage Press.

[s]Monardi, F., A. O'Neill, and S. A. Glantz. 1996. *Tobacco industry political activity and tobacco control policymaking in Colorado: 1979–1995* (Center for Tobacco Control Research and Education, Report CO1996). San Francisco: University of California San Francisco, Institute for Health Policy Studies. http://repositories.cdlib.org/ctcre/tcpmus/CO1996.

[t]Monardi, F. M., and S. A. Glantz. 1997. *Tobacco industry political activity and tobacco control policymaking in New Jersey: 1982–1995* (Center for Tobacco Control Research and Education, Report

NJ1997). San Francisco: University of California San Francisco, Institute for Health Policy Studies. http://galen.library.ucsf.edu/tobacco/nj.

[u]Aguinaga, S., H. MacDonald, M. Traynor, M. E. Begay, and S. A. Glantz. 1995. *Undermining popular government: Tobacco industry political expenditures in California 1993–1994* (Center for Tobacco Control Research and Education, Report CA1995). San Francisco: University of California at San Francisco, Institute for Health Policy Studies. http://repositories.cdlib.org/ctcre/tcpmus/CA1995.

[v]Begay, M. E., M. Traynor, and S. A. Glantz. 1993. The tobacco industry, state politics, and tobacco education in California. *American Journal of Public Health* 83 (9): 1214–21.

Review of Tobacco Industry Documents

In this section, tobacco industry documents are presented to determine whether the specific tactics that the tobacco industry used to counter ASSIST can be organized by the concept mapping framework. Millions of pages of previously confidential industry documents came into the public domain with the settlement of the lawsuit filed by the state of Minnesota against several tobacco companies[54(Bates no. 106035476/5504)] and with the Master Settlement Agreement in 1998 between 46 state attorneys general and the tobacco companies.[55] Analyses of these documents have provided researchers with a better understanding of tobacco industry goals and strategies. Because of the breadth of tobacco industry tactics and the industry's particular focus on ASSIST, unique searches were conducted rather than relying solely on the documents described in the peer-reviewed literature.

Since the end of the data collection for this chapter, White and Bero[56] published a comprehensive analysis of internal tobacco industry documents related to countering ASSIST. Their findings, although presented under a different organizational framework, confirmed that the tobacco industry perceived ASSIST as a threat and developed coordinated efforts on many fronts to minimize the impact of ASSIST, both in the states involved in the project and in non-ASSIST states (to avoid a domino effect of tobacco control policies). The strategies used by the tobacco industry had been previously used, together and separately, in other industry attempts to derail public health efforts. White and Bero reached the following conclusions:

> [The tobacco industry] coordinated resources to aggressively monitor, audit, and infiltrate ASSIST coalitions; pursue legal actions; preempt local tobacco control initiatives; generate negative publicity about ASSIST; and use its political and other allies to attack ASSIST at every level of government. Furthermore, the tobacco industry attempted to hide its efforts by working through third parties.[56(p246)]

This section discusses many of these tactics in more detail and places them within the concept mapping framework.

Methods for Document Search and Analysis

Tobacco industry documents were located via electronic searches of publicly available collections on the Internet, including tobacco industry Web sites

(for example, www.tobaccoarchives. com). The documents were accessed between September 2001 and July 2002. The search strategy was to progress from broad searches to narrow ones; for example, an initial search with a broad term, such as NCI, was narrowed by adding another term to the search string (for example, NCI & ASSIST). Search terms included *NCI, ASSIST,* the names of the ASSIST states, and a variety of combinations. Other search terms related to theoretically derived tactics (*lobby**, allies, alliances, strategi**, tactic**, budget, campaign, taxation, public relations, smokers' rights, legislat**, FOIA, media*) were used separately and in combination with the above terms. Additional searches were conducted for the names of key players and organizations identified in initial searches.

Documents were selected for detailed review if they met one of two criteria: relevance for overall tobacco industry strategy or relevance to any state-specific strategy, mainly but not exclusively ASSIST states. Because the goal of the analysis was to identify tactics generally, documents were not excluded simply because they addressed non-ASSIST states. The search and selection focused on documents dated from 1987 and later, with a few exceptions (e.g., earlier documents that were used for historical context). Documents were excluded that were exact duplicates and copies of documents that were obtained by the tobacco industry through FOIA requests from state health departments or the National Cancer Institute (NCI). Most

of the documents retrieved came from either Philip Morris or the now extinct Tobacco Institute.

Efforts were made to identify the most significant documents as determined by the closeness of the match to the search items. The sheer volume of documents made it unfeasible to review all documents that mentioned ASSIST, and the fact that the documents were treated as exemplars made it unnecessary. Since the goal was not to have a comprehensive review of how the industry countered ASSIST but to identify potential constructs for measurement, omissions were not problematic for the analysis. The difficulties in searching the documents and the limitations within the dataset have been well documented.[57] Nonetheless, the documents provide public health professionals with insights into the processes of this industry and its strategies to preempt or counter tobacco control efforts. These insights may assist with the efforts to define a construct of tobacco industry tactics.

Results

From the documents reviewed, it was concluded that many of the tobacco industry strategies identified through the concept mapping analysis and in the extant literature were used to counter tobacco control generally and to counter ASSIST specifically. As in the previous section, the tobacco industry efforts identified are organized by the same categories identified in the concept mapping analysis and subsequently used to organize the literature review.

Lobbying and Legislative Strategy

The documents provide a vast amount of evidence of the industry's lobbying and legislative strategies, both before and after the creation of ASSIST.

A 1988 Tobacco Institute presentation describes successful lobbying efforts at the local level:

> First, our efforts to repeal, modify and roll back existing legislation. … The city of Aurora, CO, is in the final stages of repealing workplace smoking restrictions enacted 2 years ago … Success was achieved through a program involving the local lobbyists, field staff and the business community. … Anchorage, Alaska presents an opportunity for us to roll back a total smoking ban in city buildings imposed in early 1987. … So, by conditioning the entire political, legislative and public climate in Anchorage, we may be successful in rolling back the current ordinance. [emphasis in original][58](Bates no. TI01770261,TI01770262, TI01770263)

Another activity in the legislative tactics was to use company employees as lobbying agents, as described in this Brown & Williamson letter to its employees urging them to become involved in legislative issues at the local level:

> we are asking you to become a monitor of tobacco issues and help prevent your local governmental jurisdictions from implementing restrictive regulations that would result in lost sales and profits. We are asking you to become the industry's "eyes and ears" by monitoring your boards of health and town councils. We need you to watch for upcoming public hearings or any activity related to tobacco regulation. The sooner we hear about a proposed regulation, the sooner we can mobilize a grassroots effort to protect the industry. As stated, we support efforts to keep tobacco out of the hands of children, but the proposals being offered in New Jersey are unreasonable. … To combat the growing number of local government tobacco regulations, we need you to urge your local customers to get involved. … [Urge them] to attend public meetings and voice their opposition.[59](Bates no. 640572304–2305)

Another 1988 document gives an example of the strategy to introduce tobacco industry-friendly legislation that supersedes public health efforts:

> The second approach is that of ventilation … or IAQ [Indoor Air Quality] legislation that you have heard about for some time. ... Ventilation legislation should, in many cases, make smoking restrictions redundant. Beverly Hills, for instance, was the first test of the ventilation approach. You will recall that the city's total ban on restaurant smoking was modified to accommodate smokers and nonsmokers.

> The third and final approach of the legislative program is smokers' rights legislation… our experience is beginning to suggest that there is a growing perception among smokers … and some non-smokers … that the anti-tobacco zealots have gone too far … Language in bills being considered right now in New York and Pennsylvania would do just that [ensure fair treatment of smokers in society].[58](Bates no. TI01770265– 0266,TI01770268–0269)

A 1988 Tobacco Institute document presents another tobacco industry legislative strategy—to support legislation that will benefit the industry in an indirect manner:

Clearly, the most intriguing work this year on the advertising front comes to us from Massachusetts and the Boston area MBTA. As you recall, tobacco advertising was banned from transit facilities last year. … This year, we have worked to change that situation in a roundabout manner. We have offered a measure that requires that the MBTA to [*sic*] maximize advertising revenues from all legal sources and channel those funds to help the elderly and handicapped. This "white hat" proposal would supercede [*sic*] the ban on tobacco advertising and, in theory at least, require the MBTA to use all legal sources for this worthwhile project … [added handwritten note] including tobacco advertising.[60](Bates no. TIOK0019093)

To stop the increasing number of clean indoor air laws and regulations passing throughout the country, Philip Morris (PM) created the Accommodation program as a preemptive measure, since they knew that smoke-free environments lead to a decrease in cigarette consumption. Preemption is described in this presentation by Philip Morris's Tina Walls:

Today we want to discuss one of PM USA's most important priorities for 1994 and 1995–accommodation/preemption. Our goal, simply stated, is to see some form of accommodation/pre-emption legislation passed in all 50 states. The achievement of universal accommodation/pre-emption is imperative … if our consumers

have fewer opportunities to enjoy our products, they will use them less frequently and the result will be an adverse impact on our bottom line.[61](Bates no. 2041183752)

A 1992 letter from Spearman Management, Inc., to the Tobacco Institute provides an example of the tobacco industry's contributions to legislators:

I am quite distressed at a telephone call that I received the other day from former Florida State Senator Lincoln Diaz-Balart, who was just elected to the U.S. House of Representatives, and his brother Mario, who is a state representative here and is running a highly successful campaign for the Senate. … Lincoln has been a great friend to our issues throughout his career in the Florida Legislature. He NEVER has voted against us. Lincoln met with the Tobacco Institute's Washington lobbyists … asking for the financial support. … Lincoln now advises us that he did not receive a single contribution from the tobacco industry during his campaign. … This is especially distressing to me because of the message it sends to his brother and the entire Cuban Caucus, who we always have counted on as a block vote for our key issues. … At a time when our issues increasingly are coming under fire … [we] cannot afford to alienate any of our friends.[62](Bates no. TIFL0066675–6676)

The documents also support the fact that the tobacco industry intended to use lobbying tactics specifically against ASSIST. A 1990 R.J. Reynolds letter discussed North Carolina's intention to apply for an ASSIST contract and the industry's early reactions to that:

A task force … is in the final stages of drafting an application for grant money. Governor Martin has talked with the Department Secretary about the grant application and they are keeping it very low key. … the Governor felt that North Carolina might be able to divert some of these funds from other states and use them for more constructive purposes like infant mortality studies. The Tobacco Institute, Philip Morris and RJR have done nothing to influence the state's decision on applying for NCI funds. Everyone has viewed this as a no-win situation. … I recommend that we continue to monitor the grant drafting process and urge Governor Martin to stay closely in touch with the situation. Further assessment will need to be made if and when the proposal is funded.[63(Bates no. 507720040–0041)]

A 1991 R.J. Reynolds memorandum presents some "potential courses of action" to address the ASSIST program at both the federal and state levels:

We will continue monitoring ASSIST activity in the 17 states selected for initial participation. … Potential courses of action being studied to manage the situation include:

- Restrict or limit how the funds are used through the state appropriations process and contacts with executive branch officials. …
- In states where legislatures have or are considering the use of state funds for tobacco counter-advertising, make key legislative and executive branch officials aware that federal funds are already being used for that purpose. …
- Work with the tobacco-land Congressional delegation to eliminate ASSIST funds in future appropriation

bills; alternatively, seek restrictions on how the funds can be used. …[64(Bates no. 507770176)]

In addition, a 1995 Lorillard letter asks employees to join in counter-ASSIST measures:

Coalitions throughout these [ASSIST] states, funded with your tax dollar, are working to put us out of business. … The purpose of this letter is to ask you to join me and the rest of the Wisconsin Sales team in telling our elected officials that we do not want our tax dollars funding programs like ASSIST.[65(Bates no. 94561863)]

[The letter, which apparently had attachments, was also forwarded to Lorillard employees in NJ]:[66(Bates no. 94561862)]

The time is now to support the industry that supports you and your family![67(Bates no. 94549615)]

Legal and Economic Intimidation

The tactics under this cluster include tobacco industry activities to use its legal and financial power to prevent and oppose the adoption of tobacco control measures at the policy level. This cluster includes the funding of front groups to defend the industry's interests, threats and filing of legal suits, and infiltrating and influencing through regulatory and semi-regulatory bodies at the national and state level in order to promote industry-friendly recommendations, guidelines, and policies. The cluster also includes the promotion of smokers' rights legislation and measures. A 1988 Tobacco Institute presentation, when addressing some of the strategies

the industry was to use for promoting ventilation for the purpose of avoiding public smoking restrictions, states that

> In Maryland and Connecticut, we will have opportunities … to explore another angle in the ventilation issue … to get experts appointed to IAQ commissions … Recommendations from these groups are often translated into legislative proposals. So it is important to be included at the table.[58](Bates no. TI01770267)

A 1988 Tobacco Institute memorandum states that among several new strategies of the public smoking programs is

> a more aggressive legal program to establish the precedent to protect smokers' rights, to act as a deterrent to smoker discrimination, and to brief representatives from organized labor and minority bar associations on smokers' rights issues.[68](Bates no. 2021195610)

The creation and funding of smokers' rights groups is described in a 1989 Tobacco Institute document:

> . . . not all smokers appear willing to defend smokers' rights. The industry is held responsible for projects it funds. Therefore, words spoken or written by sponsored smokers' rights groups must be consistent with industry positions. … [Strategies, goals, and tactics] Encourage aggressive and efficient operation of smokers' rights groups in states with most significant anti-tobacco activity, to augment efforts to motivate individual smokers. … Provide financial, technical and legal support to each group to develop their own packets of information on specific smokers' rights issues.[69](Bates no. TIMN0366820–6821)

A Tobacco Institute 1995 review discusses several legislative issues of that year as well as some regulatory challenges faced by the industry and how the industry attempted to counter the progress of the Occupational Safety and Health Administration's (OSHA) proposed regulation on indoor smoking:

> Six months of public hearings on OSHA's proposed smoking ban and indoor air quality regulation finally closed in March 1995. In these hearings, the Institute's representatives ensured that scientific evidence on the issues of environmental tobacco smoke was fully presented, that unfounded assertions were questioned, and that the perspectives of the businesses being regulated by OSHA were bought [*sic*] to the forefront.
>
> Industry action did not end with the hearing, but instead focused on written submissions, responses and legal analyses. The Institute will ensure that the best available information is presented to OSHA as the hearing record is compiled and a course of action determined by the agency. The Institute continues to assist Members of Congress in their attempts to present information at OSHA. … [On the FDA proposal to regulate tobacco] Preparing long before the actual issuance of the rulemaking, the Institute and industry allies were poised and armed with legal challenges to FDA jurisdiction, and lawsuits were filed even before the FDA's regulatory language was printed in the Federal Register. The response from Congress was close behind. … The rulemaking process for both the FDA and OSHA will enter a new stage in January 1996,

when comment periods close on both proposed regulations. The Institute will be ready.[70(Bates no. 88028786–8787)]

The documents show that the tactics categorized under this domain were also brought to bear against ASSIST. A 1991 document describes how the industry intended to use its financial and legal power to counter the ASSIST program:

- State Activities' regional staff will include plans to counter use of ASSIST funds for legislative activities within their planning for other administrative challenges stemming from EPA and OSHA activity on environmental tobacco smoke.
- Such plans may include limiting state health department's authority to fund community coalitions which pursue adoption of legislation or regulations.
- Such plans may also include limiting state funding of anti-smoking programs by amounts received under federal program.[71(Bates no. 512715489)]

Threats of lawsuits are also another consideration. A 1991 Tobacco Institute memorandum discussing the issue of state initiatives states:

[For Massachusetts] Our counsel is recommending that we proceed with a lawsuit aimed at declaring the initiative unconstitutional … This approach has some merit and there is little case law in existence to guide us on our chance for success; however, I believe it is worth pursuing. … Finally, you may recall that we sought approval of an initial $120,000 to launch our effort in Massachusetts, including the necessary legal work that resulted in filing appropriate challenges to the measure's

constitutionality and to the ballot and petition language.[72(Bates no. 91815022)]

A follow-up memo states:

We have retained the services of two attorneys with substantial initiative experience in the State. … They have helped us greatly on our issue so far. … We first attempted to present legal arguments about the initiative's constitutionality to the Attorney General prior to his certification of the issue for circulation. … A second stage of legal pursuits is to take our constitutionality arguments to the State Supreme Judicial Court.[73(Bates no. 91815008–5009)]

A 1993 document describes the utilization of legal tactics related to several ASSIST-based state initiatives:

[In Colorado] A new, ASSIST funded coalition has been established to work on a variety of anti-tobacco issues. Among the coalition's priorities is the passage of a tobacco tax increase for a variety of anti-tobacco purposes. … Goal: increase coalition partners, maintain current initiative laws, and defend/deter/delay potential anti-tobacco initiative. … [Tactics] Fund legal challenge and signature verification challenge. …Track ASSIST funding to determine potential violation of laws governing use of federal and state funds. … Increase difficulty for opposition to retain various professional signature gathering firms to assist in their efforts. … Form alliance with tolerance campaign. Contribute toward legal work being done for coalition aimed at overturning law [an anti-gay rights legislation].[74(Bates no. 92758356–8357)]

Usurping the Agenda

This cluster includes the industry's efforts to undermine both the public and the legislative agenda in the area of tobacco control by imposing its own agenda. Activities include the development of alliances with groups, such as retailers, in order to broaden the support base for its agenda, mainly in the area of youth smoking and public smoking.

A 1988 Tobacco Institute presentation on the legislative challenges and plans to address the issue of public smoking states:

> ... there are opportunities to put the anti-tobacco groups on the defensive … in their own strongholds … places like California, Colorado and Massachusetts … places for <u>us</u> to go on the offensive … We are excited about the opportunities presented by the new approaches … of repealing/modifying/rolling back existing legislation … of promoting ventilation … or IAQ [Indoor Air Quality] legislation … and smokers' rights legislation. … By implementing these concepts, <u>we</u> can set the legislative agenda … [emphasis in original][58](Bates no. TI01770259–0260)

To gather support from the hospitality industry against growing smoking restrictions, the industry developed a program to present the smoker as customer and to assist hospitality venues in accommodating both smokers and non-smokers.

> Subjected to heavy anti-smoker pressure, the hospitality and travel industries are beginning to soften—and in some instances abandon—their traditional opposition to anti-smoking initiatives. Many are being encouraged to restrict smoking to protect the public's health, to reduce overhead expenses and thereby increase profits. … [Strategies, goals and tactics include] Maintain a list of individuals within the hospitality and travel companies, who are responsible for developing and implementing anti-smoker policies. … Promote improved indoor air quality as an alternative to smoking restrictions. Promote indoor air quality consultant speakers at national, state and local hospitality association meetings. … Encourage state and local hospitality associations to produce guides on smoking restrictions laws to assure reasonable interpretation and protection of smokers' rights.[69](Bates no. TIMN0366822–6824)

A 1990 Tobacco Institute memorandum refers to a model bill that could be introduced at state level:

> . . . a state-level model bill addressing industry issues that fall within the scope of the "minors" debate … The industry model addresses key issues such as vending sales, sampling, licensing and preemption. It is important to note that this is a <u>generic</u> bill … [it] is <u>unlikely</u> that the bill would be utilized in its entirety in any situation, since some states already have laws regulating one or more of its provisions. … this model "minors" bill was designed to be used either defensively, or in a proactive or preemptive manner in priority states where these issues are most likely to surface. [emphasis in original][75](Bates no. 947035576)

The 1990 Tobacco Institute plan, when addressing the issues related to fighting advertising restrictions, states:

Demonstrate that the industry does not want children to use its products and has taken positive steps to discourage such use.

Goals and Tactics:

1. Determine the feasibility of three new programs to:
   - Create a new industry advertising and promotion code that would cover all sales and promotions practices that become controversial because of exposure to youth, black, Hispanic or other allegedly vulnerable audiences.
   - Publicly support enactment of smoking age laws in the few states which do not have legislation on the books.
   - Develop a cooperative program with retailers, especially convenience stores, encouraging compliance with smoking age laws via point-of-purchase and other information material.[76](Bates no. TIMN0361600)

A Tobacco Institute 1997 document demonstrates that the industry continued to be concerned with setting the agenda for state activity:

legislative assemblies are our last line of defense … In keeping with this, it is surprising to read that projects relating to youth smoking, fire prevention and voluntary solutions to workplace and restaurant smoking have little or no value. We judge these to be examples of the bona fides of the cigarette industry in its urgings of private rather than public policy solutions to major issues. Our files contain innumerable communications to support this view. …[77](Bates no. TIDN0016871)

These tactics also apply to industry efforts in response to ASSIST. A 1992 Philip Morris memo on countering ASSIST states and the potential for ASSIST to create marketing restrictions describes how its youth access program can serve as a preemptive tactic:

Also, a major goal of ASSIST is to reduce youth incidence, the tobacco industry could also offer our own youth initiatives with Tobacco Helping Youth Say no, and the COURSE Consortium, (once a curriculum is developed) and suggest that further Federal or state funding is not needed for youth anti-smoking campaigns.[78](Bates no. 2023916867)

Retailers' associations also played a prominent role in the industry's attack on ASSIST in Minnesota. A series of 1995 and 1996 "status reports" from the Minnesota Coalition of Responsible Retailers discussed strategies to deal with potential sales and marketing restrictions, many in direct response to ASSIST initiatives. For example,

[Detroit Lakes] … An ordinance committee consisting of ASSIST group members, retailers and a city council member will meet to discuss what kind of ordinance should be adopted regarding tobacco products. Rather than waiting for the ordinance committee to act, Tom Briant will be coordinating a pro-active ordinance sponsored by the retailers that will adopt reasonable regulations on tobacco products based on certain ordinances adopted in other Minnesota cities. A lead retailer who knows all of the city council members personally will be working on the pro-active ordinance.[79](Bates no. 94004146)

Creating Illusion of Support

This concept map cluster includes the well-described industry tactics of funding front groups either in entirety or as a major sponsor. The industry goal is to give the impression that there is broad-based, grassroots support for its proposals and strategies. The companies would also use their own employees in this grassroots efforts.

When discussing the plan to stop tobacco control measures for 1988 and beyond, a Tobacco Institute document describes how the industry desired to be perceived as a local interest:

> We remain an alien corporate entity, not a voter. This will change. A legislator must identify the tobacco industry as a local interest group: a tobacco wholesaler, a tobacco retailer, a vendor, a member company sales representative, a convenience store manager or even a bowling center proprietor. Unless a legislator can identify with our industry in the form of an individual, it is very easy for that legislator to vote against the industry without any fear of local accountability.[80(Bates no. TIMN0014204)]

The document proceeds to describe how the tobacco industry is going to "recruit" people to represent them, how it will develop "grassroots education seminars," and continue with the phone banks and direct mail, and

> The identification of local legislative activists and state legislators to be targeted is the cornerstone of this plan. This "name and face" contact system must be supported by the mechanical resources that have been effectively executed in the past. We have been putting the cart before the horse … now we have the horse: the local activist. …These programs, in support of local activists' personal contacts, are designed to drive home the economic realities of tax increases, advertising bans and restrictive smoking legislation. This is a flexible support plan that can be tailor made to any legislative district depending on the issue or the specific committee or floor vote.[80(Bates no. TIMN0014209)]

The Tobacco Institute also discussed, in its 1988 budget and plans, how broad-based coalitions could advance the tobacco industry agenda.

> In dealing with public issues, the industry has come to rely more and more heavily on development of effective coalitions to complement and supplement its communications activities. … Our allies' greatest strength – independence – remains a limit on the usefulness of these coalitions. Allies may not agree or even have an interest in all industry issues, and may not be willing or able to assist in all ways requested. … [The objective is to] establish and maintain working relations with other groups and individuals for the purpose of demonstrating broad support for industry positions and initiatives. [One of the strategies is to] broaden relationships with non-tobacco groups with which we are now working, establish relationships with new groups. [These groups included: labor unions, AFL-CIO, publishers' groups, women's and minority groups, Asian retailer communities.][81(Bates no. TIDN0018062–8063,TIDN0018066)]

Indeed, the industry considered its ability to create the illusion of support as one of its greatest strengths, as described in this 1989 Strategic Plan for the Tobacco Institute:

> … The Institute's ability to mobilize coalitions and third-party allies.
>
> The Institute has been successful in its effort to develop relationships with the business community, minority groups, farmers, labor unions, veterans, active military personnel and low-income groups in an effort to fight excise taxes, smoking restrictions and other proposals. … [The Institute] has utilized its coalition building strengths to find allies in the advertising industry, as well as among cultural and sports organizations who rely on promotional funding from tobacco manufacturers.[82](Bates no. 87649084)

A 1994 Brown & Williamson draft document describes a proposal for the creation of the company's grassroots political action program, "The Minutemen Project":

> … This proposal calls for bringing grassroots pressure on elected officials to resist the unwarranted regulation and the taxing of the tobacco industry. Government officials must be made to understand that anti-tobacco activities have a high political risk. … To develop a targeted grassroots process that will be make it possible for B&W to place political pressure on specific elected officials at the federal, state or local levels and to expand the program to a broader scale, reflecting a pro-active governmental affairs process. … Such constituents would consist of individuals and groups that support the concept of freedom

> from governmental intervention, including smokers, members of the trade, suppliers, wholesalers, retailers, growers and others. [Coalition partners would include, among others] grocers associations, restaurant association, bingo parlors, anti-tax groups, … [the strategy would include] phone banks … direct mail, … personal visits, … media [training], testimony … survey and polls, … petitions, … resolutions. … Activating third parties offers insulation to the company from direct criticism. Even though the third parties are sought out and activated through company funded efforts, it will be the third parties actually doing the lobbying. … The potential downside is that the company will be accused of fraud.[83](Bates no. 533250094–0095,533250098)

However, the creation of grassroots efforts was not always without problems. A 1987 document about a campaign in Minnesota describes in detail how the grassroots effort was mounted, with phone banks, several waves of mailings to tobacco retailers, letter writing campaigns, and a petition drive. When assessing the problem with the missing human component, it states:

> Even though we blanketed the state with industry-generated, professionally prepared, targeted and timed grassroots activity, the missing factor was the human component. That is, we failed to zero in on persons in each legislative district who contribute to their legislator, regularly communicate with their legislator, socialize with their legislator and are active in that legislator's reelection bids. … The missing component allowed the legislator to follow the line of least resistance, thereby circumventing

any real accountability to his or her constituency and supporters.[80](Bates no. TIMN0014202)

This ability to create the illusion of support would be used to counter the ASSIST program as well, as described in this 1992–96 Philip Morris Corporate Affairs Plan:

> Counter ASSIST Program in 17 states: Work with grass roots organizations to divert state health department funds, equivalent to the amount of ASSIST funding, to support other health programs (pre-natal care, half-way houses, etc.) … Develop retailer mobilization program to aid in identifying and fighting local sales restrictions – particularly vending and free standing display bans or restrictions. … Coordinate with minority business organizations to demonstrate the economic benefits of the industry on minority communities. … [To oppose smoking restrictions/bans] Develop and market workplace and service venue accommodation programs with: National Federation of Independent Businesses, American Manufacturers Association, International Council of Shopping Centers, Hospitality/ Service Associations.[84](Bates no. 2025869600,2025869602)

A 1993 report reinforces the concept of using "grassroots," in addition to lobbying, to counter ASSIST, describing the utilization of allies and front groups financed by the tobacco industry and discussing how important for the future of the industry it is to maintain funding for these activities.[85] A 1994 document discussing some of the main political challenges in the northeast region gives

another example of how the tobacco industry used front groups in both ASSIST and non-ASSIST states:

> A major tax increase will be proposed next session in Maine to pay for health care reform. We will be pulling out all stops to show how a steep tax increase will hurt Maine's economy. … We will also be working with allies such as the Maine Grocers Association to encourage opposition to any tax increase. Maine is an ASSIST state, which means it gets federal funds to reduce the incidence of smoking. … ASSIST funding gives the antis in Maine and other states deep pockets to lobby for smoking and marketing restrictions at the local level. The presence of ASSIST makes enacting smoking accommodation and marketing pre-emption priorities for us in Maine during 1995. … Rhode Island is an ASSIST state, and we expect a proposal to ban public smoking in Rhode Island next year. Our goals in Rhode Island in 1995 will be to work with others to oppose any proposed smoking ban while working to help enact smoking accommodation and marketing pre-emption.[86](Bates no. 2040236694–6695,2040236698)

Harassment

This cluster describes the industry activities to undermine public health efforts to the point where public health activities would be ineffective. It encompasses harassment and intimidation such as the use of the industry resources to file encumbering requests for documents with the Freedom of Information Act, threats of legal challenges, and the infiltration of tobacco control groups and coalitions.

The industry kept close track of the developments in the tobacco control community. This 1990 Tobacco Institute memorandum describes attendance at a Stop Teenage Addiction to Tobacco (STAT) conference:

These [conference] recommendations include what we believe to be an [*sic*] comprehensive list of the anti-tobacco movement's goals for the coming year. … The industry should give consideration to these activities in developing its plans for 1991.[87](Bates no. 947187672)

The following document was written by a tobacco industry person who attended a coalition meeting in Fort Collins, CO, in 1992, making use of open meeting policies:

They seem to comprise the Coalition for a Tobacco-Free Colorado. … despite my effort to remain invisible, ended up seated at the head of the table. I signed in as a student… [the] "close quarters" inhibited my notetaking somewhat. … would advise future "plants" to arrive late and leave early, avoiding the awkward small talk with other attendees that might create suspicion.[88](Bates no. 2023667420,2023667422)

The tactic was broadly used with ASSIST, where the industry kept trying to accuse ASSIST states of illegally using federal funds for non-allowed lobbying activities. Apparently, shortly after the announcement of the ASSIST project, Peter Greenwald, Director of the NCI Division of Cancer Prevention and Control, received a letter from Senator Malcolm Wallop (R-WY) and other legislators expressing concern that "Government funds might be used to support lobbying at the State and local levels." Greenwald responded that it was "neither the design not the intent of ASSIST to use Federal money for such purposes" but emphasis would be on policy and dissemination of information to policy makers.[89](Bates no. 512545942)

A 1991 letter from R.J. Reynolds to Representative Rick Boucher also brings up the issue of federal funds being used for lobbying through ASSIST:

ASSIST raises serious policy and legal questions about the role of NCI … it appears that the NCI research concentrated on the use of media events, … and lobbying for increased cigarette prices, clean indoor air, and restrictions on tobacco promotions as means to stop tobacco use. …These issues are important enough to merit appropriate Congressional oversight. Your role as Chairman of the Science Subcommittee makes you an ideal candidate to exercise that oversight responsibility.[90](Bates no. 512546018–6019)

Another 1991 memorandum describes the actions the industry will take against ASSIST:

… the following actions may be undertaken to counter potential state and local legislative action resulting from [ASSIST]

- Public Affairs Division will obtain technical proposals submitted … under the Freedom of Information Act.
- Proposals will be reviewed … for "public policy" activities that could spark state or local legislation on tobacco issues.
- Federal Division will alert key Members of Congress to protest use of federal taxpayer dollars (a) for activities that could impact

tobacco-producing states' economies, and (b) to interfere in state and local legislative issues.

- Federal Division will attempt to amend [NCI's] next authorization or appropriation bill (a) to prohibit use of grant funds for influencing state or local legislation, ballot initiatives, or other regulatory activities, and (b) to require detailed auditing and reporting of grant expenditures. ...

- State Activities' regional staff will identify local business and labor interests in 17 grant states who could gain representation in community-based ASSIST coalitions.[71](Bates no. 512715488–5489)

A 1992 Philip Morris memo discusses the industry "opportunities to disrupt ASSIST funding."[78](Bates no. 2023916866)

1) Congressional Investigation … A more thorough investigation should be launched, particularly in terms of the NCI/ACS relationship and the use of federal funds for state and local lobbying purposes. With the current budget debate in Washington, this would be a good time to launch an investigation….[78](Bates no. 2023916866)

Prior to this Congressional Investigation plan the industry attempted to achieve similar results, through allegations of using federal funds for lobbying activities, with letters from Senators Wallop (R-WY), Hatch (R-UT), and McConnell (R-KY) to U.S. Department of Health and Human Services Secretary Louis Sullivan. However, no widespread investigation resulted from these letters.[91,92]

Another document lists the utilization of FOIA as a counter-ASSIST measure:

In response to our Freedom of Information Act request, the National Cancer Institute sent us the proposals submitted by states that did not receive ASSIST awards in addition to the 17 that did. … Though these states have not received ASSIST funds, they'll probably be using their proposals as blueprints for at least limited anti-smoking activities anyway, having gone through the trouble of developing them. So, a review of these proposals at some point would probably be useful.[93](Bates no. TCAL0314212)

FOIA tactics were also used at the state level. For example, in Minnesota, a 1993 memorandum describes how requests were filed with the state health department:

Tom Briant, esq., of the Minnesota Wholesalers Association has obtained over 500 pages of documents from a recently conducted FOIA of the state's ASSIST program. Tom developed the attached chart from his review of the documents. … I have the documents from Tom's first FOIA and will receive updates from a second FOIA that will soon be submitted to the state health department. … Tom's work reaffirms the value of conducting FOIAs in ASSIST states. As we discussed, it is important that we finalize our selection of states for this activity.[94](Bates no. 2023763792)

Another January 1993 ASSIST/FOIA titled "ASSIST Program Issue Alternative Course of Corrective Action" discusses the potential for allegations of illegal lobbying by ASSIST grantees and suggests that grant applications for all 17 states should be obtained through FOIA requests and then using the information as

… prima facie evidence of a lobbying restricting violation. Additionally, we should determine whether similar requests have been made at the state level for funding requests from local organizations…[95](Bates no. 2023667197)

A series of documents, mainly from the Minnesota Wholesale Marketers Association, Inc., discuss the challenges of the use of ASSIST funds brought up by the Minnesota Grocers Association, following extensive FOIA requests, the decision of the Ethical Practices Boards, and the denial of the grant application of the Minnesota Grocers Association for ASSIST funds. For example,

Other options still under consideration are requesting an investigation of the Minnesota ASSIST Project by the Inspector General of HHS and asking the Minnesota Legislative Auditor to commence investigation which the Auditor had placed on hold pending the Ethical Practices Board Investigation.[96](Bates no. 2047234478)

Documents relating to the use of FOIA as a tactic against ASSIST in Colorado[97,98] and Washington also exist.[99,100]

Undermining Science

This concept map cluster represents the tobacco industry's decades-long tactics of challenging evidence about the hazards of tobacco use. For many years, the industry denied the harmful effects of smoking. However, it now concedes that smoking may be associated with some diseases, such as lung cancer, emphysema, and heart disease, and with other serious diseases. This tactic includes the industry's use of consultants and public

relations efforts in an attempt to create controversy with the public and policy makers, where no scientific controversy exists. This tactic is exemplified in the tobacco industry's approach to the research about the negative health effects of secondhand smoke. The industry created research funding centers as part of this effort.

For example, a 1988 Tobacco Institute presentation discussing the industry's scientific program states:

[CIAR] members are in London at a symposium which hopefully will produce some immediate ammunition. We hope the Center comes up with some science … and soon … because frankly nothing else could have the same effect.[58](Bates no. TI01770275)

Another 1988 Tobacco Institute document states that as part of the plan to address the growing public concern over secondhand smoke, one of the tactics would be

Through the Center for Indoor Air Research, encourage scientific research and publication of articles that point to environmental tobacco smoke as a minor indoor air quality factor.[81](Bates no. TIDN0018098)

And a 1990 Tobacco Institute 1990 plan describes further the use of consultants to assess environmental tobacco smoke (ETS) issues:

Develop and maintain a well briefed group of academic consultants able to review ETS literature for scientific media, respond to ETS research published in the scientific media, and conduct briefings and present testimony before Congress as well as

federal and state regulatory agencies. Encourage publication of at least four major analyses of the relationship between ETS and health claims during 1990. … Ensure participation of scientific consultants in national and international symposia on the relationship between ETS and health claims. … Continue to encourage scientific research and publication of articles that objectively assess ETS in the context of all indoor air quality factors.[76](Bates no. TIMN0361605–1606)

Consultants were used in all areas where the industry could be attacked, not just the smoking or health issue but also economic aspects of tobacco and tobacco consumption. For example, a 1992–96 Philip Morris Corporate Affairs Plan describes how the industry was going to address the debate about the social costs of smoking:

[On the smoking and social cost issue] Develop and publish studies:

- Systematic, external, micro-economic models to provide a clear picture of smoking's impact on society.
- Applicability and measurement of social cost and social benefits to fiscal/ tax policy development.
- The value of free choice in a democratic society. …

Develop studies comparing social fund performance vs. PM and industry as whole. …

Sponsor sessions at annual conferences on social cost theory and its application in public policy development.

Co-sponsor symposiums [*sic*] with Centers in Public Policy and Society

of Government Economists on social cost theory for legislators and other government officials. …

[On the Taxation issue] Develop and publish studies on:

Bootlegging/cross border activities.

Regressive nature of proposed taxes.

Inflexibility/instability of earmarked taxes.

Progressive solutions to deficit reductions.[84](Bates no. 2025869601,2025869603)

The tobacco industry also attempted to use science as a means to gain credibility, and the science strategy was then linked to the industry's media manipulation and public relations strategies. A 1998 Philip Morris Worldwide Scientific Affairs Strategic Plan Draft asks:

How will we improve our *credibility* within the scientific community in order to ensure that a balanced view is taken on smoking and health science? [emphasis in original][101](Bates no. 2064716946)

Media Manipulation

This concept map cluster reflects tobacco industry tactics to use information created by its consultants and scientists, as well as its influence with the media through advertising expenditures, to convey to the public its perspective on the tobacco control debate. For example, a 1988 Tobacco Institute plan for Minnesota discusses how the industry will work with the local media to enlist their support:

[The meetings] will feature Tobacco Institute resources and resource

personnel particularly from the Public Affairs Division. The target is local media and decision makers (weekly newspaper editors, radio station managers, advertising company employees, service organizations), other civic groups, and labor union leaders. The specific purpose of these meetings would be:

build alliances with, and inform attendees of, constitutional, freedom of choice, scientific, economic and labor issues in targeted legislative districts; …

activate new print and electronic media contacts in areas where media activity might not be as well developed as in larger markets; and,

concentrate on small weekly newspaper editors who are generally not consulted on major issues, by instituting briefings and continuing personal relationships.[80](Bates no. TIMN0014207)

The 1988 Tobacco Institute Public Affairs Division plans and budget stated that in response to the increased level of interest created in the media by the release of the 1986 U.S. Surgeon General's Report on passive smoking,[102] the Institute has had many opportunities to speak with the media and

as a result of a more aggressive approach, The Institute is seen as a reliable source and credible newsmaking organization by an increasing number of journalists. … Maintaining, and in fact increasing, this momentum will remain of paramount importance in the upcoming year. … Industry positions are generally strong and compelling. Allies and expert consultants have

assisted in gaining a great deal of ground. Increasing utilization of both resources through carefully planned, aggressive media strategies is the challenge. … As we have seen in the past, the staging o f preemptive media activities works well, and allows greater latitude to frame our message while weakening that of the opposition. [The goals and tactics are to] keep the Institute in the driver's seat through speakers' availability and, to the extent possible, knowledge of anti-smoking announcements before the fact.[81](Bates no. TIDN0017995, TIDN0017996, TIDN0017997, TIDN0017999)

A 1995 Philip Morris media plan for Colorado describes some of the details of the media strategy to defeat a proposed tax increase initiative:

…the defeat of the 50-cent excise tax increase last November and the recent opening of the … smoking lounge at the Denver International Airport indicate that a significant portion of the Colorado media is amenable to taking a broader view of tobacco industry issues. … The vast majority of Colorado's print and electronic media have been open to meetings, educational visits and materials which present a balanced and more global view of the issues. … [We] are confident we can continue to change the media's views and, ultimately, the views of the general public, toward a more equitable philosophy in regards to those issues affecting the industry. … How will we make this happen? … Initially, we will assist in the development of the key issues and message points we believe will be effective in Colorado. Using this "War Book" of comprehensive

position statements, we would present the broadest range of potentially beneficial – or damaging – issues to select editors, reporters and editorial boards … [The document describes how they would "tailor" the approach with individualized media discussion in each market.] We will look for appropriate opportunities as well to present our side of the issue and belief with the "Where We Stand" packet and other program materials. However, this is not advisable now until a specific issue appears which allows us to engage in opportunities. [Hand-written note: "create opportunity!"] … This proactive and personal approach will allow us to intercept anti-tobacco messages earlier in the media pipeline, allowing us to respond to negative stories by providing balance and perspective to both media and public debate. [The document also discusses the creation of alliances in order to recruit spokespeople.][103](Bates no. 2044270550–0551,2044270553)

Public Relations

This concept map cluster reflects the industry's attempts to portray itself as a responsible, socially conscious member of the business community and an indispensable member of any community. Activities include promotion of its philanthropic endeavors (for example, corporate social responsibility programs), framing the debate as generally as possible, and broadening its scope to extend beyond health issues. Examples include efforts to link the "right to smoke" to civil rights concerns and statements to the effect that if the tobacco industry is regulated, other industries would be next, creating a dangerous "police state" precedent.

When developing strategies to oppose marketing and advertisement restrictions, a 1988 Tobacco Institute plan states that one of its strategies is to

Demonstrate that the proposed restriction of tobacco advertising and promotion sets a dangerous precedent to other industries and their trade groups – the: "Slippery Slope Strategy." … [Some of the tactics included] Commission a review article by some scientific think tank such as the Franklin Institute that would demonstrate that (a) tobacco is not unique as an alleged health hazard and (b) list the great number of citations in the literature of other generic products and practices that could easily share the same status. Seek publication in Science or similar professional journal. [emphasis in original][81](Bates no. TIDN0018082–8083)

This section of the document also addresses the industry as being a responsible corporation:

Increase the level of awareness among local, state and federal officials and opinion leaders that smoking is only one of a constellation of adult practices; that social and family factors are the primary factors shaping the behavior of young people; and that member companies act responsibly in this regard. … [One of the goals is to] gain professional and legislative recognition for the industry's effort to shield youth from cigarette advertising.[81](Bates no. TIDN0018085–8086)

A 1989 Tobacco Institute document provides an example of the industry's attempt to promote the corporate responsibility image:

Focus the attention of elected officials, the media and the public on the

Lessons from the Tobacco Industry Documents

The documents search verified that the tobacco industry engages in tactics specifically designed to counter public health programs and that some measure of these tactics is available in those documents. Because the search of the tobacco industry documents identified specific strategies and actions of the tobacco industry to counter ASSIST, the documents search validates the decision to include protobacco forces in the ASSIST evaluation design. Moreover, the analysis showed that industry strategies could be categorized into eight topic areas, as outlined earlier:

1. Lobbying and legislative strategies
2. Legal and economic intimidation
3. Creating the illusion of support
4. Usurping the agenda
5. Harassment
6. Undermining science
7. Media manipulation
8. Public relations

This framework could eventually be used to create a summary index similar to the Strength of Tobacco Control index (see chapter 2). In addition, such a framework provides a template on which to build a broad model of industry counterefforts against public health endeavors.

While the tobacco industry documents are important for identifying and describing industry tactics, they serve as a document collection and not as a complete, searchable database. This means that to use them for any index of tobacco industry tactics, either as a whole or on a statewide basis, alternative data must be identified.

responsiveness and responsibility of the cigarette industry over the decades.[69](Bates no. TIMN0366866)

In 1994, Philip Morris established a task force to investigate the issue of youth access. The main concern for Philip Morris was that the "antis" had done a good job in co-opting the issue of youth smoking and turning it into a political strategy at all levels of government (local, state, and federal) and in all three branches (legislation, regulation, and judicial action), similar to the strategy often used by the industry itself:

> Anti-smoking groups use the theme of "protecting children" to promote efforts to restrict smoking by adults. These efforts include: Cigarette excise taxes, smoking restrictions and marketing restrictions. … Even in the debate over addiction, youth smoking plays a prominent role in the anti's call for FDA oversight.[104](Bates no. 2024687704)

The Philip Morris document discusses what the company should do and recommends that Philip Morris work with retailers and take an active role in the youth access arena. The document outlines the development of the "It's The Law" program.[104]

Tobacco Industry Tactics: An Evaluation Challenge

Measuring a construct as complex and elusive as tobacco industry tactics raises a panoply of potential

measurement challenges and threats. These challenges include defining tobacco industry tactics broadly enough to encompass tactics that affect public health initiatives yet narrowly enough for parsimonious measurement, reliably identifying data sources and subsequently accessing them. For example, while White and Bero[56] (also see Monograph 16, chapter 8) identified tobacco industry actions employed to counter ASSIST, the tobacco industry engages in many standard business practices, such as marketing (e.g., advertising, price promotions) that counter public health. If these standard business practices are not included, is the resultant index an adequate one? Alternatively, if all possible tobacco industry efforts could be included in a potential index, are there reliable and valid data sources to parsimoniously measure them for each state?

Approaching Limitations and Challenges to Measurement

This chapter begins to address some of the limitations and challenges to measurement with three separate approaches: concept mapping, general literature review, and ASSIST-specific document searches. This work is primarily focused on defining the scope of the problem and providing guidance for future research to be able to produce appropriate variables that can be included in the evaluation of tobacco control programs.

The chapter begins by describing an empirical effort to define the scope of the problem of tobacco industry tactics. It discusses a concept mapping project

that tapped the expertise of individuals in the field of tobacco control with respect to industry tactics, and presents that experience in a model. This model identifies that indeed tobacco industry tactics exist and can potentially be classified according to eight domains: attempts to undermine science and legitimate messages from scientific quarters, the manipulation of the media, the industry's public relations efforts, the tactics the industry uses to gain control of the public agenda, lobbying efforts, the use of front groups and artificially created grassroots movements, intimidation, and harassment of tobacco control professionals. The high level of internal consistency in the model development lends legitimacy to the model for identifying both that tobacco industry tactics are an important component of the evaluation of tobacco control efforts and that the model can provide a framework for evaluating industry tactics.

Summary

Separately, the concept map results, the documents review, and the literature review are not sufficient to develop an index variable. They do, however, validate the importance of understanding tobacco industry tactics and help to define a construct to guide index creation. The consistency among the three approaches was very high. A procedure involving experts in the field of tobacco control led to a concept map of their observations and experiences with tobacco industry counterefforts. The review of the published literature revealed that the tobacco industry implemented these same identifiable tactics. The review of

tobacco industry documents shows that the industry had a specific intention to disrupt public health programs, including ASSIST, through identifiable tactics. The three approaches also show that the tactics may be categorized and suggest that it may be possible to systematically assess these tactics as a first phase to developing a metric.

This chapter has begun the important work of identifying tobacco industry tactics and laying the groundwork for a measurable construct. The tasks that remain include defining data sources and designing systematic methodologies for data collection. Although indexing work on the tobacco industry documents[105,106] has made this a rich data source, there still remains no guarantee that the records are or will ever be complete. Because these records are not complete, there is no way to determine whether information is systematically missing and whether the documents as a whole are biased in some unknown way. Reporting requirements about lobbying and advertising vary widely from state to state, making reliable state comparisons impossible. Tactics that may be very important to the tobacco industry may not be assessable in real time because their value cannot be divorced from their context.

Near-future research efforts might focus on more clearly defining those constructs that constitute an anti-public health index, and more specifically on the operational definitions of those constructs. Subsequently, an assessment of factors proposed for that index could be examined in the same manner that factors for the Strength of Tobacco Control index (chapter 2) were assessed

(on the basis of parsimony, scientific support, and feasibility). Our initial assessment suggests that any valid and reliable index would be difficult to create because the information that it is feasible to collect is so limited.

This chapter has begun the effort set forth in Stillman et al.[1] discussing the importance of including protobacco forces in an evaluation design and providing guidance toward developing this construct. It is hoped that others will continue this effort and help develop an index that can be used within evaluation models. Until an index is created and validated, however, tobacco control evaluations should acknowledge and qualitatively describe the protobacco forces, so that the evaluation report can be interpreted within an appropriate context.

Conclusions

1. One of the early objectives of the ASSIST evaluation was to define an index of protobacco activity as part of its analysis. Toward this end, the ASSIST evaluation project undertook a review of tobacco industry documents and published literature on tobacco industry counterefforts, as well as a concept mapping process used to identify key tobacco industry tactics.
2. Eight key tobacco industry strategies identified include lobbying and legislative strategies, legal and economic intimidation, creating the illusion of support, usurping the agenda, harassment, undermining science, media manipulation, and public relations.
3. A Web-based concept mapping process performed as part of the ASSIST

evaluation project engaged tobacco control stakeholders to identify tobacco industry tactics. This process produced a conceptual map that provided detailed lists and clusters of tactics that may be useful in future quantitative measurement efforts.

4. A search of tobacco industry documents verified that the tobacco industry engages in tactics specifically designed to counter public health programs, including ASSIST, and specific industry concerns and tactics are outlined in those documents.

5. Challenges remain in quantifying the impact of tobacco industry counterefforts in public health in a form that can be used in the evaluation of tobacco control projects, including data sources and collection procedures. Possible future areas of study include direct and indirect measures of campaign funding, lobbying and advocacy efforts, and legislative measures. At a deeper level, a long-term goal is the definition of operational constructs for an anti-public health index that effectively quantifies the impact of tobacco industry counterefforts.

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9. Final Outcomes: Analytical Methods and Results

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Appendices

9. Final Outcomes: Analytical Methods and Results

This chapter describes the analytical methods and findings for the American Stop Smoking Intervention Study (ASSIST). The primary evaluation question was whether the ASSIST program reduced adult smoking prevalence and per capita cigarette consumption. The evaluation model implied additional secondary research questions that were also tested. These analyses investigated the association between ASSIST, the Strength of Tobacco Control (SoTC), the Initial Outcomes Index (IOI), and the longer term outcomes (adult smoking prevalence and per capita cigarette consumption).

Multiple linear regression was used to evaluate the effect of ASSIST on adult smoking prevalence, and a mixed effects linear model was used to analyze per capita consumption. A detailed discussion of these methods and the rationale for selecting them are provided in appendices to this chapter.

ASSIST was shown to reduce the prevalence of adult smoking, at a level that would be projected to result in more than 1.2 million fewer smokers if ASSIST had been implemented nationwide. However, analyses accounting for between-states variation using random effects modeling showed no effect of ASSIST in reducing per capita consumption of cigarettes. Among secondary results, adjusted IOI was associated with decreased prevalence, while SoTC and the cigarette price component of IOI were associated with decreased per capita cigarette consumption.

Introduction

This chapter presents the methods and results from the formal ASSIST evaluation.[1]

The aim of ASSIST was "to demonstrate that the application of statewide tobacco prevention and control programs and policies would reduce cigarette consumption and smoking prevalence."[2(p261)] As detailed in Monograph 16, ASSIST sought to change the social and environmental influences that affect individuals' use of tobacco, primarily through interventions in four policy areas: (1) smoke-free environments, (2) tobacco advertising and promotion, (3) youth access to tobacco, and (4) tobacco price. Seventeen states with staffs with a wide range of abilities and experience in developing and implementing tobacco control programs were chosen for ASSIST funding. These states also differed in type and number on baseline (preintervention) factors (such as demographics and economic dependence on tobacco) that have documented relationships with smoking prevalence and cigarette consumption rates. It was important to take these factors into consideration when comparing ASSIST and non-ASSIST states because any changes observed could potentially be attributable to these differences and not to the effects of ASSIST.

At the start of the intervention, 1992–93, there were no statistically significant differences between the smoking prevalence and per capita cigarette consumption rates in ASSIST and non-ASSIST states[1] (see table 9.1). By the end of the intervention, 1998–99, overall smoking prevalence rates in the United States had decreased by 2.4%. Subsequent statistical analysis, therefore, focused on whether the decreases in smoking prevalence during the intervention period were greater in ASSIST states than in non-ASSIST states to ensure that this difference was not simply attributable to other factors. Regression analyses adjusting for potential confounding factors (see table 9.1 for a list of the factors considered) showed that there was a greater decrease of smoking prevalence in ASSIST states than there was in non-ASSIST states. Further analyses investigated whether the intervention had a greater effect on people of particular ages or gender. These analyses found that the decreased prevalence effect of ASSIST mainly affected women.

Per capita consumption was also examined via a statistical analysis that took into account the consumption rates in each state during the time when ASSIST began, incorporated the state factors associated with cigarette consumption, and illustrated each state's seasonal pattern of consumption. This analysis did not show any differences in consumption rates over time.

Table 9.1. Baseline Characteristics of ASSIST and Non-ASSIST States

Variable	ASSIST states (N = 17)	SE	Non-ASSIST states + DC (N = 34)	SE	p^a
Adult smoking prevalence (%)	25.19	0.64	24.41	0.48	.35
Initial Outcomes Index (IOI)	0.20	0.60	–0.10	0.39	.65
Per capita tobacco consumption (packs per month)	10.64	0.48	10.54	0.41	.88
Sex					
Female (%)	52.22	0.16	51.76	0.24	.21
Race/ethnicity					
Black–non-Hispanic (%)	8.57	1.86	10.28	2.17	.61
Hispanic (%)	5.54	2.10	4.78	1.04	.72
Metropolitan area resident (%)	70.52	4.46	62.76	4.28	.26
Below poverty line (%)	13.85	0.88	14.36	0.78	.69
Economic value of tobacco × 10^3 (fraction)	5.24	3.58	1.46	1.02	.20
With education above high school (%)	44.63	1.71	45.67	0.96	.57
Mean state population (million)	4.10	0.74	3.54	0.79	.65
Mean age of state population	41.18	0.23	41.03	0.26	.71

Note: Data in tables 9.1, 9.3, 9.6, and 9.7, and in figures 9.2 and 9.3, were published in an earlier analysis in Stillman, F. A., A. M. Hartman, B. I. Graubard, E. A. Gilpin, D. M. Murray, and J. T. Gibson. 2003. Evaluation of the American Stop Smoking Intervention Study (ASSIST): A report of outcomes. *Journal of the National Cancer Institute* 95 (22): 1681–91.

[a]Two-sided *p* values are based on *t* tests.

Questions to be Addressed in the ASSIST Evaluation

The primary questions of the ASSIST evaluation are whether the ASSIST program reduced smoking prevalence and whether it reduced per capita cigarette consumption.[a] However, the evaluation conceptual model suggests a number of secondary questions about the relationships between SoTC (see chapter 2), IOI (see chapter 4), smoking prevalence, and per capita cigarette consumption. These primary and secondary questions raised in the original evaluation model[b] and reported on by Stillman and colleagues[c] are as follows:

Primary Questions

- Was ASSIST associated with a decrease in adult smoking prevalence?
- Was ASSIST associated with a decrease in adult per capita cigarette consumption?

Secondary Questions

- What was the relationship between ASSIST and SoTC?
- Was ASSIST or SoTC associated with an increase in IOI?
- Did states with higher SoTC scores have lower adult smoking prevalence?
- Did states with higher IOI scores have lower adult smoking prevalence?
- Did states with higher SoTC scores have lower adult per capita cigarette consumption?
- Did states with higher IOI scores have lower adult per capita cigarette consumption?

[a]Manley, M., W. Lynn, R. Payne Epps, D. Grande, T. Glynn, and D. Shopland. 1997. The American Stop Smoking Intervention Study for Cancer Prevention: An overview. *Tobacco Control* 6 (Suppl. 2): S5–S11.

[b]Stillman, F. A., A. M. Hartman, B. I. Graubard, E. A. Gilpin, D. Chavis, J. Garcia, L-M. Wun, W. Lynn, and M. Manley. 1999. The American Stop Smoking Intervention Study: Conceptual framework and evaluation design. *Evaluation Review* 23 (3): 259–280.

[c]Stillman, F. A., A. M. Hartman, B. I. Graubard, E. A. Gilpin, D. M. Murray, and J. T. Gibson. 2003. Evaluation of the American Stop Smoking Intervention Study (ASSIST): A report of outcomes. *Journal of the Nation Cancer Institute* 95 (22): 1681–1691.

The sidebar "Questions to be Addressed in the ASSIST Evaluation" describes the conceptual framework that guided the evaluation of ASSIST and the primary and secondary research questions. The next section ("Overall Considerations for Analysis") describes the overall considerations that applied to both the primary and secondary analyses.

The three sections that follow describe the analytical methods used and present the results from the analysis of (1) adult smoking prevalence, (2) per capita cigarette consumption, and (3) the various secondary outcomes for the ASSIST evaluation. The last section summarizes the main results and places them in context with respect to tobacco control in the United States during the intervention period.

Additional background information about the selection of analytic methodologies is contained in two appendices to this chapter, "Issues Related to Selection of Methods for Analyzing Smoking Prevalence" (appendix 9.A) and "Approaches to Analyzing per Capita Cigarette Consumption Data" (appendix 9.B).

Overall Considerations for Analysis

This section outlines, with respect to the ASSIST evaluation, several decisions that apply to all of the analyses that were conducted for both the primary and secondary questions.

Units of Selection/Observation

Although states were not assigned randomly to ASSIST or non-ASSIST status,[3] the state was the unit of selection for ASSIST sites; therefore, the state was the unit of analysis for the evaluation. In the evaluation models, each of the 51 units (50 states plus the District of Columbia) is treated as an equal unit, regardless of population size. With only 51 units of observation, the number of variables that can be included in a regression analysis is limited. Consequently, the ASSIST evaluation relied heavily on developing summary indices (see chapters 2 and 4).

One-tailed Tests and Statistical Power

Decisions related to the initial design of the ASSIST evaluation included the use of one-tailed statistical tests for hypotheses that could be formulated directionally.[2] It was assumed that ASSIST would lead to lower prevalence and to lower per capita cigarette consumption. There was no basis for suspecting that this intervention would increase prevalence or per capita consumption. Tests of means, proportions, and single coefficients from regression models were, therefore, from one-tailed t tests at the .05 level of significance when the hypotheses were directional. For ease

of understanding, two-sided 90% confidence intervals are presented so that the reader may focus on the appropriate upper or lower confidence limit corresponding to the implied direction of the hypothesis. However, when simultaneous inferences about several regression coefficients were being made, two-tailed F tests at the .05 level of significance were used, because the hypotheses involved were multidirectional.

A priori power computations based on a one-tailed test for unadjusted smoking prevalence indicated that with the 17 ASSIST states and 34 non-ASSIST states, such an analysis would have a power between 63% and 76% to detect a difference of 1.5 percentage points and between 95% and 99% to detect a difference of 2.5 percentage points.[2] No a priori power computation was performed with respect to differences in per capita cigarette consumption.

Preliminary Analyses

A number of preliminary analyses were conducted to explore potential methods for the evaluation. These analyses used prebaseline and baseline data. The analysis approach was selected on the basis of these preliminary analyses and before any additional analyses were conducted. In this way the researchers ensured that the method selection was not unduly influenced by the results. An additional feasibility analysis was performed using interim data through mid-1996. This allowed for verification that the methods selected were sound without adding to the number of statistical tests performed on the final data and potential Type I error.

Two appendices at the end of this chapter document the issues addressed in this decision-making process. Appendix 9.A describes issues related to the analysis of adult smoking prevalence, including the treatment of baseline prevalence and the options for adjusting for factors or state conditions that might differ among the states. Appendix 9.B addresses some of the possible ways to analyze the per capita consumption data. It also addresses the importance of accounting for the state-specific variability in the data; these differences had a substantial effect on the analysis results (and, in particular, on the size of the confidence intervals) that related ASSIST to per capita consumption. The interested reader should consult these appendices if there are questions concerning why the analytic approaches described below were used.

Model Diagnostics

Because the unit of analysis was the state, and there were a limited number of states, an individual state could strongly influence the results. Standard regression diagnostics were therefore conducted for the smoking prevalence analyses in which one state at a time was left out to identify states that had an unusually strong influence on the results.[4] Also, with respect to the prevalence analyses, covariates used in the regression analyses to adjust for state conditions were examined for unusually high correlations with the exposures (e.g., ASSIST, SoTC, and IOI) to determine whether these covariates were unduly inflating variances.[4]

Separate analyses omitting the District of Columbia are presented because some measures developed for the evaluation (SoTC and IOI) require information from local jurisdictions that are not present in the District of Columbia.[*] For example, the District of Columbia has an inflated IOI score; states that preempted local clean indoor air legislation had points deducted from the state and local clean indoor air rating (see chapter 3), a component of the IOI score. However, preemption at any level below the unit of analysis is not an option in the District of Columbia, so no points could be deducted. In addition, the District of Columbia IOI score is artificially inflated due to strong enforcement of a weak clean indoor air law. These factors, along with easy access to less expensive cigarettes in Virginia, render the District of Columbia an influential outlier for the smoking prevalence-IOI relationship.

Additional analyses that exclude California are presented. California is an influential outlier because it had established a comprehensive, well-funded tobacco control program prior to ASSIST and the funding for its tobacco control program far exceeded funding in any other state during the ASSIST period.

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[*]Although the District of Columbia is obviously not a state, it was treated as a "state" in these analyses because it was part of the Centers for Disease Control and Prevention's Initiatives to Mobilize for the Prevention and Control of Tobacco Use (IMPACT) and it was a SmokeLess States grantee during the ASSIST period.

Adult Smoking Prevalence

Methods

Data Source

Smoking prevalence data are from the Tobacco Use Supplement to the Current Population Survey (TUS-CPS; see chapter 5).[5] From the survey data on individuals, the percentage or prevalence of current smokers can be computed within each state and the District of Columbia. The TUS-CPS was conducted at baseline in 1992–93, at an interim point in 1995–96, and at the end of the program in 1998–99. However, only the baseline and end of the program data were included in the final analyses.

Analytic Approach

The prevalence data were analyzed using a two-stage regression model. At the first stage, a single logistic regression model was fit to the TUS-CPS data from baseline (1992–93) and from last follow-up (1998–99) to model current smoking status (1 = current smoker, 0 = nonsmoker) at the individual level. This logistic regression used the TUS-CPS sample weights; it included the variables listed in table 9.2 as individual-level covariates; and it included interactions between sex and age and between sex and race/ethnicity. Residuals obtained from the logistic regression were averaged within each state for the baseline and follow-up period to be used in the second stage of the regression analysis. These state-level mean residuals represent adjusted prevalences for the states that remove state-to-state differences for the individual-level covariates.

Multiple linear regression was used for the second stage of the analysis to adjust for state-level covariates (see table 9.2). The model for this analysis is described by equation 9.1 where R_{Bs} and R_{Fs} represent the mean residuals for a state s from the first-stage logistic regression of the baseline and the follow-up, respectively; E_s represents the exposure variables of interest for a state s; and ε_s is the random error. The exposure variable could have been ASSIST status, IOI, SoTC, and/or selected interaction(s) between these exposures.

$$R_{Fs} = \beta_0 + \beta_1\,R_{Bs} + \beta_2\,E_s + \varepsilon_s \quad (9.1)$$

State-level covariates (see table 9.2) were considered for inclusion as independent variables in equation 9.1, using an all-possible-subsets procedure based on the minimum Mallows Cp statistic.[6] This stepwise procedure was applied by fixing the baseline mean residual as a covariate in the model, omitting the exposure variable(s) (e.g., ASSIST), and evaluating the possible subsets of state-level covariates. None of the state conditions was statistically significant when this procedure was used. This indicated that the first stage of the analysis effectively removed these sources of variation at the individual level, so that no further variation need be explained by state-level covariates.

Separate sets of models for smoking prevalence were estimated for adult men and women and by age group (18–29, 30–49, 50–64, 65+).

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or exceeded the national mean change, compared with only 15 (44%) of the 34 non-ASSIST states (including the District of Columbia). Among the ASSIST states, Maine and Virginia achieved the largest decrease in mean adult smoking prevalence (−5.01%, *SE* = 1.68%, and −4.70%, *SE* = 1.36%, respectively), while Indiana and New York had the smallest decreases (−0.78%, *SE* = 1.79%, and −0.98%, *SE* = 0.63%, respectively). Among non-ASSIST states, Georgia and Nevada had the greatest decreases in mean adult smoking prevalence (−4.43%, *SE* = 1.57%, and −4.31%, *SE* = 1.52%, respectively), whereas Delaware, the District of Columbia, and Oklahoma had slight increases in prevalence (0.04%, *SE* = 1.74%; 0.31%, *NA;* and 0.78%, *SE* = 1.51%, respectively). Taken together, ASSIST states achieved a somewhat greater decrease in adult smoking prevalence than non-ASSIST states (*M* = −3.02% vs. −2.11%, respectively; a difference of −0.91%, *p* = .015).

Results from Adjusted Two-stage Model

Table 9.3 presents the results of the multiple linear regression analysis for prevalence (adjusted for baseline prevalence and individual-level demographics) between ASSIST and non-ASSIST states at the end of the intervention period (1998–99). The adjusted difference (regression coefficient) in prevalence was −0.63% (90% confidence interval [CI]: −1.25, −0.01, *p* = .049). This relationship was slightly weakened when the District of Columbia was removed from the analyses (−0.53%; 90% CI: −1.12, 0.07,

p = .076, data not shown). However, without California in the analyses, the relationship was similar to the overall results (−0.66%; 90% CI: −1.28, −0.04, *p* = .044, data not shown). Table 9.3 also shows subgroup analyses for the exposure effects of ASSIST on prevalence, by sex and age. ASSIST had a significant effect on prevalence rates among females: −0.96% (*p* = .023). However, ASSIST's effect was not statistically significant among males. No differences in effect on prevalence by age were found.

Per Capita Cigarette Consumption
Methods

Data Sources

Bimonthly estimates of per capita cigarette consumption for each state were the data to be modeled. The sources of these data are described elsewhere (see chapter 5). Figure 9.1 shows the raw bimonthly data for ASSIST and non-ASSIST states in the top and bottom panels, respectively. The variability with respect to the states in the consumption data over time, particularly in the non-ASSIST states, was substantial, and it is not difficult to imagine that it might obscure any signal (e.g., effect of ASSIST) to be found in the noise (variability).

Analytic Approach

The analytic model of per capita consumption that was implemented is a mixed effects linear model,[7] given by equation 9.2.

Table 9.3. Results of Regression Analysis of Smoking Prevalence for ASSIST Status, by Sex and Age

Exposure/ Subgroup[a]	ASSIST versus non-ASSIST			
	ß	90% CI	p[b]	R^2[c]
Total	−0.63	−1.25, −0.01	.049	.68
Sex				
Male	0.09	−0.46, 0.64	.42	.50
Female	−0.96	−1.73, −0.19	.023	.65
Age				
18–29	−0.60	−1.92, 0.71	.23	.38
30–49	−0.57	−1.50, 0.36	.15	.42
50–64	0.45	−0.46, 1.40	.21	.37
65+	−0.65	−1.56, 0.25	.12	.54

Note: Non-ASSIST states include the District of Columbia. CI indicates confidence interval.
[a]Tests of statistical significance were performed for interactions of sex by ASSIST status (two-sided), p = .18, and age group by ASSIST status, p = .30. [b]One-sided p values are based on t tests. [c]R^2 was calculated using a standard formula for linear regression.

$$C_{st} = \mu + \beta_1 t + \beta_2 t^2 + \beta_3 t^2 + \beta_4 t^4 + \beta_5 \sin(t\,\pi/3) + \beta_6 \cos(t\,\pi/3) + \gamma X_{st} + \alpha_1 A_s + \alpha_2 A_s \times t + \alpha_3 A_s \times t^2 + \alpha_4 A_s \times t^3 + \alpha_5 A_s \times t^4 + m_s + b_s t + \varepsilon_{st}. \quad (9.2)$$
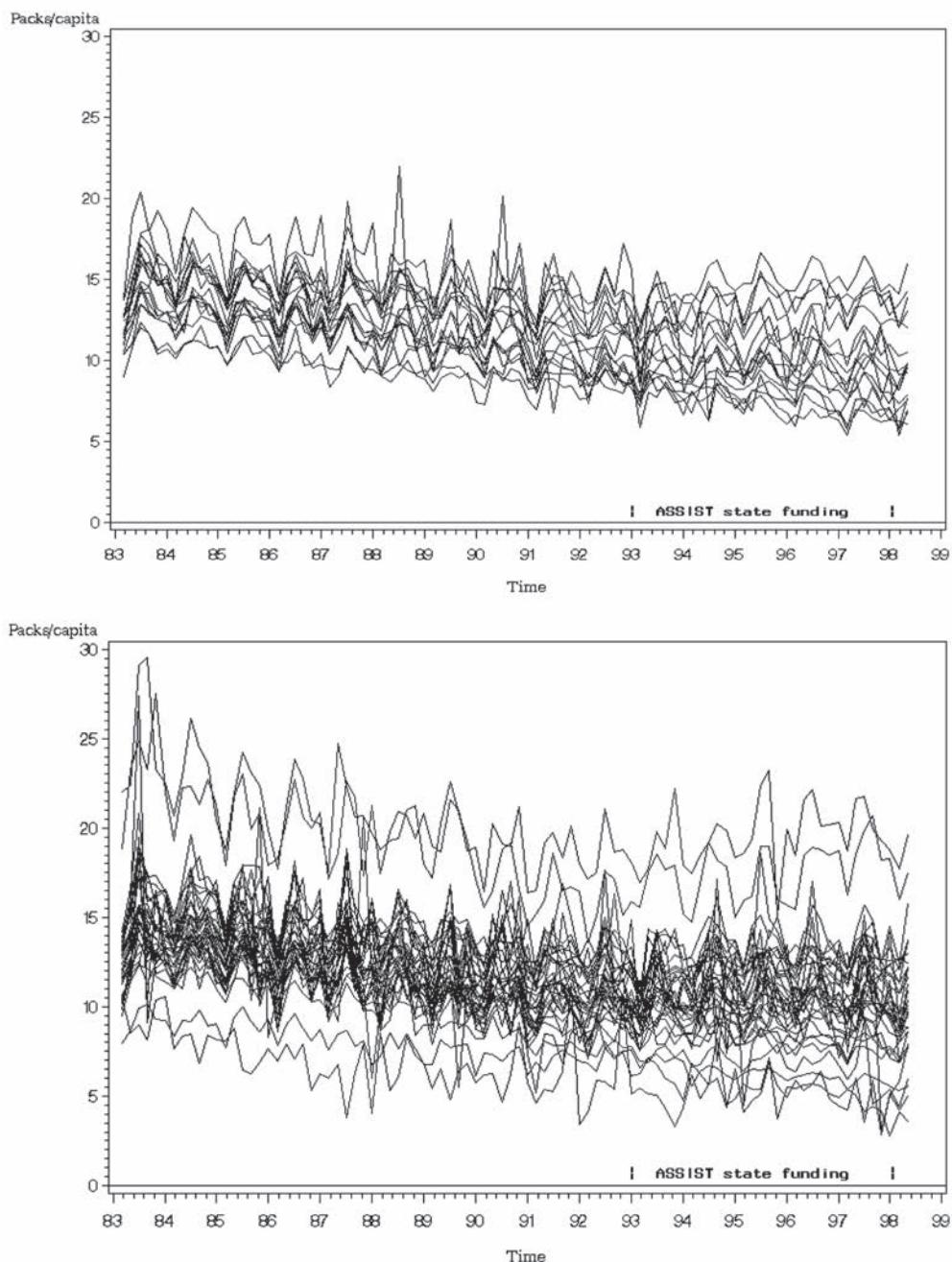
The dependent variable is bimonthly consumption, denoted by C_{st} for state s at time t. Independent variables include time (bimonthly time, t) and powers of time (t^2, t^2, t^4), which account for a nonlinear trend, and sine and cosine functions of time, $\sin(t\,\pi/3)$, $\cos(t\,\pi/3)$, which account for seasonal periodicity in the consumption data, and ASSIST status, A_s.

This model has a state-varying random intercept, m_s, a random regression coefficient, b_s, for the time variable, and an ARIMA(1) autoregressive correlation structure for the error terms, ε_{st}, across time within state.

Forward stepwise regression was used to select the time-varying and non–time-varying state-level covariates (table 9.2) to be added to an initial model with only the terms involving time and without interactions with A_s. The stepwise regression resulted in a final model that included statistically significant state-level covariates (X_{st}), independent variables for ASSIST status, interactions between ASSIST status and time, powers of time, and the sine and cosine of time.

In the modeling approach that was used, the interactions between ASSIST status and time were over the entire period (December 1988–May 1999). After adjusting for the state conditions, this model permits the trend in cigarette consumption for the ASSIST states to be different from the trend for the non-ASSIST states during the preintervention period (December1988–October 1993)

Figure 9.1. Bimonthly per Capita Cigarette Consumption
in ASSIST (top) and Non-ASSIST (bottom) States

as well as the intervention period (November 1993–May 1999).

It should be mentioned that the time-varying covariates used in the analysis were not available at each bimonthly time point. Some were available annually, and those derived from the TUS-CPS had only three distinct values corresponding to the three surveys. Therefore, interpolated values from the TUS-CPS for each year were generated. The yearly values were used for six adjacent bimonthly periods. Per capita consumption models with IOI or cigarette price as exposures, E_s, adjusting for state cross-border differentials in price, were also examined.[8]

Primary Results

Unadjusted Results

The ASSIST and non-ASSIST states did not show a significant difference in baseline per capita cigarette consumption (table 9.1: 10.64 vs. 10.54 packs/month, $p = .88$).

Figure 9.1 shows the state-specific, unadjusted, bimonthly per capita consumption rates by ASSIST status. There appears to be a common periodic seasonal pattern in these rates, which was the motivation behind including the cosine and sine time relationships in equation 9.2. Figure 9.2 shows the difference in the aggregated unadjusted mean consumption rates (jagged line) between the ASSIST and non-ASSIST (ASSIST minus non-ASSIST) states over time. ASSIST states tended to have higher per capita consumption before the intervention period but lower consumption during the intervention period.

Results from Adjusted Analyses
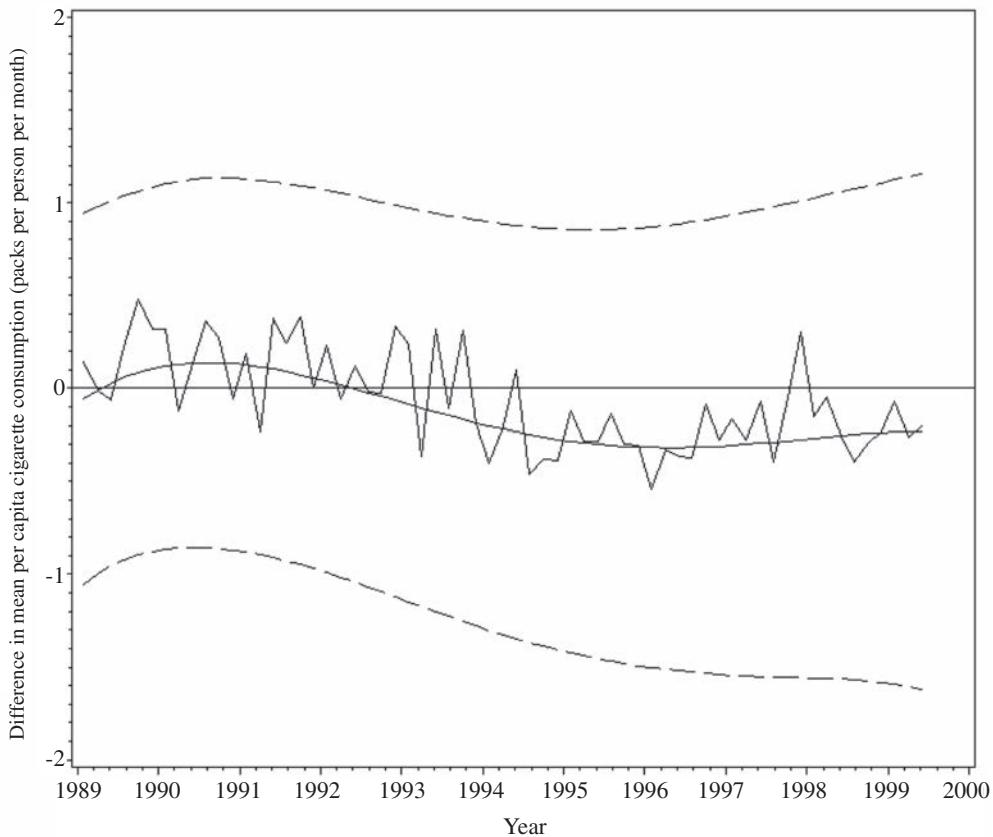
Figure 9.2 also shows the difference in consumption (smooth line) as calculated by the fitted model given by equation 9.2 together with 90% confidence intervals for the difference (dashed lines). The adjusted differences between the ASSIST and non-ASSIST states in consumption for each year as estimated by the mixed-effects model (equation 9.2) are presented in table 9.4. After adjusting for the significant state conditions (percentage Hispanic, economic value of tobacco, and percentage with income below poverty level), ASSIST had no statistically significant effect on consumption ($p = .22$).

These results did not differ substantially when the District of Columbia or California was removed from the analyses or when the analysis time was extended to include data as far back as 1985. Adding terms to the model to account for cross-border smuggling did not change the overall ASSIST-effect result (e.g., not significant), but these terms were significantly related to consumption.

Secondary Results (SoTC and IOI Analyses)

This section addresses the secondary questions related to SoTC and IOI. (See "Secondary Questions" section in the sidebar on page 271.)

Figure 9.2. Crude Difference in Bimonthly per Capita Consumption of Cigarettes between ASSIST and Non-ASSIST States

Notes: The jagged line shows the crude difference in bimonthly mean per capita consumption of cigarettes between ASSIST and non-ASSIST states (ASSIST minus non-ASSIST). The smooth solid line shows the predicted bimonthly per capita consumption from the mixed-effects model. The dashed lines are the pointwise 90% confidence intervals for the predicted bimonthly per capita consumption derived from the model.

Methods

Data Sources

The data used in these analyses are described in chapter 2 ("Strength of To-bacco Control") and chapter 4 ("Initial Outcomes Index").

Models

Effect of ASSIST on SoTC. The basic form of the model presented in equation 9.1 was the basis for this analysis. SoTC was the dependent variable. Explanatory variables included in the model were baseline level of funding (this was the

Table 9.4. Adjusted Differences in per Capita Cigarette Consumption between ASSIST and Non-ASSIST States during the Intervention Period

Year	ASSIST– non-ASSIST adjusted difference[a]	90% CI
1993	–0.19	–1.28, 0.90
1994	–0.27	–1.40, 0.86
1995	–0.31	–1.49, 0.87
1996	–0.31	–1.54, 0.92
1997	–0.27	–1.55, 1.01
1998	–0.24	–1.58, 1.10
1999	–0.23	–1.61, 1.15

Note: CI indicates confidence interval.

[a]The units are in packs per month per person. None of the differences was statistically significant; all *p* values were greater than .32. The interactions between ASSIST status and time and powers of time (Wald test) were not statistically significant (*p* = .22).

only component of SoTC collected at baseline), ASSIST status as the exposure variable, and covariates selected using the Mallows Cp procedure (as described previously). Besides SoTC as a composite index, its individual components (see chapter 2) were examined in separate analyses.

Effect of SoTC or ASSIST on IOI. The analysis of IOI as an outcome variable was restricted to the baseline and intervention period (September/October 1992 through April/May 1999); IOI was measured (annually) during this period only. The IOI models examine the relationship between ASSIST and IOI and between SoTC and IOI, using the mixed-effects linear model given by equation 9.3:

$$IOI_{st} = \mu + \beta_1\, t + \beta_2\, t^2 + \beta_3\, t^3 + \gamma\, X_{st} + \alpha_1\, E_s + \alpha_2\, E_s \times t + \alpha_3\, E_s \times t^2 + \alpha_4\, E_s \times t^3 + m_s + \varepsilon_{st} \quad (9.3)$$

The annual IOI measurement, denoted by $\mathbf{IOI_{st}}$ for state *s* at time *t,* is the dependent variable, and independent variables include time (annual time, $\mathbf{t}$) and powers of time ($\mathbf{t^2}$, $\mathbf{t^3}$), which account for a nonlinear trend in IOI. The model also includes a random intercept, $\mathbf{m_s}$, which allows for state-varying random intercepts, and an ARIMA(1) autoregressive correlation structure among the error terms ε_{st}, across time within state. Because the dependent variable IOI is measured annually, there is no need for sine and cosine terms to adjust for seasonal periodicity. Time-varying and non–time-varying state-level covariates were added to a model that included only the terms involving time as independent variables. A forward stepwise approach was used to select state-level covariates. The final model included the significant state-level covariates and independent variables for exposure status, $\mathbf{E_s}$, indicating either ASSIST status or level of SoTC.

Effect of SoTC or IOI on Prevalence. Equation 9.1 was used for these analyses, with the exposure variable of interest either SoTC or IOI. When the exposure variable was SoTC, the final 1999 value (only one available) for each state was used, and when exposure was IOI, the average IOI over the intervention period for each state was used. In addition to the evaluation of the composite indices, separate analyses were conducted using each of their components.

Table 9.5. IOI Analyses of the Impact of SoTC, as a Main Effect, on IOI and the Components of IOI

Outcome	SoTC ß[a]	90% CI	p[b]
IOI[c]	0.27	–0.10, 0.64	.12
Components			
Cigarette price	2.95	–1.03, 6.93	.11
Smoke-free workplaces	0.87	–0.12, 1.86	.07
Clean indoor air legislative score[c]	0.44	–0.47, 1.35	.21

Note: IOI indicates Initial Outcomes Index. SoTC indicates Strength of Tobacco Control. CI indicates confidence interval.

[a]The units are standard deviation of IOI (or IOI components) per standard deviation of SoTC. [b]p tests of significance are two-sided. [c]The clean indoor air legislation score reflects both the strictness and coverage of clean air ordinances within each state. The score includes a preemption penalty and a further adjustment for local ordinance strength (see chapter 3).

Effect of IOI on per Capita Consumption. The analysis relating IOI to per capita consumption was again restricted to the intervention period (see above section on "Effect of SoTC or ASSIST on IOI"). Because of this restricted time period, a new mixed-effects linear model was fit to the consumption data and is described by equation 9.4.

$$C_{st} = \mu + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \beta_4 \sin(t\,\pi/3) + \beta_5 \cos(t\,\pi/3) + \gamma X_{st} + \alpha_1 \text{MIOI}_s + \alpha_2 (\text{IOI}_{st} - \text{MIOI}_s) + m_s + b_s\, t + \varepsilon_{st}. \quad (9.4)$$

The model includes a state-varying random intercept, m_s, and a random regression coefficient for time, b_s. This model includes the following as independent variables: MIOI_s, the within state mean IOI (the average of the annual IOI measurements for a state); and $\text{IOI}_{st} - \text{MIOI}_s$, the difference between the annual IOI and the average IOI for a state. The regression coefficient for $\text{IOI}_{st} - \text{MIOI}_s$, α_2, is the one of interest because it describes how change in IOI within a state relates to change in per capita consumption.[9] This model also

includes an ARIMA (1) autoregressive correlation structure for correlation between the error terms, ε_{st}, within state. The state-level covariates in table 9.2 were rescreened using forward stepwise regression, starting with a model that included only the terms involving time as independent variables, without the main effects and interactions with MIOI_s and IOI_{st}. Additional models including ASSIST status and interactions between ASSIST status and IOI were examined to determine how ASSIST might have modified the effect of IOI on consumption.

Relation of SoTC to per Capita Consumption. The analysis of the effect of SoTC on per capita consumption was restricted to the intervention period because only a single value of SoTC, measured at the end of the intervention (1999), was available to represent tobacco control during the entire intervention period. The model used for the SoTC analysis is given by equation 9.5.

$$C_{st} = \mu + \beta_1 t + \beta_2 t^2 + \beta_3 t^3 + \beta_4 \sin(t\,\pi/3) + \beta_5 \cos(t\,\pi/3) + \gamma X_{st} + \alpha_1 \text{SoTC}_s + m_s + b_s\, t + \varepsilon_{st} \quad (9.5)$$

This model is the same as the one relating IOI to consumption (equation 9.4); it included the same state conditions and independent variable for SoTC (denoted by $SoTC_s$), which replaced the IOI terms.

Results

Did ASSIST Affect SoTC?

As in chapter 2, where the mean SoTC scores did not differ by ASSIST status, ASSIST status was not significantly related to SoTC in the regression analysis that adjusted for baseline funding, metropolitan residency, age, and education above high school (ASSIST regression coefficient, $\beta = .062$, 90% CI: –0.445, 0.569, $p = .42$). Excluding the District of Columbia or California from the analyses did not change the results. ASSIST was also not related to the separate components of SoTC (capacity, resources, effort), with or without the District of Columbia or California in the analyses. (See appendix 11.A for state-level crude SoTC estimates.)

Did SoTC Affect IOI?
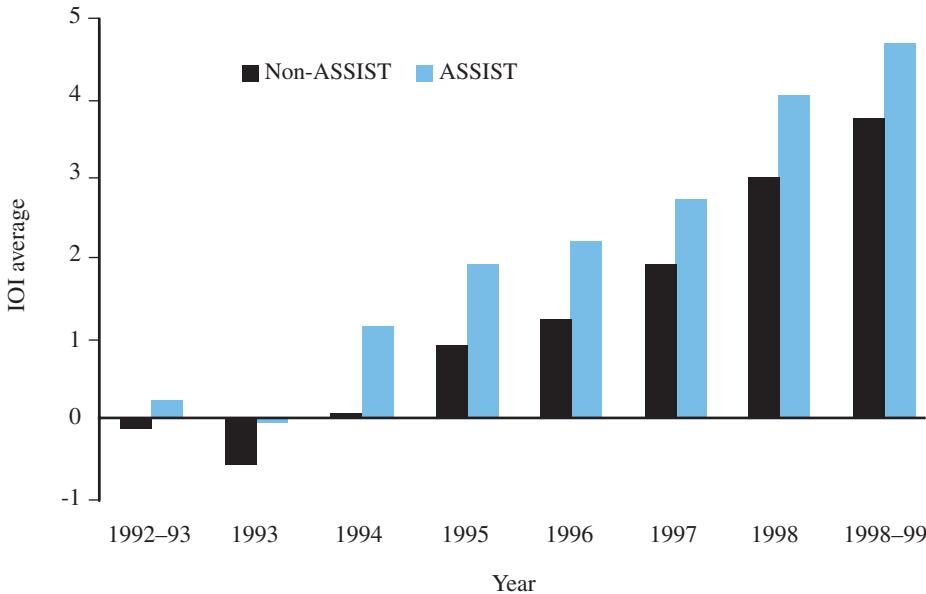
Using a mixed model analysis based on equation 9.3 with SoTC as only a main effect, SoTC was not found to be related to IOI ($\beta = .27$, standard deviation of IOI per standard deviation of SoTC, 90% CI: –0.10, 0.64, $p = .12$), after adjusting for state conditions (education above high school, metropolitan residency, and southern census region) (table 9.5). Also, SoTC was not related to the components of IOI (clean indoor air legislation, cigarette price, smoke-free workplaces), and omitting the District of Columbia or California had no effect.

Did ASSIST Affect IOI?

The overall mean change in IOI in the United States from 1993 to 1999 was 4.05. (Appendix 11.A shows baseline and final time points for unadjusted IOI by state.) Of the 17 ASSIST states, 12 (71%) achieved this level of increase in IOI, compared with 10 (29%) of the 34 non-ASSIST states (see chapter 4, table 4.5).

Figure 9.3 shows that for each year, starting in 1992–93 through 1994, the unadjusted (for state conditions) mean IOI in the ASSIST states was higher than it was in the non-ASSIST states. Thereafter, both groups increased their IOI scores each year. In addition, although the ASSIST states gained a 1.1-point lead in 1994 and maintained this lead in IOI over time, they did not accrue a greater lead by the end of the project in 1999. Nevertheless, when adjusted for state conditions (education above high school education, metropolitan residency, and southern census region), ASSIST status was not significantly related to change in IOI over the intervention period ($p = .13$). This adjusted analysis further confirmed that ASSIST did not differentially increase IOI during most of the intervention period. Excluding the District of Columbia or California from the analyses did not change these results. Similar analyses of the separate components of IOI (clean indoor air legislation, cigarette price, smoke-free workplaces) did not reveal significant relationships between the components and ASSIST, with or without the District of Columbia or California in the analyses.

Figure 9.3. Yearly Initial Outcomes Index Average for ASSIST and Non-ASSIST States

Did SoTC Affect Prevalence?

SoTC had an inverse association (unadjusted) with smoking prevalence in 1998–99 ($r = -.42$). However, this relationship was not maintained after adjusting for baseline prevalence and individual-level factors ($\beta = -.19$, change in prevalence [%] per standard deviation of SoTC, 90% CI: –0.43, 0.06, $p = .11$) (table 9.6). In addition, the SoTC components (i.e., resources, capacity, efforts) were not statistically significantly associated with smoking prevalence after adjustment for individual-level factors. Results remained the same without the District of Columbia or California in the analyses, and the analyses within gender or age group also showed no association between SoTC and smoking prevalence. Because of these statistically nonsignificant results, the interaction between SoTC and ASSIST was not explored.

Did IOI Affect Prevalence?

Unadjusted IOI had a moderately strong negative correlation with smoking prevalence in 1998–99 ($r = -.52$; see chapter 4). Analyses that adjusted for baseline prevalence and individual-level factors found that IOI was inversely associated with prevalence, although the association was not statistically significant ($\beta = -.11$, prevalence [%] per standard deviation of IOI, 90% CI: –0.22, 0.01, $p = .063$; table 9.7). When the District of Columbia was removed from the analysis, IOI was statistically significantly inversely associated with smoking prevalence ($\beta = -.15$, 90% CI: –0.26, –0.04, $p = .015$). Without California, the results were similar

to the overall analysis (β = −.11, 90% CI: –0.22, 0.01, p = .07). Again, because the adjusted main effects did not reach statistical significance, interactions with ASSIST were not explored.

With all states and the District of Columbia in the model, none of the IOI component variables (i.e., smoke-free workplace, cigarette price, or state and local ratings for clean indoor air legislation), when analyzed separately, was statistically significantly associated with smoking prevalence, when adjusted for baseline smoking prevalence. However,

Table 9.6. Results from Regression Analysis of Smoking Prevalence for Strength of Tobacco Control (SoTC)

Exposure/Subgroup	Prevalence/SoTC[a]	90% CI	p[b]	R^2[c]
Total	–0.19	–0.43, 0.06	.11	.67
Sex				
Male	–0.17	–0.45, 0.11	.16	.51
Female	–0.23	–0.54, 0.08	.12	.63
Age				
18–29	–0.22	–0.73, 0.29	.24	.38
30–49	–0.15	–0.52, 0.22	.25	.41
50–64	–0.31	–0.66, 0.05	.08	.39
65+	–0.05	–0.40, 0.31	.41	.52

Note: CI indicates confidence interval.
[a]The units are percent prevalence per standard deviation unit in SoTC. [b]One-sided p values are based on t tests. [c]R^2 was calculated using a standard formula for linear regression.

Table 9.7. Results from Regression Analysis of Smoking Prevalence for Initial Outcomes Index (IOI)

Exposure/Subgroup	Prevalence/IOI β[a]	90% CI	p[b]	R^2[c]
Total	–0.11	–0.22, 0.01	.063	.67
Sex				
Male	–0.02	–0.16, 0.11	.40	.50
Female	–0.20	–0.35, –0.06	.012	.65
Age				
18–29	–0.13	–0.37, 0.11	.18	.39
30–49	–0.04	–0.22, 0.14	.36	.41
50–64	–0.17	–0.35, 0.01	.06	.39
65+	–0.11	–0.29, 0.08	.17	.53

Note: CI indicates confidence interval.
[a]The units are percent prevalence per standard deviation unit in IOI. [b]One-sided p values are based on t tests. [c]R^2 was calculated using a standard formula for linear regression.

when the District of Columbia was removed from the model, all of the IOI components individually were statistically significantly associated with lower smoking prevalence. This finding emphasizes the difference between the District of Columbia and states in their mechanisms for implementation of tobacco control policy (see subsection in this chapter on "Model Diagnostics" in the section on "Overall Considerations for Analysis," page 273). With the District of Columbia removed, a higher percentage of smoke-free work-site policies was statistically significantly associated with lower smoking prevalence (β = $-.046$, CI: -0.08, -0.01, p = .022); higher cigarette price was statistically significantly associated with lower smoking prevalence (β = $-.013$, CI: -0.025, -0.001, p = .047); and higher clean indoor air local and state legislation ratings were statistically significantly associated with lower smoking prevalence (β = $-.053$, 90% CI: -0.105, -0.002, p = .049). Table 9.7 also indicates that states with higher IOI scores have

significantly lower prevalence rates among females (p = 0.012) but not among males. No age effect was found.

Did SoTC Affect per Capita Consumption?

After adjustment for state-level factors, the SoTC index was found to be statistically significantly inversely associated with per capita cigarette consumption (β = $-.39$, packs per person per month per standard deviation of SoTC, 90% CI: -0.01, -0.77, p = .046). States with higher SoTC scores had lower per capita consumption. In all states combined, per capita consumption decreased by 0.61 per person per month (90% CI: 0.02, 1.20), with a change from the 25th percentile to the 75th percentile of SoTC over all states. In separate analyses, the capacity component of the SoTC index was found to be inversely and statistically significantly associated with per capita consumption (β = $-.64$, 90% CI: -0.28, -1.00, p = .003). States with higher levels of capacity had lower per capita consumption, regardless of their ASSIST

Table 9.8. Results from Regression Analysis of per Capita Cigarette Consumption for Strength of Tobacco Control (SoTC)

Exposure	Per capita cigarette consumption/ SoTC ß[a]	90% CI	p[b]	Adjusted effect size 75th–25th percentile difference in exposure	90% CI
Total SoTC	–0.39	–0.776, –0.003	.046	–0.61	–1.215, –0.005
Components					
Resources	–0.11	–0.53, 0.31	.32	–0.039	–0.180, 0.102
Capacity	–0.64	–1.00, –0.27	.003	–1.270	–2.009, –0.531
Effort	–0.04	–0.39, 0.31	.43	–0.077	–0.749, 0.595

Note: CI indicates confidence interval.
[a]The units are packs per person per month per standard deviation of SoTC or of components of SoTC. [b]p tests of significance are one-sided.

status. Results were unchanged without the District of Columbia or California (see table 9.8).

Analyses were also conducted to determine whether the effect of SoTC (and its individual components) on per capita consumption differed between the ASSIST and non-ASSIST states. This analysis was based on a mixed-effects model that tested interactions between SoTC (or its components) and ASSIST status. Table 9.9 shows no statistical difference between the effect of SoTC or its components by ASSIST status. These results remained unchanged without the District of Columbia or California.

Finally, analyses were conducted to determine if SoTC affected the temporal pattern of bimonthly per capita consumption over the intervention period. Table 9.10 shows no significant interaction between SoTC and time.

Did IOI Affect per Capita Consumption?

After adjusting for state-level factors (i.e., percentage Hispanic, economic value of tobacco, and percentage with incomes below poverty level), states with larger changes in IOI score over time were associated with lower per capita cigarette consumption than states with smaller changes in IOI ($\beta = -.32$, packs per person per month per standard deviation of IOI, 90% CI: -0.39, -0.25, $p < .001$). For a state, per capita consumption was estimated to decrease by 0.57 packs per person per month as the IOI values increased from the 25th to the 75th percentile over the intervention period (90% CI: 0.45, 0.69). When analyzed separately, the only component of the IOI score with a statistically significant association with consumption was cigarette price, which was statistically significantly inversely associated with consumption ($\beta = -.023$, 90% CI: -0.020, -0.026, $p < .001$). States with higher cigarette prices and larger changes in cigarette price during the ASSIST period had lower per capita consumption. Results remained unchanged without the District of Columbia or California in the analyses (see table 9.11).

The interaction of change in IOI with ASSIST status was also examined. The mixed effects model for this analysis was similar to equation 9.4 but included an

Table 9.9. Results from Regression Analysis of per Capita Cigarette Consumption for Interactions of Strength of Tobacco Control (SoTC) and ASSIST Status

Exposure	Interaction with ASSIST ß[a]	90% CI	p[b]
Total SoTC	–0.71	–1.73, 0.31	.13
Components			
Resources	–0.66	–1.65, 0.33	.14
Capacity	–0.17	–1.03, 0.69	.36
Effort	0.10	–0.76, 0.96	.42

Note: CI indicates confidence interval.

[a]The units are packs per person per month per standard deviation of SoTC or of components of SoTC. [b]*p* tests of significance are one-sided.

Table 9.10. Results from Regression Analysis of Temporal Pattern of per Capita Cigarette Consumption for Strength of Tobacco Control (SoTC)

Model terms	ß for interaction	SE	$p^{a,b}$
Interactions with total SoTC			
SoTC × time	−0.0128	0.0161	.19
SoTC × time^2	0.0001	0.0009	
SoTC × time^3	0.0000	0.0000^c	
Components			
Resources × time	−0.0051	0.0166	.44
Resources × time^2	−0.0002	0.0009	
Resources × time^3	0.0000	0.0000^c	
Capacity × time	−0.0243	0.0165	.10
Capacity × time^2	0.0008	0.0009	
Capacity × time^3	−0.0000	0.0000^c	
Effort × time	0.0026	0.0151	.67
Effort × time^2	−0.0004	0.0008	
Effort × time^3	0.0000	0.0000^c	

[a]p for simultaneous inference for all interactions with time. [b]p tests of significance are two-sided. [c]Numbers shown to four significant figures and were less than 0.0001.

Table 9.11. Results from Regression Analysis of per Capita Cigarette Consumption for Initial Outcomes Index (IOI)

Exposure	Per capita cigarette consumption/ IOI ß[a]	90% CI	p^b	Adjusted effect size 75th–25th percentile difference in exposure	90% CI
Change in IOI[c]	−0.32	−0.39, −0.25	<.001	−0.57	−0.69, −0.45
Components					
Change in cigarette price	−0.023	−0.026, −0.020	<.001	−0.420	−0.494, −0.346
Change in smoke-free workplaces	0.015	−0.007, 0.037	.14	0.190	−0.096, 0.476
Change in clean indoor air legislative score[c]	−0.017	−0.047, 0.013	.17	−0.004	−0.011, 0.003

Note: CI indicates confidence interval.

[a]The units are packs per person per month per standard deviation of IOI or of components of IOI. [b]p tests of significance are one-sided. [c]The clean indoor air legislation score reflects both the strictness and coverage of clean air ordinances within each state. The score includes a preemption penalty and a further adjustment for local ordinance strength (see chapter 3).

Table 9.12. Results from Regression Analysis of per Capita Cigarette Consumption for Interactions of Change in Initial Outcomes Index (IOI) and Its Components with ASSIST Status

| Exposure | Interaction with ASSIST | | | Adjusted effect size | |
	β[a]	90% CI	p[b]	75th–25th percentile difference	90% CI
Change in IOI[c]	–0.001	–0.103, 0.101	.49	–0.0022	–0.1870, 0.1826
Components					
Change in cigarette price	0.006	–0.001, 0.013	.05	0.110	0.001, 0.219
Change in smoke-free workplaces	–0.010	–0.032, 0.012	.23	–0.120	–0.389, 0.149
Change in clean indoor air legislative score[c]	–0.066	–0.143, 0.011	.08	–0.015	–0.032, 0.002

Note: CI indicates confidence interval.

[a]The units are packs per person per month per standard deviation of IOI or of components of IOI. [b]*p* tests of significance are one-sided. [c]The clean indoor air legislation score reflects both the strictness and coverage of clean air ordinances within each state. The score includes a preemption penalty and a further adjustment for local ordinance strength (see chapter 3).

interaction between ASSIST status and the within-state change in IOI and an interaction between ASSIST status and the mean state IOI; the first interaction was the one of interest (table 9.12). The association of the change in IOI and consumption did not vary between the ASSIST and non-ASSIST states ($p = .49$), but there was a small effect in change in price between ASSIST and non-ASSIST states (β = .006, 90% CI: –0.001, 0.013).

Summary

Our analyses demonstrate that ASSIST states had statistically significant lower adult smoking prevalence than non-ASSIST states at the end of the intervention period. Our data also suggest that much of the decrease in adult

smoking prevalence may be associated with decreases in smoking prevalence among women. However, this finding needs to be interpreted with caution because this was a subset analysis and because the statistical test of interaction between sex and ASSIST status for a difference in the association of ASSIST on smoking prevalence was not statistically significant. Nevertheless, this finding is still of interest to the general health community, because women were one of several priority populations for interventions in the ASSIST project.[10]

Although the per capita cigarette consumption rates were lower in ASSIST states than in non-ASSIST states at the end of the intervention period, these differences were not statistically significant. However, changes in per capita consumption and smoking prevalence

With the state as the fundamental unit of measure, these per capita consumption results underscored the importance of accounting for variations between states within the analysis. An earlier study by Manley and colleagues[a] showed that ASSIST states had lower per capita consumption than non-ASSIST states at the midpoint of the intervention; however, this conclusion was incorrect because the analysis was flawed, having failed to properly account for between-state variability in per capita consumption of cigarettes. Further details on this analysis are provided in appendix 9.B.

Source: Davis, W. W., B. I. Graubard, A. M. Hartman, and F. A. Stillman. 2003. Descriptive methods for evaluation of state-based intervention programs. *Evaluation Review* 27 (5): 506–34.

[a]Manley, M. W., J. P. Pierce, E. A. Gilpin, B. Rosbrook, C. Berry, and L-P. Wan. 1997. Impact of the American Stop Smoking Intervention Study on cigarette consumption. *Tobacco Control* 6 (Suppl. 2): S12–S16.

do not always occur together, as was the case for the prevalence analysis, which showed a statistically significant decrease over the intervention period. In California, per capita cigarette consumption continued to decline significantly during a period of unchanged smoking prevalence.[11] Also, the extensive between-states and within-state variability in per capita consumption data appears to have overshadowed any small difference in per capita consumption rates between ASSIST and non-ASSIST states (figure 9.2). A post hoc power analysis indicated that there was only an 11% power to detect the largest difference in per capita consumption rate

observed between ASSIST and non-ASSIST states during the intervention period (table 9.4).

IOI was only marginally related to adult smoking prevalence ($p = .063$) when the District of Columbia was included in the analysis. However, when the District of Columbia was removed, IOI was significantly and negatively related to smoking prevalence. IOI was significantly and negatively related to per capita cigarette consumption. In addition, IOI was higher in ASSIST states and changed more in ASSIST states over the intervention period; however, a multivariate analysis that was adjusted for state conditions did not show a significant main effect or interaction between IOI and ASSIST status. That is, there was not a statistically significant differential effect of ASSIST on increasing IOI during most of the intervention period. However, there was a suggestion of an ASSIST interaction on the association between change in price and per capita consumption.

SoTC was significantly negatively related to prevalence but not when adjusted for baseline prevalence and individual-level covariates. SoTC was significantly negatively related to per capita consumption after adjustment for state-level covariates. However, SoTC was not related to IOI over the intervention period. Finally, ASSIST was not related to SoTC, after adjustment for important state-level covariates. The SoTC measure was available only at one point in time (1999); if it had been measured consistently before and during the intervention period, the results might have been different. For example, if SoTC had been measured at

baseline, one would have expected to see increases over time.

Since the analysis treated all states and the District of Columbia equally, it is not surprising that removing the District of Columbia from the analysis increased the impact of policy on smoking prevalence. IOI and SoTC were constructed to capture state effects, and since the District of Columbia is not a state and does not have the same infrastructure and governmental jurisdictions as a state, the District of Columbia data were artificially increased and of questionable accuracy for those analyses.

It must be remembered that ASSIST was not a randomized trial, and the evaluation was restricted to 51 units of observation, assessed during a period of tremendous nationwide changes affecting tobacco control. Many non-ASSIST states instituted tobacco control programs. Some of these programs were initiated pre-ASSIST, and others were initiated during the intervention period. In addition to initiation of state-level tobacco control programs, litigation between the states' attorneys general and the tobacco industry resulted in considerable attention to tobacco issues, including negative publicity for the tobacco industry from the release of their previously confidential internal documents. During this same time, the U.S. Food and Drug Administration attempted but failed in its bid to regulate tobacco.

Finally, the tobacco industry appears to have actively allocated effort and resources to counter tobacco control efforts generally and ASSIST specifically at the state level. For example, Slater

et al. found more pervasive Marlboro promotional offers and advertisements in states with comprehensive tobacco control programs.[12] White and Bero[13,14] identified multiple tactics and coordinated efforts that the tobacco industry used to attack ASSIST. Had the evaluation successfully measured and accounted for these efforts in the analyses described in this chapter, we might have seen a greater ASSIST effect on the primary outcomes of smoking prevalence and per capita cigarette consumption.

Despite these challenges, the ASSIST evaluation did successfully answer some of the primary and secondary questions addressed in the conceptual framework. ASSIST status was associated with decreased smoking prevalence, and higher IOI was associated with lower prevalence. In addition, SoTC and IOI were associated with lower per capita consumption.

The small but statistically significant differences in the reduction of adult smoking prevalence in ASSIST states, when applied on a population basis, could be expected to have a large impact on the public.[15,16] Indeed, if all 50 states and the District of Columbia had implemented ASSIST among the baseline population 18 years of age or older (i.e., 192,322,966),[17] the decrease in adult smoking prevalence would represent approximately 1,213,000 (95% CI: −235,200, 2,661,300) fewer smokers nationally.

The methods used to evaluate ASSIST were necessarily very complex. However, many of the challenges encountered in the ASSIST evaluation will also be present in the evaluation of state-level

tobacco control programs. The units of observation (counties or jurisdictions where interventions are administered and applied) will likely be limited so that summary measures or indices (e.g., SoTC, IOI) will be required. The effects observed over time may be attributable to influences from national programs (e.g., American Legacy Foundation's TRUTH campaign) or spillover from other states' programs, rather than interventions within the state. It will be appropriate to account for secular trends occurring even before the interventions took place and to account for demographic and other differences among the observational units.

Conclusions

1. Change in prevalence across all states was analyzed using multiple linear regression that adjusted for potential confounding factors. Per capita cigarette consumption was examined using mixed effects linear modeling incorporating initial consumption rates and state factors associated with cigarette consumption.
2. Primary analysis results showed that ASSIST states exhibited statistically greater decreases in smoking prevalence for women. ASSIST states also exhibited lower per capita cigarette consumption over the course of the intervention period; however, ASSIST status was not significantly related to per capita cigarette consumption when these results were adjusted for state conditions.
3. Secondary results were as follows:

- **ASSIST Status.** The ASSIST status of a state was not significantly related to the Strength of Tobacco Control index or to the Initial Outcomes Index after adjusting for state conditions.
- **Strength of Tobacco Control.** Strength of tobacco control was significantly related to decreased per capita cigarette consumption. However, strength of tobacco control and its components (i.e., resources, capacity, or efforts) were not statistically significantly associated with smoking prevalence after adjustment for individual-level factors. Strength of tobacco control was also not found to be significantly related to the Initial Outcomes Index.
- **Initial Outcomes Index.** The Initial Outcomes Index was significantly associated with reduced smoking prevalence among women as well as with overall smoking prevalence when the District of Columbia was removed from the analysis. Initial Outcomes Index and its cigarette price component were also significantly related to decreased per capita cigarette consumption. While the Initial Outcomes Index was not significantly related to ASSIST status, there was a relationship between its cigarette price component and ASSIST status.
4. Combining these results shows that if ASSIST had been implemented nationwide, projections indicate that there would have been over 1.2 million fewer smokers in the United States.

Appendix 9.A. Issues Related to Selection of Methods for Analyzing Smoking Prevalence

This appendix presents background material about how the methods used to analyze smoking prevalence were selected. The authors made decisions about how to account for baseline prevalence in the analytic model and how to adjust for state factors, such as inequalities in demographics, that affect adult smoking prevalence. The details of the models used are presented in the main body of the chapter.

Baseline Prevalence

One of the first issues to be addressed in formulating the model is how to treat the baseline and final prevalence estimates. The simplest approach would be to ignore the baseline data and assume that the mean prevalence for the ASSIST and non-ASSIST states was similar at baseline. This assumption may or may not be valid. It might also be more appropriate to use an analysis of covariance approach to adjust for the baseline value, because states with high initial prevalence rates could exhibit a different degree of change than states with low initial prevalence rates. Another choice would be to use the change score (difference) in smoking prevalence from baseline to the end of the program as the dependent variable in the analyses.

This issue is not unique to the ASSIST evaluation, and a discussion of the advantages of the baseline as covariate over the other approaches is presented in Bonate.[18] Because the correlation between baseline and outcome is less than 1, the correlation between baseline and change score is negative. Thus, an observed difference between groups at baseline is predictive not only of a difference in raw outcomes but also of a difference in change scores in the opposite direction. If the intervention group is at an unfair disadvantage compared with the control group when its effects are measured in raw outcomes (due to an imbalance at baseline), change scores will maintain that unfair advantage. In contrast, the baseline-as-covariate method produces a result that is uncorrelated with the baseline; it essentially subtracts a fraction of the baseline from the outcome. Further, the variance of parameters of interest is generally lower with the baseline as covariate approach than would be obtained with the other approaches.

Adjusting for Differences in Demographics and Other Factors

It is possible that ASSIST states might collectively show a different demographic profile or differ from non-ASSIST states in underlying characteristics related to smoking status at the individual level. The following approaches were considered for adjusting the analyses for differences between the ASSIST and non-ASSIST states in state- and individual-level covariates. These methods were empirically tested using pre-baseline and baseline data so that the selection of the approaches that were used for the evaluation of ASSIST was not influenced by the results of the evaluation.

Propensity Scores

One way to account for these differences is to calculate a propensity score that predicts ASSIST status. This propensity score is subsequently used as a covariate in the model.[19] Accordingly, with ASSIST status as the dependent variable, state-level data (mean values of various demographic characteristics from the CPS or from other sources; see table 9.1 in the main body of this chapter) were subjected to a logistic regression analysis. The resultant probability of being an ASSIST state from this model for each state would become the value of a covariate for the analysis. However, with only 51 units of observation, none of the independent state-level variables were strongly related to ASSIST status.

Matching

Another approach to account for baseline differences among states is to match each of the 17 ASSIST states to a comparable non-ASSIST state. This was done in a previous community intervention study,[20] and matching was suggested[21] and investigated as a possibly superior approach[22] to regression techniques for the ASSIST evaluation.

Using matching would reduce the number of observations to 34. Using power analysis methods developed by Martin et al.,[23] the resulting statistical power to detect a 1.5% difference in prevalence between ASSIST and non-ASSIST was less than 60%. In addition to the overall loss of statistical power, even difficulties in matching states with respect to enough important variables (e.g., preintervention prevalence, cigarette tax rate, demographics) to consider the two states comparable were insurmountable.[21] Thus, matching was abandoned in favor of regression approaches for the ASSIST evaluation.

Another approach related to matching that was considered was to use demographic methods of direct standardization of the smoking prevalence rates for the states using the U.S. distribution of the sociodemographic covariates as a reference population for the standardization. This approach was not used because of limitations on the number of variables that could be used for standardization and because of difficulties in adjusting race and ethnicity categories that were not represented in all states.

Two-stage Regression Model

The prevalence of adult smoking was compared between the ASSIST and non-ASSIST states using a two-stage regression analysis that was similar to the approach used in the analysis of the Community Intervention Trial for Smoking Cessation (COMMIT).[24] The first stage of the regression analysis was used to adjust for differences in individual-level demographic factors (table 9.2) that exist among states and are associated with smoking. At this stage of the regression analysis, current smoking at the individual level was predicted using a logistic regression model that was fit to the combined TUS-CPS data from the baseline (1992–93) and follow-up (1998–99) periods. The logistic regression was weighted by TUS-CPS sample weights and included

individual-level variables and the interactions between sex and age and between sex and race/ethnicity. Residuals obtained from the logistic regression averaged (using the TUS-CPS sample weights) within each state for each of the baseline and follow-up periods were used in the second stage of the regression analysis.

Multiple linear regression was used for the second stage of the regression analysis to adjust for state-level factors (table 9.1) and baseline smoking prevalence (using the adjusted baseline state-level prevalences from the first-stage regression) and to evaluate the relationship between an exposure (e.g., ASSIST, SOTC, or IOI) and adult smoking prevalence. With only 51 units of observation (50 states and the District of Columbia) available for the second stage regression analysis, it was important that the model at this stage be as parsimonious as possible. The task was to select only a few predictors that together explained the most variance in the dependent variable. State-level factors were selected for inclusion as independent variables in the regression analysis using an all-possible-subsets procedure with a minimum Mallows Cp statistic criteria.[6]

Before the two-stage regression analysis was implemented, it was tested and confirmed by a preliminary analysis of prebaseline national smoking prevalence data from 1985 and 1989 Current Population surveys, which served as a test baseline sample, and 1992–93 baseline TUS-CPS data, which served as a test follow-up sample. Further evaluation of the two-stage regression analysis was performed with the 1992–93 TUS-CPS data as the baseline and the 1995–96 TUS-CPS data as the follow-up. These preliminary analyses were useful for demonstrating that the two-stage regression approach could be successfully implemented in the ASSIST evaluation.

How State-level Covariates Were Selected for the Second Stage

With only 51 units of observation used in the second stage of the regression analysis, it was important that the regression model be as parsimonious as possible. The task was to select only a few predictors that together explained the most variance in the dependent variable. The procedure chosen to select the most predictive subset of covariates was an all-possible-subsets regression analysis judged by the minimum Mallows Cp statistic,[6] which worked well in the preliminary analyses.

Model Diagnostics

It was important to determine whether any one individual state unduly influenced the results. The method used computed the DFITS statistic, which allowed for identification of states that altered the prediction of the models, and the DFBETAS statistic to identify states that most influenced the estimates of the regression coefficients.[4] Collinearity diagnostics were also performed to identify state-level covariates with unusually high correlations, which might lead to numerical instability in the estimation of the regression coefficients or inflate the variances associated with the regression coefficients.[4] The collinearity diagnostics computed the eigenvalues for the design matrix times its transpose to obtain a condition index used to check for numerical instability.

Appendix 9.B. Approaches to Analyzing per Capita Cigarette Consumption Data

This appendix describes some of the approaches that were considered for the analysis of the per capita cigarette consumption data and provides more detail regarding the development of the approach used in the final ASSIST evaluation.

Slopes Approach

Linear regression was used to compute a slope for the bimonthly data points in each state before the start of ASSIST. A second slope was computed for data points during the intervention period. The intervention slope was then modeled as a function of the preintervention slope along with the set of covariates (selected as described in appendix 9.A for prevalence) and a variable for ASSIST status (1 = ASSIST, 0 = non-ASSIST). Prior to 1993 and from then until 1996, the linear model provided a reasonable fit to the data. However, as figure 9.B.1 illustrates, in some states trends in per capita cigarette consumption over a longer period were decidedly nonlinear, which implied that another approach was required.

Accounting for State-to-State Variability in Consumption Trends

Because ASSIST and the evaluation design specified state as the unit of observation, it was important that the variability between states be accounted for using appropriate random-effects models. The impact of conducting a fixed versus random effects type of analysis is discussed below.

Manley et al.[25] analyzed per capita cigarette consumption from December 1984 through January 1996 and concluded that there appeared to be an ASSIST effect. In that analysis, bimonthly per capita consumption values were weighted by state population and were then averaged for the ASSIST and non-ASSIST states. Attention centered on the difference in the mean per capita consumption levels for ASSIST and non-ASSIST states over time. A regression-based smoothing technique was then used to compute confidence intervals for the smoothed trend in the difference, and since the lower 95% confidence interval of the smoothed trend in the difference was above zero after 1994, it was concluded that ASSIST had reduced per capita cigarette consumption.

Revisiting this analysis, it was noted that between-states variability was not considered because state was not explicitly the unit of analysis.[26] Also, the variance of the intervention effect can differ greatly depending on whether the states' effects are considered as fixed or random effects. When a random effects model was used to assess the difference and the state variability was taken into account with each state having the same weight, the 95% confidence interval included zero for the entire period considered. However, a weighted analysis produced similar results (figure 9.B.2).

Figure 9.B.1. Examples of States with Nonlinear Trends in Bimonthly per Capita Cigarette Consumption after 1993

Per Capita Cigarette Consumption in Oklahoma

Per Capita Cigarette Consumption in Colorado
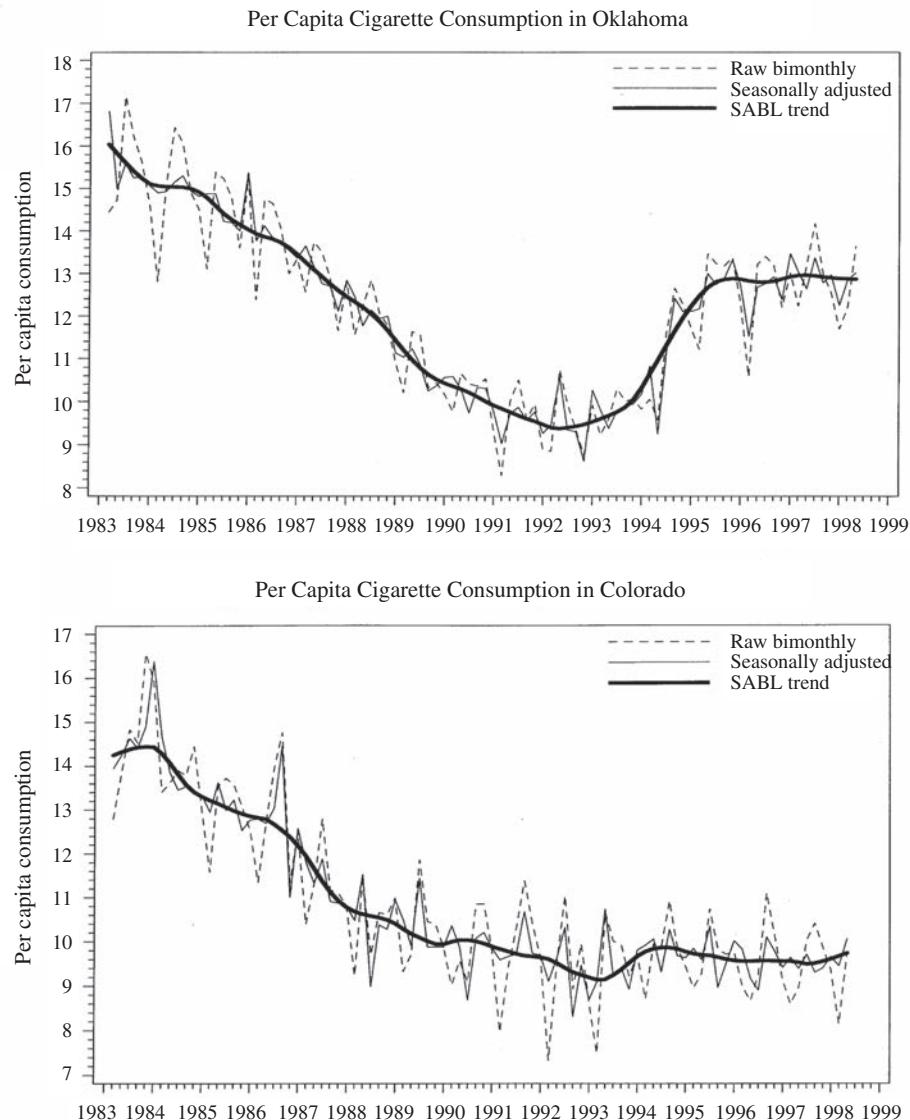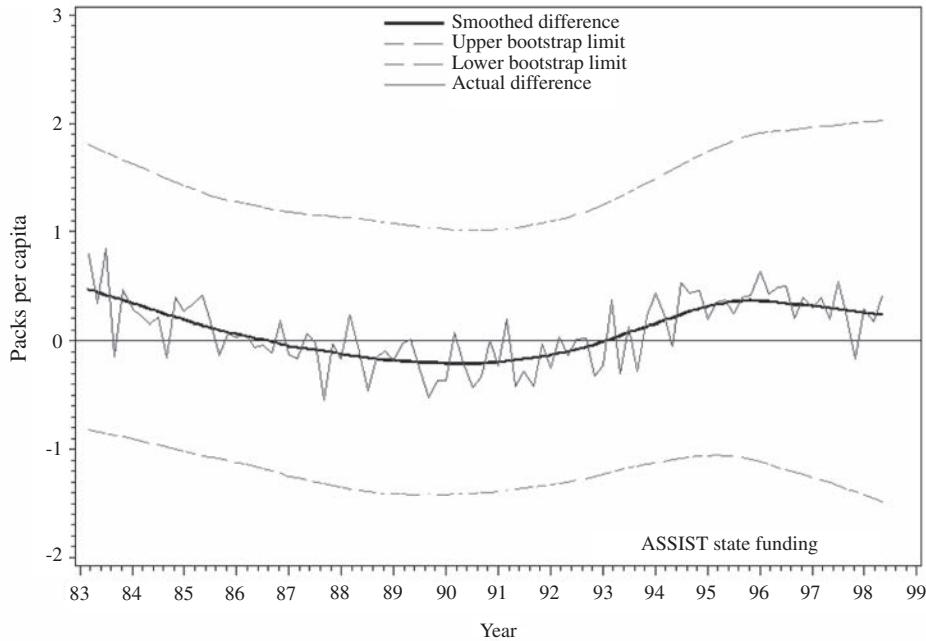
Figure 9.B.2. Random Effects Analysis with 95% Confidence Interval of Difference in per Capita Cigarette Consumption (Non-ASSIST Minus ASSIST)

Source: Davis, W. W., B. I. Graubard, A. M. Hartman, and F. A. Stillman. 2003. Descriptive methods for evaluation of state-based intervention programs. *Evaluation Review* 27: 522. Used with permission.

These analyses illustrate the importance of accounting for the state-to-state variability in the analysis of the intervention effect.

Mixed Effects Time-dependent Models

Mixed random and fixed effects linear modeling was used to analyze the bimonthly per capita consumption data and the annual IOI data. An alternative modeling approach that was considered was the generalized estimation equation method. However, because there were only 51 states or units of analysis, there was concern that the robust variance estimation and the resulting significance tests that used these robust variances would be inaccurate.[27] Therefore, the likelihood-based approach of mixed effects linear modeling was chosen as the method of analysis.

There were several steps required in deriving the final analytical models for the per capita cigarette consumption data. These were as follows:

- The trend over time in the consumption data for all of the states was modeled by a fourth-order polynomial. A spectral analysis was conducted on the detrended bimonthly consumption data, combining the data from all 50 states and the District of Columbia to determine if there was a periodicity in the data. The analysis was carried out using the SAS time series procedure PROC SPECTRA.[28] A strong annual period component was estimated from the periodogram, which warranted inclusion of a sine and a cosine term in the mixed effects models to account for this periodicity.
- Upon examination of the likelihood ratio test, it was determined that a random intercept and a random slope for time were necessary to properly model the state-to-state variability in the consumption patterns.
- An unstructured correlation (the most general approach, requiring no assumptions) matrix was used to estimate the correlation between the random effects.
- After inclusion of the periodicity terms, trend, and random effects, residual within state correlation remained. This was significantly modeled by an ARIMA(1) variance structure.
- Regarding selection of state-level covariates, the Mallows Cp procedure could not be easily automated for these types of models. Instead, a forward-stepping procedure was used. Without the exposure variable(s) of interest, and after including the terms for time, including periodicity, and the random effects for the intercept and slope, the state condition most significantly related to per capita consumption was selected at each step, and the final model included all those that were significant at the two-sided $p < .05$ level.
- Wald F tests were used to determine the level of statistical significance of the fixed effect regression coefficients in the models. The denominator degrees of freedom depended on the number of state-level time-dependent covariates included in the model, where the degrees of freedom for the variance were reduced by 1 from 50 degrees (1 less than the number of units of analysis) for each of the covariates added to the model. There was also a reduction of 1 degree of freedom for each non–time-dependent variable.
- Finally, the model to evaluate the exposure variable of interest included all of the features indicated above together with the exposure variable of interest. For instance, a dummy variable indicating ASSIST status (1 = ASSIST, 0 = non-ASSIST) and appropriate interaction terms with the polynomial time terms were evaluated in the final model for this exposure. Again, Wald F tests were used to determine statistical significance of the set of exposure variables.

Two versions of the final model were evaluated. In the first version, the interactions between ASSIST status and time and powers of time began only after the implementation of ASSIST (at the end of 1993). After adjusting for the state conditions and other considerations, this model assumes that the trend in cigarette consumption for ASSIST

states is the same as the trend for non-ASSIST states during the period before ASSIST was implemented (1988–93).[29] Figure 9.2 in the main body of this chapter suggests that the trends for ASSIST and non-ASSIST states did differ prior to the intervention period, because the difference prior to 1993 diminished (was not constant). Also, results for this model produced predicted differences during the intervention period that were not consistent with the observed data. Thus, another version of the model was adopted. In this version, the interactions of ASSIST and time (and powers of time) were considered over the entire time interval, which allowed the trend for consumption to be different between the ASSIST and non-ASSIST states in both the pre- and postintervention periods.

Appendix 9.C. Outcome Measures: Per Capita Cigarette Consumption (Packs/Month) and Adult (18 Years and Older) Smoking Prevalence (%)

(Shading indicates ASSIST states.)

State	Per capita cigarette consumption			Change in per capita cigarette consumption:	Adult smoking prevalence			Change in adult smoking prevalence
	1992–93	1995–96	1998–99	1992–93 to 1998–99	1992–93	1995–96	1998–99	1992–93 to 1998–99
AK	10.4	11.4	8.2	−2.2	27.61	25.31	26.69	−0.92
AL	11.3	11.0	10.6	−0.7	25.74	23.22	22.29	−3.45
AR	11.9	12.7	11.3	−0.6	28.73	26.57	25.99	−2.74
AZ	8.9	7.7	6.9	−2.0	22.37	22.80	19.86	−2.51
CA	7.2	6.4	5.2	−2.0	18.94	17.92	16.59	−2.35
CO	9.1	9.0	8.7	−0.4	24.16	22.55	20.20	−3.96
CT	8.7	8.3	7.9	−0.8	22.31	19.81	20.56	−1.75
DC	7.0	5.9	5.0	−2.0	23.23	22.25	23.54	0.31
DE	13.0	13.6	14.7	1.7	23.30	24.83	23.34	0.04
FL	9.9	10.0	9.4	−0.5	23.89	22.24	20.66	−0.23
GA	11.5	11.2	10.2	−1.3	24.32	22.79	19.89	−4.43
HI	6.3	5.9	3.5	−2.8	22.18	21.75	18.34	−3.84
IA	10.2	10.3	10.0	−0.2	23.50	23.40	22.37	−1.13
ID	9.4	9.1	8.2	−1.2	23.61	22.32	21.84	−1.77
IL	10.0	9.0	7.9	−2.1	24.47	23.67	22.92	−1.55
IN	13.6	14.8	14.3	0.7	27.81	28.92	27.03	−0.78
KS	9.9	9.9	9.3	−0.6	24.22	25.87	22.45	−1.77
KY	18.0	19.4	17.7	−0.3	31.98	29.69	29.81	−2.17
LA	12.1	12.3	11.2	−0.9	25.37	25.83	22.74	−2.63
MA	9.0	8.2	6.5	−2.5	21.40	20.68	19.34	−2.06
MD	8.9	8.3	7.5	−1.4	23.59	21.07	19.46	−4.13
ME	11.7	10.9	9.1	−2.6	28.52	25.71	23.51	−5.01
MI	11.6	8.9	9.2	−2.4	27.20	25.67	23.36	−3.84
MN	9.0	9.3	8.8	−0.2	25.11	22.85	21.19	−3.92
MO	13.2	13.8	12.7	−0.5	26.24	25.97	23.49	−2.75
MS	11.6	12.2	11.7	0.1	25.46	23.23	21.53	−3.93
MT	9.3	10.1	9.1	−0.2	23.53	23.94	23.29	−0.24
NC	13.9	13.9	12.7	−1.2	26.93	26.21	22.98	−3.95
ND	9.4	8.9	8.2	−1.2	22.18	23.73	20.47	−1.71
NE	9.8	9.6	8.8	−1.0	21.97	21.47	21.18	−0.79
NH	16.6	17.6	18.2	1.6	24.69	23.67	22.04	−2.65
NJ	8.8	8.7	6.8	−2.0	20.38	20.50	19.84	−0.54
NM	7.9	7.6	6.8	−1.1	23.99	23.95	20.93	−3.06
NV	11.0	10.2	10.9	−0.1	28.37	28.09	24.06	−4.31
NY	8.5	7.3	6.8	−1.7	21.52	20.86	20.54	−0.98
OH	11.8	12.1	11.4	−0.4	25.96	26.07	24.01	−1.95
OK	9.4	12.4	12.5	3.1	26.74	25.52	27.52	0.78
OR	10.5	10.4	8.6	−1.9	22.93	22.52	21.16	−1.77
PA	10.2	10.3	9.8	−0.4	23.34	24.08	22.88	−0.46
RI	10.1	9.6	9.4	−0.7	23.20	23.77	19.87	−3.33
SC	12.6	11.0	11.7	−0.9	25.71	25.14	22.73	−2.98
SD	10.1	10.6	9.2	−0.9	25.51	22.73	24.08	−1.43
TN	12.5	13.2	12.2	−0.3	28.53	27.21	25.99	−2.54
TX	9.0	8.6	7.6	−1.4	23.45	23.32	20.89	−2.56
UT	7.4	6.7	5.2	−2.2	16.90	15.04	13.73	−3.17
VA	11.1	11.7	10.8	−0.3	25.47	24.95	20.77	−4.70
VT	12.8	11.9	9.9	−2.9	26.26	24.89	22.34	−3.92
WA	8.4	6.5	5.9	−2.5	24.14	23.28	20.13	−4.01
WI	10.5	10.2	9.3	−1.2	26.15	25.04	24.54	−1.61
WV	11.9	12.2	12.0	0.1	30.25	27.83	26.38	−3.87
WY	12.4	12.7	12.2	−0.2	24.82	25.06	23.70	−1.12

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10. Cost-effectiveness of ASSIST

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Contents

10. Cost-effectiveness of ASSIST

The data on the cost-effectiveness of the American Stop Smoking Intervention Study (ASSIST) were analyzed in terms of cost per life-year gained and cost per quit. This chapter reports the findings of those analyses and examines the methodology used to estimate this cost-effectiveness, as well as factors and assumptions affecting the results.

The analyses yielded a cost-effectiveness best estimate of $1,255 per quit and $2,093.02 per life-year gained, based on a conservative assumption of a 0.63 decrease in tobacco prevalence rates attributable to ASSIST. These estimates compare favorably with alternatives such as intensive physician-based interventions and the implementation of formal smoking cessation guidelines, as well as other accepted public health-related interventions such as mammography. Moreover, effects not considered in the analysis, such as the long-term effects of policy interventions and the development of a tobacco control infrastructure, have the potential to reduce these costs further. Thus, the ASSIST intervention represents a cost-effective approach to the improvement of public health.

Introduction

This chapter documents the cost-effectiveness of ASSIST. The analysis demonstrated that the conservatively estimated cost of each life-year gained from ASSIST compares favorably with the cost per life-year gained from many other population-level public health interventions.

The decision to implement any publicly funded public health intervention must address two basic questions. First, does the intervention have beneficial effects? Second, are the effects large enough to justify the expense of the intervention—in other words, is the intervention cost-effective? Examining cost-effectiveness enables an assessment of the value per dollar spent on one program compared with amounts spent on other programs and, therefore, provides essential information for decisions about how to spend scarce resources.

In this chapter, two effects of ASSIST are examined in light of the total expenditures of the project: how many people quit smoking and how many life-years were gained. The analyses show that ASSIST was cost-effective and yielded an improvement in public health, per dollar spent, that is highly competitive with a broad range of public health interventions. The estimated cost per quit is $1,255, and the dollar amount spent per life-year gained is $2,093. In the context of other public health interventions, the cost per life-year gained attributable to ASSIST is less than the cost per life-year gained attributable to other types of preventive interventions.

The population reached by ASSIST was large—in 1999, about 73.3 million adults throughout 17 states. Of these 73.3 million adults, about 20 million were smokers. Thus, even a small reduction of smoking prevalence in this population would represent a large effect in terms of the number of people who either quit smoking or did not initiate smoking. For example, for a population of this size, a decrease of 0.1 percentage points in the average prevalence of smoking would translate into about 70,000 individuals. Therefore, on a per person basis, the cost of preventing tobacco use is likely to be low. A cost-effectiveness analysis is a method for determining that cost.[1]

The principal application of cost-effectiveness calculations is to compare competing interventions; therefore, an important consideration in selecting the outcome measure is its comparability with data from other relevant interventions. Several other types of calculations provide benchmarks by which the cost of a program can be measured. Numerous studies have estimated the dollar cost per life-year gained for a variety of interventions, thereby providing useful benchmarks.[2]

A Cost-effectiveness Analysis: The Basic Approach

The basic approach to a cost-effectiveness analysis is as follows.

- An intervention is undertaken: for example, a medical procedure, an educational program, the placement of a guardrail or additional lighting on a busy highway, and so forth.

- Corresponding to the particular intervention, an outcome (or a set of outcomes) is identified: typically a measure that can be quantified, such as a death rate, lives gained, life-years gained, or some other effect determined by the nature and purpose of the intervention.

- The measure is assessed prior to the intervention to establish its baseline level of occurrence in the absence of exposure to the intervention.

- The intervention is implemented.

- After the intervention has occurred, the outcome measure is re-assessed, and change in the measure is determined from the baseline level.

The total cost (fixed, variable, and marginal costs combined) of the intervention is then divided by the change in the outcome measure to compute the dollar cost per unit change in outcome. Expressed as an equation, the basic cost-effectiveness measure is a ratio:

cost-effectiveness = total cost/ change in outcome due to intervention. (10.1)

The lower the resulting number, the more cost-effective, or economical, is the program.

Present Discounted Value

Rarely are the costs and outcomes so clearly defined and simultaneously related as in the guardrail example (see sidebar). More typically, expenditures and outcomes occur at different points in time, and the costs are not constant.

An Example of Cost-effectiveness

The following simple example illustrates the basic approach to analyzing cost-effectiveness.

Suppose there is a stretch of road where a large number of fatal auto accidents occur; the number of deaths per year is 10. A guardrail, which will last about 5 years and costs $2.5 million, is installed. It lasts only 5 years because it is struck by cars and quickly becomes ineffective and must be replaced. After the guardrail is installed, the total number of fatalities decreases to 8 per year. Hence, the annual cost per year is $500,000, and the number of lives gained is 2. Thus, the cost per life gained is $250,000. The policy issue is, of course, whether there is another intervention that would give a lower cost per life gained. If installation of additional traffic lights costs $1 million per year but gains 10 lives, the cost per life gained of this intervention would be $100,000. Traffic lights would be a more cost-effective policy option. If funds are limited, cost-effectiveness suggests that traffic lights should probably take precedence over the installation of a guardrail.

Indeed, often the full effect of an intervention is not manifest until many years after the intervention actually takes place. In the case of ASSIST, expenditures were incurred beginning in 1991 (through 1999), but the principal outcome, the decrease in smoking prevalence, was not measured until 1999. Moreover, the reason the decrease in smoking prevalence is important is that it is linked to a subsequent decrease in morbidity and mortality, but these effects are not realized for many years.

The procedure for taking into account the scattered timing of outcomes and expenditures is called *discounting*. The basic premise underlying discounting is time preference: a dollar now is worth more than receiving a dollar a year from now. Accordingly, saving a life now is viewed as being more valuable than saving a life in the distant future. Similarly, society prefers to have resources available now as opposed to later, because those resources yield benefits in the interim. Accordingly, an expenditure *E* that takes place *S* years prior to the outcome has a value in the year for which the analysis is being conducted. This value is called a *present discounted value* (PDV) and is expressed by the equation

$$PDV \text{ of } E = E(1+r)^S. \qquad (10.2)$$

In equation 10.2, *r* is called the *discount rate*. For example, if *r* is 3%,[*] then $100 spent 10 years ago has a present value of about $134. A past expenditure has a present discounted value that is typically larger than the original amount of the expenditure. An expenditure *T* years in the future, on the other hand, has a present discounted value given by the formula

$$PDV \text{ of } E = E(1 + r)^{-T} = E/(1 + r)^T. \qquad (10.3)$$

The present discounted value of a future expenditure *E* is typically smaller than the actual amount *E* that will accrue in the future. Thus, for *r* equals 3% (*r* = 0.03), $100 that will be spent 10 years from now has a present discounted value of $74.71.

Briefly, discounting enters into the ASSIST expenditure calculations as follows. Some ASSIST expenditures

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[*]A standard assumption in cost-effectiveness estimates is that *r* = 3%.

occurred years before the outcomes were measured. The present value of these expenditures, as measured in 1999, is higher than the actual amount spent in earlier years. While the actual amount spent over the years 1991–98 was $124.3 million, after adjusting for inflation and making present discounted value adjustments, the amount comes to $150.2 million. In addition, the outcome of life-years gained from smoking cessation induced by ASSIST will be realized many years in the future. Here, discounting yields a smaller value for the life-years gained due to ASSIST. The full effects of discounting are presented in tables 10.1 and 10. 2 (for expenditures) and table 10.3 (for discounted life-years saved).

The Role of Sensitivity Analysis in Cost-effectiveness

A standard procedure in a cost-effectiveness analysis is to examine how sensitive results and conclusions are to various key assumptions in the analysis. One needs to undertake this exercise because virtually all cost-effectiveness studies involve some uncertainty about assumptions. This analysis is done by changing assumptions and parameters of the study and then examining how conclusions and results are altered. A sensitivity analysis was performed as part of evaluating the cost-effectiveness of the ASSIST interventions, and details of this analysis are presented in tables 10.4, 10.5, and 10.6.

It is standard in a well-constructed cost-effectiveness study to include a discussion of alternative assumptions; essentially, one wants to test how sensitive the ranking of various alternatives is to

"tweaking" or modifying these assumptions. Further discussions of the role of sensitivity analyses in cost-effectiveness studies can be found in *Methods for the Economic Evaluation of Health Care Programs.*[1]

Cost-effectiveness: ASSIST

Data Sources

Population Data

The Tobacco Use Supplement of the Current Population Survey (TUS-CPS),[3] developed by National Cancer Institute staff, was used to ascertain smoking prevalences for each state and the District of Columbia. Prevalence estimates from September 1998, January 1999, and May 1999 were combined and served as the outcome measure of smoking prevalence for each ASSIST state. The methodology is described in chapters 4 and 9 and has been published elsewhere.[4,5]

Expenditure Data

Staff from the National Cancer Institute's Contracts Office calculated total annual expenditures for each of the 17 ASSIST states. These expenditures were derived from quarterly financial reports submitted to the Contracts Office by each designated state ASSIST budget officer during the years 1991–98. Direct expenditure categories included (1) total labor, including fringe benefits; (2) non-expendable equipment; (3) materials/supplies; (4) local travel; (5) national travel; (6) advertising; (7) intervention; (8) mobilization; (9) other costs (e.g., printing, conference expenditures); and

Table 10.1. ASSIST Total State Expenditures

State	Total raw expenditures		
	1991–98 dollars	Constant 1999 dollars	Discounted 1999 dollars
Colorado	8,260,979	8,984,179	10,055,436
Indiana	5,763,030	6,186,421	6,818,329
Maine	5,210,617	5,647,276	6,295,698
Massachusetts	7,486,699	8,028,884	8,837,345
Michigan	9,900,100	10,751,896	12,011,014
Minnesota	7,577,788	8,205,738	9,138,988
Missouri	6,882,817	7,484,172	8,378,485
New Jersey	7,597,419	8,226,867	9,163,094
New Mexico	5,330,994	5,805,699	6,512,573
New York	12,422,191	13,438,427	14,951,936
North Carolina	9,518,407	10,347,318	11,582,019
Rhode Island	5,120,477	5,547,537	6,185,110
South Carolina	5,846,040	6,302,111	6,985,959
Virginia	7,195,520	7,802,116	8,704,722
Washington	8,265,514	8,983,315	10,053,423
West Virginia	4,714,941	5,107,610	5,693,737
Wisconsin	7,241,516	7,885,140	8,841,855
Total	124,335,049	134,734,705	150,209,722
All ASSIST states			
Mean	7,313,826	7,925,571	8,835,866
SD	2,004,863	2,176,815	2,432,420
Coefficient of variation	0.27411962	0.27465721	0.27528936
Maximum/minimum			
Maximum (New York)	12,422,191	13,438,427	14,951,936
Minimum (West Virginia)	4,714,941	5,107,610	5,693,737

(10) cost-sharing. Indirect expenditures, as estimated by each ASSIST state, were added to the direct expenditures to yield total expenditures.

The raw expenditures are listed in the second column of table 10.1. The total actual (or nominal) expenditure by the 17 ASSIST states from 1991 to 1998 was about $124.3 million. The amounts spent by each state varied, from about $4.7 million (West Virginia) to $12.4 million (New York). The average spent per state was $7.3 million. Although the more-populated states, such as New York and Michigan, had the highest total expenditures, their per capita amounts were less than in the less-populated states. The average per capita expenditure for the entire ASSIST project for the period 1991 to 1998 was $2.45. (See

Table 10.2. ASSIST per Capita Expenditures (Adult Population, 18 Years Old and Older)

State	Per capita expenditures		
	1991–98 dollars	Constant 1999 dollars	Discounted 1999 dollars
Colorado	2.76	3.00	3.36
Indiana	1.31	1.40	1.54
Maine	5.41	5.87	6.54
Massachusetts	1.59	1.71	1.88
Michigan	1.36	1.47	1.64
Minnesota	2.16	2.34	2.61
Missouri	1.69	1.84	2.06
New Jersey	1.24	1.34	1.49
New Mexico	4.28	4.67	5.23
New York	0.90	0.98	1.09
North Carolina	1.67	1.81	2.03
Rhode Island	6.83	7.40	8.25
South Carolina	2.00	2.15	2.38
Virginia	1.38	1.50	1.67
Washington	1.94	2.10	2.35
West Virginia	3.36	3.64	4.06
Wisconsin	1.86	2.02	2.27
All ASSIST states			
Mean	2.45	2.66	2.97
SD	1.63	1.77	1.98
Coefficient of variation	0.66	0.67	0.67
Maximum/minimum			
Maximum (Rhode Island)	6.83	7.40	8.25
Minimum (New York)	0.90	0.98	1.09

table 10.2.) At the state level, per capita expenditures ranged from about $0.90 (New York) to $6.83 (Rhode Island).

Discounted Expenditure Data

The raw expenditure data were adjusted in the following ways: The first year of ASSIST expenditures is 1991, and the last year assessed in this analysis is 1998. (Although the project was funded through October 1, 1999, the prevalence data do not extend that far.) Though annual inflation rates were low during that time, over 8 years the consumer price index rose 22.3%; thus, it is necessary to adjust for inflation in the computations. Accordingly, total ASSIST expenditure, measured in inflation-adjusted constant 1999 dollars, was $134.7 million (table 10.1). Per capita inflation-adjusted expenditures (i.e., constant dollars measured in terms of 1999 prices and not

Table 10.3. Life-years Gained Attributable to ASSIST: Women

Age of quitting in 1999	Expected life-years gained	Expected life of smoker	Years to expected death	Discounted life-years gained (1999)	Total number of quits	Total life-years gained (population)	Discounted life-years gained (population)[a]
18.5	4.30	75.7	57.20	0.725	6,559	28,202	4,757
22	4.30	75.7	53.70	0.806	15,503	66,661	12,489
27	3.93	76.3	49.27	0.846	16,343	64,281	13,830
32	3.57	76.7	44.73	0.884	18,264	65,141	16,144
37	3.20	77.4	40.40	0.908	20,812	66,597	18,898
42	2.83	78.0	35.97	0.923	20,555	58,240	18,980
47	2.47	78.7	31.73	0.918	18,074	44,583	16,586
52	2.10	79.6	27.60	0.889	15,548	32,651	13,826
57	1.73	80.7	23.67	0.830	12,234	21,206	10,159
62	1.37	82.0	20.03	0.734	9,913	13,548	7,277
67	1.00	83.6	16.60	0.599	9,096	9,096	5,446
72	0.63	85.4	13.37	0.420	8,721	5,523	3,664
77	0.27	87.5	10.53	0.194	7,635	2,036	1,478
Total life-years gained						477,765	143,534

Note: The assumed recidivism rate is 0.50, and all quitters are assumed to be lifetime smokers.

[a]Discounted life-years gained (population) = Discounted life-years gained (per capita) × total number of quits.

Table 10.4. Cost-effectiveness with Various Recidivism Rates

Recidivism rate	Life-years gained	Discounted life-years gained	Dollars per discounted life-year gained
0.0	449,563	143,534	1,046.51
0.1	404,607	129,181	1,162.79
0.2	359,651	114,827	1,308.14
0.3	314,694	100,474	1,495.01
0.4	269,738	86,120	1,744.18
0.5	224,782	71,767	2,093.02
0.6	179,825	57,414	2,616.28
0.7	134,869	43,060	3,488.37
0.8	89,913	28,707	5,232.55
0.9	44,956	14,353	10,465.10

Notes: Discount rate = 0.03. Decrease in prevalence ratio, women = 0.0096. Fraction of permanent quitters who are lifetime smokers = 0.50. Total ASSIST expenditure = $150,209,722 (discounted constant value expenditures).

Table 10.5. Cost-effectiveness with Various Changes in Women's Prevalence Rates

Change in women's prevalence	Expected life-years gained	Discounted expected life-years gained	Dollars per life gained
0.002	46,829	14,951	10,046.49
0.004	93,659	29,903	5,023.25
0.006	140,488	44,854	3,348.83
0.008	187,318	59,806	2,511.62
0.010	234,147	74,757	2,009.30
0.012	280,977	89,709	1,674.42
0.0096	224,782	71,767	2,093.02
0.0014	32,781	10,466	14,352.14

Notes: Recidivism rate = 0.5%. Permanent quit rate = 0.5%. Change in male prevalence rate = 0.000.

Table 10.6. Fraction of Lifetime Smoker Quits Attributable to ASSIST

Fraction of quitters attributable to ASSIST	Life-years gained	Discounted expected life-years gained	Dollars per life-year gained	Dollars per permanent quit
0.1	44,956	14,353	10,465.10	7,900.16
0.2	89,913	28,707	5,232.55	3,950.08
0.3	134,869	43,060	3,488.37	2,633.39
0.4	179,825	57,414	2,616.28	1,975.04
0.5	224,782	71,767	2,093.02	1,580.03
0.6	269,738	86,120	1,744.18	1,316.69
0.7	314,694	100,474	1,495.01	1,128.59
0.8	359,651	114,827	1,308.00	987.52
0.9	404,607	129,181	1,162.79	877.80
1.0	449,563	143,534	1,046.51	790.02

discounted) for individuals 18 years old and older across all 8 years averaged $2.66 (table 10.2).

The second adjustment converts raw expenditures into present values for the year of the analysis. The effect of ASSIST in terms of reduced smoking prevalence was measured for 1999 compared with 1991, and ASSIST expenditures began in 1991. The 1991 dollar value is different from its 1999 value, just as an expenditure to be made in the distant future has a different value in any earlier year. These present values are determined by adjusting for the opportunity cost of foregone interest, that is, by computing the present discounted value. Let W represent the year

in which an expenditure was made. The expenditure made in year W is converted to its 1999 value as follows: One dollar spent in year W has a 1999 value of $(1 + r)$,[1999–W] so that Z dollars spent in W have a 1999 value of $Z(1 + r)$.[1999–W] For example, for W = 1991, 1999 minus 1991 equals 8 years, so that if r is 0.03 (i.e., a 3% rate of interest), then the value of that 1991 dollar is $1.27 in 1999. After adjusting for inflation and after expressing all expenditures in values for the year of analysis, the total amount spent by the ASSIST states, expressed as a 1999 discounted value, is $150.2 million. The per capita expenditure, expressed as a 1999 discounted value, is $2.97 per adult. Detailed values are given in tables 10.1 and 10.2.

Cost per Quit and Noninitiation of Smoking

An important effect of ASSIST is the decrease in smoking prevalence in the ASSIST states. As reported in chapter 9, the decrease in the prevalence rate attributable to ASSIST is 0.63 percentage points.[6] There are significant gender differences, however, in the effects of ASSIST: For men, the prevalence rate declined for the total sample by 0.09 percentage points; for women, the ASSIST-attributable decline was 0.96 percentage points. A complete discussion of the assumptions underlying these estimates is provided in chapter 9; sensitivity analysis is provided in tables 10.4, 10.5, and 10.6. These figures are used to determine the decrease in the number of smokers (those who quit and those who did not initiate smoking); the 1999 adult population (18 years old and older) of ASSIST

states is multiplied by the ASSIST-induced decrease in smoking prevalence:

$$\text{decrease in smokers} = \frac{(\text{population})(\text{decrease in prevalence})}{100} \quad (10.4)$$

or

$$\text{ASSIST-attributable decrease in smokers} = \text{population} \times 0.0063. \quad (10.5)$$

The total ASSIST-attributable decrease in smokers was about 478,860 for all 17 states combined. The total raw expenditure was $124,335,049. The total 1999 discounted value of the program, over all states and all years through 1998, was $150,209,722. The following ratio expresses the cost per quit:

$$\text{cost per quit} = \frac{\text{total discounted expenditure}}{\text{decrease in the number of smokers}} \quad (10.6)$$

With no inflation or present value adjustments, the cost per quit is $259.65; the 1999 present discounted value is $313.68.

These initial estimates reflect relatively optimistic assumptions about the efficacy of ASSIST. They assume that there is no recidivism (or relapses) and that all smoking cessation (quits) generated by ASSIST occur among individuals who, but for ASSIST, would have remained lifelong smokers. If we assume that instead fully half of the quitters take up smoking again within 3 years, and that half of those who quit permanently would have done so on their own within 3 years (these assumptions follow from Gilpin et al.),[7] even in the absence of ASSIST, the net permanent reduction in smokers due to ASSIST is closer to

119,735, which in turn raises the cost per quit to $1,255.

In summary, ASSIST, in the short run, reduced the number of adult smokers by about 478,860 in ASSIST states. Given that the 1999 discounted value of ASSIST is $150.2 million, the cost of this reduction per individual is $313. If the effects of ASSIST are assumed to persist, so that the total number of discounted quits increases over time and eventually approaches the discounted number of 877,730 in the ASSIST states, the cost per quit is as low as $171. Under more pessimistic assumptions about the long-run effect of ASSIST, the cost per quit is, of course, higher. Thus, the estimated cost per quit associated with

ASSIST lies in a range between about $150 and $1,500. However, as previously noted, the conservative best estimate of the cost per quit is $1,255. By comparison, the cost per quit associated with brief, unsolicited advice from a physician (a 5-minute talk about the dangers of smoking and simple strategies for quitting) during a regular consultation is $500 for individuals who abstain from smoking for at least 1 year.[8] The cost per quit of the Agency for Health Care Policy and Research guidelines on smoking cessation is $4,119.[9]

Interpreting Changes in Prevalence

For any age cohort, the smoking prevalence is the number of smokers in

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Examining ASSIST's Long-term Impact on Cost per Quit

To the extent that ASSIST activities resulted in permanent policy changes (youth access laws, clean indoor air acts, and higher excise taxes), an assumption may be warranted that the decrease in prevalence persists indefinitely into the future. Thus, the percentage of 18-year-olds who smoke is permanently reduced by 0.63%. An estimate of how such effects might alter the cost per quit was calculated as follows. The 1999 state population estimates for 18-year-olds were obtained for the 17 ASSIST states. It was assumed that 0.63% fewer of the individuals in this group would smoke. Thus, for the year 1999, approximately 8,496 fewer 18-year-olds smoked as a result of ASSIST. Assuming that the population of 18-year-olds would increase over time at the standard rate of 0.85% per year,[a] in each subsequent year there are $8,496 (1 + 0.0085)^t$ fewer 18-year-old smokers. Since these noninitiations/quits occur in the future, these future nonsmokers attributable to ASSIST are discounted at the rate of 3%.

Discounting these growing cohorts of future nonsmokers (attributable to ASSIST) at 3% implies a net discount rate of 2.13% (i.e., [1.03/1.0085] – 1). Accordingly, the total discounted number of fewer 18-year-old smokers is 398,871. Here the standard formula for a perpetuity, $8496/i$, is applied, where i is the net discount rate. When this figure is added to the short-run effect of ASSIST (478,860 fewer smokers in 1999), the cost per additional nonsmoker generated decreases to $171. If, on one hand, a smaller population growth rate is assumed, say an annual rate of 0.425%, the cost per quit is somewhat higher, $185. On the other hand, if we assume that in the long run only 25% of the short-run decrease in smokers persists, the cost per permanent quit rises to $290 if the population growth rate is 0.85% and to $333 if the population growth rate is only 0.425%. One way to interpret these last calculations is as a measure of the cost per quit if the effects of ASSIST decay over time. Further sensitivity analysis on the cost per quit is reported in the next section.

[a]U.S. Directorate of Intelligence. 1999. *CIA world fact book.* Washington, DC: U.S. Central Intelligence Agency. http://www.photius.com/wfb1999/rankings/population_growth_0.html

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that age cohort divided by the total number of people in that cohort; for example, adult smoking prevalence is calculated by dividing the number of adult smokers by the total number of adults in the population. The number of smokers can decrease in three ways: Individuals quit, move out of the state, or die. The number of smokers can increase in three ways: nonsmokers begin to smoke (initiation), ex-smokers begin to smoke again (reinitiation), or smokers move into the state. Leaving aside sampling and measurement differences, the prevalence can decrease if the number of nonsmokers increases while the number of smokers remains constant.

Between 1991 and 1998, smoking prevalence decreased from an average of 25.19% in ASSIST states to 22.17%. Statistical analyses (see chapter 9) indicate that about 0.63 of this 3.02 percentage point decrease, that is, about 21% of the decrease, can be attributed to ASSIST. Given the 1999 adult population of the ASSIST states, this decline means that about 478,860 people who would otherwise be smoking are not smoking because of ASSIST.

Most of the change in prevalence attributable to ASSIST is because of lower rates of initiation and smoking cessation. Most adult smokers began smoking when they were teenagers; more than 90% of adult smokers were smoking by the time they were 20. The average age of adult smokers in the ASSIST population was 41.48; the median age was 35.9. To calculate the most conservative

cost-effectiveness estimate, one would assume that the entire decrease in prevalence is attributable to smoking cessation. Thus, to the extent that ASSIST reduces smoking prevalence by discouraging initiation, the gain in expected life-years is biased downward by this assumption, because increases in life expectancy are larger if an individual never initiates smoking. However, the differences in lifetime mortality and morbidity for individuals who quit in their early twenties do not differ much from those of lifelong nonsmokers. The degree of bias introduced for very young adults by the assumption that all of the reduction in prevalence arises from quits is probably small.

Life-years Gained by Smoking Cessation

Smoking is related to a number of diseases: heart disease, stroke, lung cancer, other cancers, and various pulmonary diseases (chronic obstructive pulmonary disease, emphysema, and pneumonia). The 1990 report of the surgeon general, *The Health Benefits of Smoking Cessation*,[10] provides an overview of the health benefits of smoking cessation; this section relies extensively on that report.

Suppose a person has been smoking for years but then quits.* What happens to that person's mortality and morbidity risks compared with a person who never smokes in his or her lifetime (a *never-smoker*) and an individual who continues to smoke? Such risks decrease but do not revert completely to the level

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*It has become standard to measure effectiveness in terms of quality-adjusted life-years (QALY) gained. A limitation of this analysis is that it does not include measures of QALYs gained.

of a never-smoker. Risks do over time decline relative to an individual who continues to smoke. Whereas for some smoking-related diseases (heart attacks, congestive heart failure, and stroke) the risks decrease over time to that of a never-smoker, for other diseases (lung and other cancers) the risk decreases but stays above the level of a never-smoker. While the rate of decrease in lung capacity is halted, the damage to lung capacity is only slightly reversed with cessation. Decreases in lung capacity are linked to the incidence of various pulmonary diseases. Taken together, mortality and morbidity risks significantly decrease with cessation but never fall completely to the level of a person who has never smoked.

What is the gain in life expectancy? Only a few estimates are available. In the present analyses, the estimates were used from the Framingham study data that were used by D'Agostino and colleagues[11] based on the Framingham data as reported in the 1990 surgeon general's report (*The Health Benefits of Smoking Cessation*)[10] to compute the expected life-years gained by the decrease in prevalence attributable to ASSIST. A man who is a moderate smoker and who quits smoking between the ages of 35 and 39 gains 5.2 years of expected life. His life expectancy is 69, whereas the life expectancy of a never-smoker is 77. A long-term male smoker who ceases to smoke between the ages of 65 and 69 gains about 1.3 years in life expectancy. In the same Framingham study, women who quit between 35 and 39 years of age gained 3.2 years, and women who quit between 65 and 69 gained 1.0.[11] In general, the younger the smoker is when

he or she quits smoking, the greater is the gain in expected life-years. While the absolute number of expected life-years is greater if an individual quits while young, the percentage gain in expected life-years from the point in time of quitting is about the same for both younger and older individuals.

For men, the ASSIST-attributable change in prevalence percentage is 0.09 ($p = .042$); for women, the ASSIST-attributable drop is –0.96 ($p = .023$; see chapter 9 for details). Since the drop attributable to ASSIST is statistically significant only for women, expected life-years gained were computed solely for women. In particular, the estimates reported by D'Agostino and colleagues[11] were used in order to linearly extrapolate and interpolate expected life-years gained for different age categories for women. Assuming that a woman who quits smoking at age 37 gains 3.2 years and one who stops at age 67 gains 1.0, the linear extrapolation-interpolation equation has the following form:

$$\text{ex\textit{pected life years gained for female smokers when quitting at AGE}} = (2.2/30)(37 - AGE) + 3.2. \quad (10.7)$$

This approach predicts that a woman who never smokes lives on average 4.3 years longer than a woman who is a lifetime smoker. (For equation 10.7, *never smoked* is equivalent to setting *AGE* = 21.) These estimates are roughly consistent with the findings of Peto and colleagues.[12]

Life-years gained are, for the most part, in the distant future. The standard procedure is to discount future life-years gained to generate a value for the year of

analysis. For the ASSIST analysis, the assumption is that the 1999 death rates from smoking-related diseases persist into the future. However, such a projection is uncertain because there may be major breakthroughs in the prevention, early detection, and cures of some smoking-related diseases, which could lead to lower mortality and morbidity, or rates could increase if exacerbating circumstances occurred, such as increased air pollution. Because of such uncertainty, for the purposes of decision making about the allocation of resources, a life-year gained 40 years in the future is not treated as equivalent to a life-year in the year of the assessment.[*]

Discounting of future life-years gained is done in much the same way that a future monetary payment is discounted. The value of a life-year gained T years from the present (or a specified year) is $1/(1 + r)^T$. For example, if $r = 0.03$ and T equals 30, then a life-year gained 30 years from now has a discounted value of 0.41. For decision-making purposes, if there were two interventions, A and B, with the same cost, but A would yield benefits in the present whereas B would yield benefits 30 years from now, B would have to save at least 2.44 life-years for every single life gained by A in order to be more beneficial than A. Discounting reveals the tradeoffs between interventions in terms of time and benefits.

Life-years gained from smoking cessation differ significantly by gender; accordingly, gender differences in the effect of ASSIST have been analyzed. The estimated effect of ASSIST on the smoking prevalence of women is a statistically significant absolute decrease of 0.96 percentage points ($p = .023$). The estimated effect of ASSIST on male prevalence is a 0.09 increase in percentage prevalence and is not statistically significant ($p = .42$); the change in male prevalence attributable to ASSIST is assumed to be zero. These two estimates are used in calculating discounted life-years gained.

In contrast to gender, the effect of ASSIST does not seem to vary by age; that is, the effect of ASSIST is the same for all adult age cohorts, once gender is taken into account. Table 10.3 presents the calculations for life-years gained for women and by age of quit. The life-years gained by quits occur in the future and are discounted back (table 10.3, column 5) to the age of expected death in the absence of smoking cessation (table 10.3, column 4). Suppose, in the absence of cessation, a lifetime smoker can be expected to live T additional years. An individual who quits gains G expected life-years, so that his or her total expected life remaining is $T + G$. Hence, at the original expected time of death T, the discounted value of this gain of G years is

$$D = (1/r)[1 - e^{-rG}] = \int_0^G e^{-rt}dt. \qquad (10.8)$$

D is a value generated at time T in the future. To determine the value of discounted life-years (DLY), D in turn is discounted as follows:

$$DLY = D(e^{-rT}). \qquad (10.9)$$

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[*]A more fundamental reason for discounting future lives saved, of course, is the underlying positive rate of time preference.

Equation 10.9 yields the discounted number of life-years gained for the age of cessation. For example, a 37-year-old man who quits smoking will gain on average 5.1 years of life. If he had not quit smoking, his life expectancy would have been 71 years, but with cessation his life expectancy is 76.1 years; hence, $G = 5.1$ and $T = 34.0$. Using equation 10.9, the discounted life-years that are gained for the age of cessation are 1.705 years. There are important gender differences in life-years gained. A 37-year-old woman who quits gains only 0.908 discounted life-years: The gain in expected life-years is smaller for women, and because women live longer, the future gain is discounted more for women than for men—that is, T is larger for women.

The total for life-years gained by ASSIST is calculated by taking the discounted number of life-years gained for each individual for each age cohort and multiplying this figure by the total number of individuals in the age cohort who have quit (attributable to ASSIST). For example, the total number of women between 35 and 39 in the ASSIST states is 4.3 million. The estimated decrease in the smoking prevalence rate of women attributable to ASSIST is 0.96 percentage points. Hence, the total number of quits attributable to ASSIST for the 35- to 39-year-old age cohort of women is 0.0096 times 4.3 million: about 41,000. If only 50% of these quits are permanent, then the total number of permanent quits is about 21,000. Multiplying this 21,000 by 0.9 years yields the total number of discounted life-years gained for the 35- to 39-year-old age cohort of women: about 19,000. These calculations are performed

for each age cohort in the adult female population, and then the figures are summed to yield a total.

Applying this approach to the ASSIST population, assuming a 0.96 decrease in prevalence rate for women and assuming a permanent quit rate of 50%, the total gain in 1999 life-years is about 450,000. The total gain in discounted life-years is about 150,000. The average gain in discounted life-years for women is roughly 0.75.

ASSIST Cost per Life-year Gained

Cost per life-year gained depends on a variety of assumptions. The ASSIST analysis assumes that the long-run effect of ASSIST is a permanent decrease of about 95,068 smokers; this figure yields a total discounted number of life-years gained of about 71,767. In computing discounted life-years gained, the discount rate is assumed to be 3%, a standard assumption in cost-effectiveness estimates. (A smaller discount rate would yield a lower cost per life-year estimate.) Tables 10.4, 10.5, and 10.6 present the cost per life-year gained under a variety of different assumptions about the effectiveness of ASSIST and the reinitiation rate. One issue is the rate of relapse. Cromwell and colleagues assumed a short-run relapse rate of 45% and concluded from long-term follow-up data that over a 5-year period an additional 30% of quitters fail to abstain from tobacco use.[9] Gilpin and colleagues found similar estimates for recidivism.[7] Hence, a conservative approach is to assume that in the long run, only 50% of all ASSIST quitters are permanent quitters. Under this assumption, the cost per life-year is $790.

By assuming that each quit represents someone who otherwise would have been a lifetime smoker, the cost-effectiveness of ASSIST may be overstated. People who smoke differ in their propensity to quit; some are very close to quitting and will do so in the near future. A program such as ASSIST can hasten this decision. Others are likely to never quit, so that a program like ASSIST has no effect on their consumption of tobacco products. Although there is little guidance in the cessation literature about how individual differences in quitting might be incorporated into this analysis, such differences must be accounted for. Therefore, it is assumed that half of the permanent quits attributable to ASSIST represent individuals who would have quit anyway within the near future (assume 3 years). Under this assumption, the number of permanent quits that, in the long run, are attributable to ASSIST is 95,068. The corresponding number of discounted life years saved is 71,767, and the cost per life-year saved is $2,093. The cost per permanent quit is $1,580.03 if just the drop in female prevalence of 0.96 is used; the change in male prevalence attributed to ASSIST is zero. Costs per permanent quit are slightly lower, $1,255, if the overall population drop in prevalence attributable to ASSIST is 0.63.

Discussion

The actual cost-effectiveness of ASSIST may be lower than the best (and very conservative) estimate of $2.09 per life-year gained we have calculated. First, this estimate is based on the assumption that there is a one-time effect of ASSIST on smoking prevalence and that this effect does not persist beyond 1999. In fact, the programs, excise tax increases, and policies brought about by ASSIST are likely to have an enduring effect on lowering rates of smoking initiation by teenagers for a long time and will result in a continuing stream of individuals who would have become smokers but do not because of ASSIST. In addition, the programs, tax increases and policies instituted by ASSIST are likely to continue motivating and helping smokers to quit. Factoring in the life-years gained by dissuading people from smoking and from becoming smokers would further reduce the cost per life-year gained attributable to ASSIST.

The second reason for suspecting that both of the dollar estimates might be too high is that ASSIST helped establish tobacco control infrastructures in the states. Part of the ASSIST legacy is the experienced cadre of tobacco control practitioners who have been well trained in program design, advocacy, and media relations. Presumably these individuals will continue to train others, who will continue to conduct effective programs that in turn will lead to lower smoking prevalence, yielding additional life-years gained.

The estimates of cost per quit may be too low for at least two reasons. The first consideration is recidivism. To a large extent, decreases in prevalence are attributable to quits or prevented relapses. It is well documented that typically smokers do not permanently quit on the first try and that the overall recidivism rate is also quite high.[7] These factors were taken into account by assuming that

only a certain fraction of the estimated quits will be permanent. In the baseline calculation, a recidivism rate of 50% is assumed, along with the assumption that half of all quitters would be, but for ASSIST, lifetime smokers. Table 10.4 presents cost-effectiveness ratios for various assumptions about recidivism. If the recidivism rate were 70%, for example, the cost per discounted life-year gained would be $3,488. In the most optimistic calculations, in which all quits are permanent, the cost per quit becomes $395, and the cost per life-year gained becomes $451.

Another consideration is timing. In the period prior to ASSIST (between 1968 and 1990), roughly 2.5% of all smokers quit permanently each year. At least some of the ASSIST-attributable decrease in prevalence occurred because ASSIST may have induced smokers who would have quit smoking anyway to have quit sooner. Therefore, some of the quits may not be fully attributable to ASSIST. If they could be accounted for, those quits would increase the cost per quit estimate.

Unfortunately, data are not available for a systematic investigation of these considerations. Little is known about the quit distribution age: For example, for a smoking cohort of age 40, the percentage who will permanently quit at age 40 + t, $t = 1, 2, 3 \ldots$, and the fraction who will never quit is unknown. If these data were available, the next step would be to determine how ASSIST changed the shape of this distribution (i.e., induced people to quit earlier than they would have otherwise) and how ASSIST raised the cessation levels of smokers who

would otherwise never have quit. Some rather mechanical steps can take this consideration into account. For example, if half the individuals who quit because of ASSIST would have quit within the next 5 years anyway, then the cost per quit of the ASSIST intervention doubles. This assumption was made in the best estimates of cost-effectiveness. Table 10.6 presents calculations in which the net effect of ASSIST is varied.

Summary

The purpose of computing the cost per life-year gained is to enable comparisons of the cost-effectiveness of ASSIST with other public health interventions for tobacco use and other public health issues. (The standard reference for a compendium of cost-effectiveness calculations is a 1995 article by Tengs and colleagues.[2] See also the "league tables" provided by the Harvard Center for Risk Analysis.[13]) While some interventions are more cost-effective than ASSIST, many are less cost-effective, including mammograms, exercise electrocardiograms, and other widely promoted interventions. Mammograms cost $2,700 per life-year gained, and electrocardiograms for 40-year-old men cost $108,000 per life-year gained. Among smoking interventions, a brief personal warning from a physician is very cost-effective (not so much because of a large effect, but because this advice is very cheap, about $10 per patient) as is smoking cessation advice for pregnant women. Smoking cessation advice for pregnant women reduces the number of low birth weight babies. Low birth weight babies often have medical problems that are expensive to

treat, so cessation advice has a net negative cost, and the cost-effectiveness ratio is less than zero.

ASSIST was, however, more cost-effective than an intensive physician antismoking intervention in Maryland with a cost per life-year gained of $2,587. According to Cromwell and colleagues, nationwide implementation of the Agency for Health Care Policy and Research guidelines on smoking cessation has a cost per life-year gained of $2,820 (1999 discounted dollars).[9] At a cost per life-year gained of about $2,093, ASSIST appears to have been a relatively economical public health intervention.

Conclusions

1. The cost-effectiveness of ASSIST was analyzed relative to its cost per quit and cost per life-year gained. This analysis was based on population data from the Tobacco Use Supplement of the Current Population Survey and National Cancer Institute cost estimates for ASSIST, as well as quantitative assumptions regarding changes in smoking behavior over the term of the period studied.
2. The cost per quit of ASSIST interventions was estimated as $1,255 and cost per life-year gained was estimated as $2,093.02. These figures were based on best-estimate assumptions for factors such as the effectiveness of ASSIST interventions, long-term quit rates, and recidivism rates. Under the most optimistic assumptions, the cost per quit was been computed to be as low as $171, and cost per life-year gained as low as $395.

3. On a per capita basis, the overall cost of ASSIST interventions averaged $2.45 per person, with costs for individual states ranging from a low of $0.90 per person to a high of $6.83 per person.
4. From a cost standpoint, relative to improved health and lives saved, ASSIST compared favorably with other accepted public health interventions such as mammograms and electrocardiograms, as well as other less expensive tobacco control interventions such as physician counseling.

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11. The ASSIST Evaluation: Contributions to Evaluation of Complex Public Health Initiatives

Frances A. Stillman and Carol L. Schmitt

Contents

11. The ASSIST Evaluation: Contributions to Evaluation of Complex Public Health Initiatives

The evaluation of the American Stop Smoking Intervention Study (ASSIST) successfully documented public health outcomes attributable to ASSIST, an 8-year publicly funded partnership between the National Cancer Institute (NCI) and the American Cancer Society, implemented through cooperative agreements with 17 state health departments. Because ASSIST was designed to change tobacco use by changing the social and physical environments that promoted such use, ASSIST's efforts focused on building state capacity to deliver comprehensive tobacco use prevention and control, promoting public and private policy change, using well-designed media campaigns, and advocating for media coverage of tobacco control issues. The inherent complexity of this large-scale public health approach to tobacco use prevention and control raised significant challenges for the evaluation of the program. These challenges were met with the novel approach described in this monograph.

The ASSIST evaluation documented the association between "upstream" changes attributable to ASSIST and subsequent reductions in tobacco use prevalence and cigarette consumption. In the process, this evaluation broke new ground in several key areas:

- *It successfully documented the effectiveness of a large-scale demonstration project in a rigorous and statistically valid manner, even though the project interventions were uniquely adapted to each ASSIST state and were also widely adopted outside the bounds of the ASSIST states.*
- *The evaluation team developed a methodology that included empirically validated, aggregate measures of tobacco control inputs and intermediate policy outcomes, which were found to be related to two long-term outcomes: tobacco use prevalence rates and cigarette consumption rates.*
- *The evaluation represented an early systems-based approach to evaluation, including the construction of logic models, the use of a network of stakeholders for model validation, and the development of a prototype knowledge base in the specific area of newspaper coverage of tobacco issues.*
- *The evaluation validated the importance of upstream interventions in future tobacco control and other public health efforts.*

The ASSIST evaluation leaves an important legacy of methods and measures that will guide the field for years to come, and the evaluation itself serves as a roadmap for future assessments of population-level public health efforts.

Introduction

> Politics is essential for effective public health, and thus is the inescapable context of public health interventions. To disregard sociopolitical determinants of health is to relegate public health to prevention and promotion of individual risk behaviors.[1(p49)]
>
> —John B. McKinlay and Lisa D. Marceau, "Upstream Healthy Public Policy: Lessons from the Battle of Tobacco"

The ASSIST evaluation measured the success of a project that was based on a bold hypothesis—that interventions aimed at the individual alone would not result in substantive changes in tobacco use and health outcomes. Rather, ASSIST incorporated decades of tobacco control research that strongly suggested that the highest possible level of tobacco use prevention and control could be achieved through interventions that altered a social environment that supported tobacco use. The ASSIST project was an ambitious, publicly funded effort that used upstream tobacco control interventions—efforts that would yield changes in the social environment of tobacco use and subsequently affect smoking prevalence and cigarette consumption rates. Its evaluation was an equally ambitious endeavor that measured the impact of those interventions on the public health outcomes of tobacco use prevalence and cigarette consumption. This evaluation broke new ground in the assessment of complex public health initiatives while documenting the success of ASSIST.

Challenges to Evaluating ASSIST

The ASSIST evaluation was one of the first large-scale studies of upstream interventions for tobacco control, focusing on policy advocacy, media, and capacity building. ASSIST's goal was to change policies, regulations, and social norms so that nonsmoking became the norm. The program accomplished its goals by providing states with a modest level of funding to develop the unified network of national, state, and local organizations needed to deliver tobacco control (i.e., capacity), thus using the state's policy environment to change tobacco use. The ASSIST evaluation team faced challenges as a result of the nature of the intervention itself, thus precluding the original evaluation plan of comparing ASSIST states with non-ASSIST states. In addition, operational and practical challenges needed to be overcome: the evaluation effort did not begin until several years after the project was underway, the budget for the evaluation was limited, and significant effort was expended to assemble the final evaluation team. Therefore, the evaluation had to be focused and parsimonious. As a result, only those evaluation factors that were judged essential and that could be feasibly measured were included.

ASSIST was never envisioned as a randomized trial, and states were not randomly selected for the evaluation. Each state adapted the protocol to its unique political, social, and cultural context. ASSIST did not collect information

from the individual states on how each implemented its programs. Therefore, the evaluation team could not evaluate overall implementation of the interventions. In addition, data collected were available only from ASSIST states and were not available from non-ASSIST states. Finally, ASSIST targeted a much larger and more diverse population than any previous community-based tobacco control intervention, and no attempt was made to prevent ASSIST-like interventions from being adopted in non-ASSIST states. ASSIST states had a combined population of 91 million people, more than one-third the population of the United States, including more than 10 million African Americans and 7 million people of Hispanic and other racial/ethnic minority groups.[2] The combination of these features made it difficult to assess ASSIST with standard outcome[3] or process evaluation methods.[4]

Response to Evaluation Challenges

In response to these challenges, the central issue of the ASSIST evaluation (and a broader issue for the evaluation of upstream interventions in general) became how to measure and document the causal relationships among broad, population-based measures and public health outcomes. What had been originally envisioned as a simple evaluation of a demonstration project became a complex evaluation effort that engaged a diverse group of scientists and practitioners and involved extensive data sources.

The evaluation was guided by an a priori conceptual model that represented the sequential process of change hypothesized to occur in response to ASSIST.[5] This model was based on ecological theory (see sidebar, "ASSIST and Systems Methods in Tobacco Control") and included those factors identified as essential and measurable, while acknowledging that many important political, economic, and social factors could not be consistently or accurately measured across all states.

The ASSIST evaluation model included components that had never been used before, such as Strength of Tobacco Control (SoTC) and the Initial Outcomes Index (IOI). These measures had to be defined, measured, and quantified before they could be incorporated into the statistical models used in the evaluation. As the chapters in this monograph describe, the extant literature and the expertise of researchers and practitioners were used to define these components. In many cases, new measures and data-collection systems were created to collect this information at the state level. For example, the Tobacco Use Supplement for the Current Population Survey (TUS-CPS) was developed with the assistance of the United States Census Bureau to measure state factors (see chapter 5). Methods were devised to measure newspaper coverage of tobacco-related issues (see chapter 7), to measure legislative action (see chapter 3), and to measure the "dose" of tobacco use control and prevention at the state level (see chapter 2).

The ASSIST evaluation team had to meet an additional challenge before

ASSIST and Systems Methods in Tobacco Control

Ecological theories guided the design of many current public health programs during the 1990s,[a] and ecological theory was the basis for the ASSIST conceptual framework (see Monograph 16, chapter 11). However, before the ASSIST evaluation, there was little guidance for evaluating these programs.[b] The ASSIST evaluation was among the first to define the models, linkages, and appropriate measurement strategies for an ecologically based intervention by identifying constructs and relationships hypothesized to account for any reductions in smoking prevalence and cigarette consumption that might be attributable to a state tobacco control program.[c]

During the later stages of the ASSIST evaluation, the ecological perspective was widened to include a focus on systems methods applied to public health areas such as tobacco control. Within NCI, for example, the Initiative for the Study and Implementation of Systems (ISIS) is currently researching methodological areas such as systems modeling, network analysis, knowledge management, and large-scale organizational change within a context of complex, interrelated systems of behavior—exactly the kind of environment that is now seen within tobacco control, with multiple stakeholders, countervailing forces from the tobacco industry, complex models of behavior, and other factors.[d] This systems view of the world represents a potentially important way of understanding and managing the kinds of upstream public health interventions that could evolve in the future.

Although the ASSIST evaluation concluded at about the same time that efforts such as ISIS were beginning, ASSIST provided some of the first evidence that systems methods could feasibly be used to evaluate complex public health programs. The systems methods used in ASSIST were the following:

- Concept mapping—a participatory, multi-stakeholder approach to decision making within groups—was used as part of the validation of SoTC criteria and was used to identify potential measures of tobacco industry tactics. Concept mapping applies a mixed-methods analysis to produce visual maps of participant ideas and their relationships, to aid planning and evaluation activities within groups.[e]
- Tobacco control professionals and researchers were involved at the national, state, and local levels to participate in the validation of the SoTC measure.

these new components could be used in the evaluation. The fact that only 50 states and the District of Columbia could be included as "observations" created statistical limits on how many factors could be included in the analysis. For example, this meant that instead of being able to include all of the individual measures of intermediate outcomes, such as policy measures and state excise taxes, in the statistical models, one measure or number that represented all of these outcomes had to be created for each

state. The process that resulted in the IOI is documented in chapter 4, and the process that resulted in the SoTC score is documented in chapter 2. In addition, although many state-level factors could have affected the implementation and effects of a comprehensive tobacco control program, only a few could be included in the analysis. State-level factors considered for inclusion in the analysis and those selected for the analysis are discussed in chapter 5, along with the data sources for these factors.

- The development of SoTC involved the creation and validation of a logic model across multiple interrelated factors, a precursor to many of the systems dynamics methods used for simulation of complex behavior.
- A database of newspaper coverage of tobacco issues, described earlier in this volume as a demonstration project, parallels the development of knowledge bases for decision support within a systems environment.

All of these factors suggest that the future of public health lies in programs that can be implemented upstream and subsequently measured in complex environments—an approach with the potential to yield great advances in public health. This environment was the context within which the ASSIST evaluation was designed and implemented. In the words of McKinlay and Marceau, "The perspectives and methods developed during the infectious and chronic disease eras have limited utility in the face of newly emerging challenges to public health."[f(p25)] Efforts such as the ASSIST evaluation were designed to address this new reality.

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Key Findings of the ASSIST Evaluation

The ASSIST evaluation effort documented the following key findings that associated ASSIST intervention factors with public health outcomes:

- ASSIST states had a greater decrease in adult smoking prevalence than non-ASSIST states.

- States that experienced greater improvement in tobacco control policies had larger decreases in per capita cigarette consumption than states that had experienced less improvement in tobacco control policies.
- States with higher policy scores also had lower smoking prevalence and lower cigarette consumption.[*]

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[*]This finding was significant only when the District of Columbia was not included as a "state" in the analysis. Chapter 9 discusses the challenges associated with equating District-level tobacco control programs and outcomes with state-level ones.

- States with greater "capacity," or ability to implement tobacco control activities—such as states with highly functioning tobacco control infrastructures in the health department, staff experience in tobacco use control and prevention, and strong interagency and statewide relationships—had lower per capita cigarette consumption.
- The cost-effectiveness of ASSIST—the cost per life-year gained—compares favorably with other accepted preventive public health interventions.

Appendix 11.A summarizes several major findings of the ASSIST evaluation. It includes ASSIST versus non-ASSIST state means and standard errors for smoking prevalence rates and IOI scores at baseline and at the end of ASSIST (1999), along with SoTC scores for 1999. The appendix also includes the same information for each of the 50 states and the District of Columbia.

What Do These Results Mean?

The results from the ASSIST evaluation provide evidence that investment in state tobacco control programs that focus on strong tobacco control regulations and policies is an effective strategy for reducing tobacco use. The small but statistically significant differences in the reduction of adult smoking prevalence in ASSIST states, when applied on a population basis, could be expected to have a large impact on the public's health. If all 50 states and the District of Columbia had implemented ASSIST, there would

have been approximately 1,213,000 fewer smokers nationally.

States with stronger tobacco control policies also had larger decreases in per capita cigarette consumption. This suggests that policy-focused tobacco interventions can have a strong and sustained effect on the number of cigarettes smoked. More recent analyses support the effectiveness of policy interventions to decrease tobacco use. Smoke-free workplace policies have been associated with reduced daily cigarette consumption,[6–8] higher quit rates,[8–10] lower smoking prevalence rates,[6,7,9,10] and longer sustained cessation.[10] Although policy efforts take time, they can bring about major changes in social norms, including smoking behavior.

The ASSIST evaluation went beyond simply reporting aggregate serial trend data; it is the first such study to link these outcomes to tobacco control program components. This linkage was accomplished by systematically assessing states' capacities to implement tobacco control programs and determining how these capacities were related to smoking prevalence and cigarette consumption. The ASSIST evaluation was the first time that state capacity for tobacco control was measured and subsequently associated with decreased tobacco use. States with stronger infrastructures or capacities (ability to implement tobacco control activities) had lower per capita cigarette consumption, serving as evidence that when tobacco control programs are strong and well supported, a decrease in the amount of smoking can be achieved.

Measuring Capacity

The ASSIST evaluation was the first time that the components of the tobacco control infrastructure at the state level had been defined and its capacity (its ability to perform or produce) successfully measured and subsequently linked to outcomes within a conceptual model.[a] Including capacity in the evaluation model was essential because one of the major legacies of ASSIST was the creation of "an evolving infrastructure for implementing comprehensive tobacco prevention and control initiatives" (see Monograph 16, chapter 11, p. 480). This infrastructure provides the capacity to conduct modern tobacco use prevention and control efforts.

Both before and since the ASSIST evaluation, a large body of literature has accumulated regarding developing capacity for public health efforts.[b,c,d,e,f,g,h,i] However, at the time of the ASSIST evaluation, there were few published papers on measuring capacity, and those studies were mainly at the community level.[j] Since the ASSIST evaluation, the literature on measuring capacity has grown. Currently researchers have documented measures for capacity components including leadership,[k] coalitions,[l,m] and interagency relationships.[n,o,p] Evaluating changes in capacity will be especially important as tobacco use prevention and control programs face funding shortages, which in some states have resulted in the elimination of many program activities[q] and in measurable threats to capacity, including weakened interagency relationships.[r] Maintaining capacity for tobacco control—including a sufficient number of skilled staff and strong interagency relationships—has been identified as key to continuing gains in tobacco use prevention and control goals.[s]

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[n]Provan, K. G., and H. B. Milward. 2001. Do networks really work? A framework for evaluating public sector organizational networks. *Administration Review* 61:400–09.

[o]Provan, K. G., M A. Veazie, N. I. Teufel-Shone, and C. Huddleston. 2004. Network analysis as a tool for assessing and building community capacity for provision of chronic disease services. *Health Promotion Practice* 5 (2): 174–81.

[p]Krauss, M., N. Mueller, and D. Luke. 2004. Interorganizational relationships within state tobacco control networks: A social network analysis. *Preventing Chronic Disease* 1 (4): A08.

[q]Hamilton, W. L., C. N. Rodger, X. Chen, T. K. Njobe, R. Kling, and G. Norton. 2003. Independent evaluation of the Massachusetts Tobacco Control Program. Eighth Annual Report. January 1994-June 2001. http://www.mass.gov/dph/mtcp/reports/2002/abt8th.htm.

[r]Center for Tobacco Policy Research. 2004. Florida's challenge to maintain its tobacco control program: A rapid response report about Florida's tobacco control program. http://ctpr.slu.edu/documents/FLRRR.pdf.

[s]Center for Tobacco Policy Research. 2004. Turning the tide: North Carolina's tobacco prevention and control efforts. http://ctpr.slu.edu/documents/NCRRR.pdf.

A subsequent cost-effectiveness analysis (see chapter 10) confirmed that the ASSIST interventions were economically competitive with other population-level interventions as well as with intensive individual interventions.

The Legacy of the ASSIST Evaluation

ASSIST was a quasi- or natural experiment, not a randomized experiment and, as such, presented the evaluation challenges described earlier in this chapter: states were not randomly selected for the evaluation; implementation standardization was not a core feature of ASSIST; ASSIST targeted a much larger and more diverse population than any previous community-based intervention; and other tobacco control initiatives,

such as SmokeLess States and the Initiatives to Mobilize for the Prevention and Control of Tobacco Use (IMPACT), were fielded during the ASSIST period. In addition, the number of "observations" (states) to be evaluated placed statistical restrictions on how many factors could be included in the analyses.

ASSIST also epitomized Rogers's "diffusion of innovation." "Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system."[11(p115)] Diffusion studies describe trends of successive or sequential adoption of programs or policies. ASSIST practices were diffused formally and informally into all 50 states and the District of Columbia. The ASSIST coordinating center held 17 national training workshops—information exchanges and conferences where strategy, technology,

resources, and technical assistance were shared. Although some of these events were limited only to ASSIST states, non-ASSIST states were included in others, including the first national tobacco control conference meeting in 1997. In this way diffusion occurred both between ASSIST states and consequently into non-ASSIST states.

Stillman et al.[12] provide an early indication that these new and effective techniques diffused into non-ASSIST states, resulting in changes subsequently associated with decreases in tobacco use. ASSIST states had greater increases in IOI scores, a measure of tobacco control policy implementation, than non-ASSIST states only in the first years of the program, 1993 through 1994. Thereafter, IOI scores increased for both groups of states at a similar rate (see chapter 9, figure 9.3).

The ASSIST evaluation legacy includes the successful development of several new measures, including the TUS-CPS, and methods and measures to track legislative change (see chapter 3), state tobacco dependence on tobacco growing and manufacturing (see chapter 6), and exposure to tobacco control programs (SoTC, chapter 2). The legacy also includes substantial progress on other measures. These include methods and measures to track changes in media coverage of tobacco control topics (chapter 7) and tobacco industry actions that counter public health programs (chapter 8).

A number of the components created for the ASSIST evaluation have been institutionalized at the national level. NCI

also continues to sponsor the TUS-CPS, a key source of national- and state-level data on smoking and other tobacco use.[13] NCI also continues to support the update of two legislative indices developed under the ASSIST evaluation—the extensiveness of state tobacco control laws related to youth access to tobacco and clean indoor air.[14] The SmokeLess States initiative adopted the ASSIST evaluation conceptual framework, including the media coverage of tobacco control issues, policy scores, and the Strength of Tobacco Control. The Robert Wood Johnson Foundation (RWJF) will continue to support administration of the SoTC survey in 2006 and 2008.

In addition to new data collection methods and systems, the ASSIST evaluation informed and influenced changes in how states evaluate their tobacco control programs. These changes include a move toward evaluating programs in context,[15,16] linking state and local data,[17] and accounting for factors such as the state political environment[18] and tobacco industry activities.[19–25]

Likewise, the sequential process of change depicted in the ASSIST evaluation conceptual model endures as the basis for current tobacco use prevention and control programs. This process and its components and measures are represented in the evidence-based logic models of the three goal areas for the Office on Smoking and Health at the Centers for Disease Control and Prevention[26,27] and are the basis for the current SmokeLess States evaluation.[28] Research has continued to support the causal relationships between components of the conceptual model. This research includes

analyses of media coverage[29–35] and policy outcomes.[36,37]

Research on tobacco industry efforts to counter public health initiatives has grown since the ASSIST evaluation, and initiatives such as the digital tobacco industry library at the University of California San Francisco[38] have made searching and obtaining these documents significantly more reliable and productive. Although an analysis of Tobacco Institute budgets was funded by NCI for the ASSIST evaluation,[39] these budgets were not comprehensive and could not be used to consistently measure these efforts across all states. In addition, the budgets were available only until 1997. Despite these significant advances in document accessibility, the successful documentation of tobacco industry efforts to thwart ASSIST[40] (see Monograph 16, chapter 8), and the progress made toward a measure of protobacco efforts (see chapter 8, this monograph), publicly available data (at both the federal and state level) for such a score remain difficult to standardize at the state level. Developing this score remains a challenge for future research.

The ASSIST evaluation legacy includes the tools to measure the milestones and upstream markers of success that allow researchers and practitioners to document the presence, outcomes, and benefits of tobacco control initiatives. Building on the ASSIST evaluation legacy and addressing the remaining challenges in tobacco control will require a long-term commitment. The following section describes some potential approaches to ensure that this commitment is met.

The Future of Tobacco Control

The ASSIST evaluation provided evidence that the "blueprint" for tobacco control detailed in NCI Smoking and Tobacco Control Monograph 1[41] and implemented for ASSIST was feasible and effective and that the sequential processes of change described were valid. Much still needs to be changed—policies that do not protect people from secondhand smoke; low taxes on tobacco products that keep them affordable; barriers to effective cessation aids that help smokers quit; and tobacco product advertising that promotes these products as attractive and normative, and minimizes their risk. Despite continued progress toward these changes, in early 2005 adult smoking prevalence was 20.9%, and reaching the U.S. Surgeon General's *Healthy People 2010*[42] goal of reducing adult smoking prevalence in the United States to 12% by 2010 appears unlikely.[43,44]

Renewed progress toward these goals requires a better understanding of the magnitude of interventions, the relative contributions of their program components, and their impact on at-risk populations.[45] This better understanding will come from new surveillance and methodological strategies that can delineate the biological, behavioral, and social influences underlying tobacco use, with emphasis on groups that exhibit health-related disparities. These new surveillance measures should include the environmental factors that lead to tobacco experimentation and subsequent addiction, and expanded data on attitudes and beliefs about "smoke-free" accommodations and workplaces. As

tobacco control initiatives increasingly move to the state and local levels, we need to expand capabilities to monitor the dissemination, quality, and outcomes of those efforts. The TUS-CPS tobacco use questionnaire should be modified to incorporate new measures of tobacco-use behaviors, and new supplements should be commissioned to cover new and emerging areas of importance.

Data are currently being collected by multiple entities: individual states collect data,[15,17,46–50] research groups such as the Center for Tobacco Policy Research[51] and ImpacTeen[52] collect data, and the federal government collects data. These data are used for individual state evaluations, evaluations of initiatives (e.g., SmokeLess States), and monitoring of individual factors (e.g., prevalence). However, national leadership is needed to engage stakeholders and build a comprehensive surveillance plan at the federal level. A comprehensive tobacco control surveillance network could begin

to integrate available data, help create a more comprehensive data system that could track state tobacco control program development, help in the observation of patterns, and provide the essential data needed to test effectiveness at the societal level. These data could be used to assess all of the different tobacco control programs in the United States and would be useful for ranking states and reporting on their progress.

In addition, new public access databases need to be established to make these critically important state-level factors available to federal and other researchers. These data would greatly expand the current capacity of states to evaluate their own tobacco control programs. Such data would also help researchers develop more comprehensive models to document the relationships between the factors that promote or impede tobacco use, and ultimately establish an association between these factors and reduction in the tobacco-related cancer burden.

Key Questions for Tobacco Control

Tobacco control efforts must continue to address different types of questions, and to do so will require different but overlapping data as well as different methods. For example, program administrators at the state, local, and national levels want to know the optimal mix of interventions and funding levels to reduce the burden of tobacco use. This is extremely important because funding for tobacco control is currently decreasing and program administrators must make important decisions concerning the health of their populations. The key issues are how effective interventions are in terms of magnitude of change, relative contribution of program components, and relative impact for different target populations:

- Do specific components matter in the real context?
- How do we translate clinical trial results into other, less controlled, settings?
- What should a practitioner do in his or her state?
- Has the program been implemented effectively?
- Does the cost effectiveness of this program compare favorably with other interventions?
- Are trends moving in the anticipated directions?

It is also important to understand the research resources needed to provide support to answer these important questions.

Finally, sufficient funding for tobacco use prevention and control is necessary for continued progress in reducing tobacco use. Recent reductions in funding represent one of the greatest threats to the capacity that ASSIST built. Only four states (Colorado, Delaware, Maine, and Mississippi) funded their programs in fiscal year 2005 at even the minimal levels recommended by the Centers for Disease Control and Prevention. Preliminary evidence suggests that as a result fewer mass media campaigns have been fielded and that decreases in youth smoking have stalled.[53]

Using the ASSIST Evaluation Approach for Other Public Health Initiatives

In 1991, the ASSIST focus on changing the social environment of smoking to address what is an individual behavior—smoking—was a revolutionary concept.[54] Today, this approach is being applied to our nation's most pressing health risk behaviors. For example, environmental factors that promote cardiovascular disease have been identified, as have potential environmental interventions to modify them.[55–57] However, cardiovascular disease and obesity share behavioral determinants with environmental influences—physical activity and food intake—and the majority of the research in these areas has focused on obesity. While some research on obesity addresses genetic and individual influences, much of the current research focuses on the interactive environmental determinants of food intake and physical

activity.[58–81] The comprehensive tobacco use prevention and control model has been identified as an appropriate guide to obesity prevention,[82] and tobacco control researchers will recognize many current themes in the obesity research; policy change can be used to address both environmental determinants of overeating and underexercising,[69,75,81,83] comprehensive models need to be articulated so that interventions can be implemented,[84] and states need capacity to deliver these interventions and monitor their effects.[83]

The ASSIST evaluation strategy is extremely relevant to the analysis of these so-called "new public health" programs. These large-scale, nonrandomized studies are better assessed by a real-world perspective that moves beyond the study of risk factors and interventions directed solely at changing the behavior of individuals. Evaluations of large-scale studies historically focus on analytical techniques at the expense of study design. For example, community intervention trials in cardiovascular disease and evaluations of state interventions suggest that similar to tobacco use control and prevention interventions, realistic effects are modest changes, over a long time frame, that are difficult to distinguish from secular trends. These programs would also benefit from continuous data collection that includes upstream factors such as infrastructure, policies, and program components.

If public health interventions continue to address complex social phenomena, they will, like ASSIST, require more sophisticated evaluation designs: A traditional before-and-after comparison group design with the intervention represented

by a single variable is inadequate in this context and would surely mask important effects. Studies of social phenomena must go beyond the "black box approach," in which the focus is only on the outcome and the inner processes are hidden. Most studies relate exposures to outcomes without actually describing the process used to achieve their stated goals.

This need mirrors a growing systems view of the world, where outcomes cannot just be described by cause-and-effect observation from simple logic models. As our ability to model increasingly complex phenomena grows, we are finding that the interrelationship and feedback between factors have an increasing role in outcomes—from general cases of how behavior leads to unintended outcomes, to specifics such as how the countervailing efforts of the tobacco industry affect interventions like the ASSIST project. This trend points to the need for evolving, dynamic models of behavior as well as an evaluation methodology that links these dynamic factors to measurable outcomes.

Tobacco use, like many of our current public health challenges, is a complex societal problem that involves individual behavioral factors, economic factors, political factors, and sociocultural factors, as well as vested interests of U.S. and transnational corporations. Successful public health interventions must continue to focus on development of appropriate public health policies, as well as educating governments to take appropriate steps to protect their populations. This is clearly stated by McKinlay and Marceau[85(p29)] in their article "To Boldly Go…": "The success of public health in

the 21st century, especially interventions at the level of social policy, will depend in large part on the role of the state."

Summary

The ASSIST evaluation effort broke new ground on several fronts. It provided (1) a rigorous, validated assessment of a large-scale, upstream tobacco control initiative with interventions that led to successful outcomes in tobacco consumption; and (2) evidence that specific factors affect tobacco prevalence. It serves as a model that can be used to guide future evaluation efforts in evidence-based public health, which by nature does not always lend itself to the randomized controlled trial model used in other areas, such as medicine.

Perhaps most important, this evaluation helped establish the broader legitimacy of upstream public health interventions, using tobacco control as a proof of concept. Tobacco use remains the country's leading cause of preventable death, despite substantial reductions in individual use of tobacco in the decades since the release of the first Surgeon General's Report on smoking and health in 1964. In the eyes of many public health professionals, our best hope for significant further reductions in the disease burden of tobacco is encompassed in the quote from McKinlay and Marceau[1] that begins this chapter and points us beyond the traditional public health focus on individual behavior, toward upstream measures that take place at a societal level. The ASSIST project and its subsequent evaluation served as important milestones in validating the

hypothesis that the key to a smoke-free society is an environment where smoking is viewed as non-normative.

Upstream measures are seen as a fairly recent trend in tobacco control (the early discussions leading to the ASSIST project took place in the late 1980s), yet in many ways these efforts also connect with the original activism of early public health efforts to confront death and disease. From the yellow fever epidemic of the early nineteenth century, which was managed in part by policy measures ranging from ship inspections to citywide quarantines,[86] to John Snow's intervention against contaminated water sources in nineteenth-century London,[1] to social activist Jacob Riis's call in the early twentieth century to pass laws affecting New York City tenement life,[87] there is a direct link to modern-day, upstream interventions such as clean-air laws and restrictions on tobacco advertising. Moreover, most of these efforts were opposed by the same kinds of powerful social forces discussed in the preceding section. This means, in a very real sense, that history is teaching us once again that a move toward upstream public health efforts requires a new approach to implementation and evaluation, from a purely scientific examination of causes and effects, to a living, breathing process that evolves as a system.

Both ASSIST and its evaluation represent a growing trend within public health to move beyond its historical base of disease control and prevention into advocacy for policy and infrastructure changes that could drive more permanent and far-reaching changes in health outcomes. Moreover, these projects represent a milestone within the broader area of evidence-based public health by not only funding promising interventions but also developing unique measures that correlate a composite dose level of intervention strength with outcomes in prevalence and consumption. In using a participatory, expert-based approach to develop and validate indirect criteria that were ultimately correlated to outcomes, the ASSIST evaluation effort made an important contribution to the measurement of tobacco control efforts and to the advancement of tobacco control as a discipline.

Looking to the future, the ASSIST evaluation represents a starting point for further research into the refinement and evolution of its own criteria, based on factors such as the interplay between tobacco control constructs (resources, capacity, and efforts) and countervailing forces such as the efforts of the tobacco industry. As such, it represents an important step toward a growing systems view of the world, which takes a more ecological approach to the dynamics of how public behavior and public health are changed. This, in turn, holds the promise that future public health efforts will result in a better quality of life for all people.

Conclusions

1. ASSIST was an ambitious, 8-year project designed to reduce tobacco use prevalence and consumption at the state level by changing the social, political, and media environment surrounding tobacco use. Its evaluation

required the assessment of a complex network of interventions, many of which became widely adopted in other states over the course of the project.

2. Originally designed as a state-by-state comparison of a demonstration project, the ASSIST evaluation methodology evolved to assess a broad range of upstream, population-level tobacco control practices and their outcomes. This effort eventually produced metrics such as the Strength of Tobacco Control index for state-level tobacco control effectiveness and the Initial Outcomes Index for preliminary outcomes in policy and legislative issues, as well as promising efforts in areas such as tracking media coverage.

3. The ASSIST evaluation serves as a promising model for other complex, population-level public health initiatives that do not fit other evaluation models such as randomized controlled trials.

4. The ASSIST evaluation established the effectiveness of the ASSIST interventions, including lower adult smoking prevalence in ASSIST states, greater decreases in per capita cigarette consumption in states with stronger tobacco control, and significant correlations between specific evaluation components and reductions in tobacco use.

5. Future directions in upstream tobacco control include improved data sources and evaluation metrics, stronger assessment of tobacco industry counterefforts, and a growing need to address tobacco control efforts from a systems perspective.

Appendix 11.A. Crude Prevalence, Initial Outcomes Index (IOI), and Strength of Tobacco Control Index (SoTC), by State

States	Prevalence (%)						IOI (%)						SoTC (%)	
	Baseline	SE	Final	SE	Final–baseline	SE	Baseline	SE	Final	SE	Final–baseline	SE	Only at final	SE
ASSIST														
Colorado	24.16	0.96	20.20	0.74	-3.96		-0.90		2.75		3.65		-0.40	
Indiana	27.81	1.34	27.03	1.19	-0.78		-3.14		1.42		4.56		-1.08	
Maine	28.52	1.08	23.51	1.29	-5.01		1.87		6.96		5.09		-1.25	
Massachusetts	21.40	0.64	19.34	0.81	-2.06		1.66		8.63		6.97		0.46	
Michigan	27.20	0.59	23.36	0.69	-3.84		0.76		6.64		5.88		0.90	
Minnesota	25.11	1.31	21.19	0.94	-3.92		3.83		5.96		2.13		1.74	
Missouri	26.24	1.47	23.49	1.10	-2.75		-1.01		3.38		4.39		-0.79	
New Jersey	20.38	0.51	19.84	0.75	-0.54		1.92		7.93		6.01		1.12	
New Mexico	23.99	1.00	20.93	0.94	-3.06		0.17		2.70		2.52		-0.53	
New York	21.52	0.42	20.54	0.47	-0.98		2.18		8.03		5.85		0.69	
North Carolina	26.93	0.71	22.98	0.68	-3.95		-4.26		0.41		4.67		-0.15	
Rhode Island	23.20	0.63	19.87	0.97	-3.33		1.61		6.88		5.28		1.09	
South Carolina	25.71	1.00	22.73	1.20	-2.98		-1.91		0.47		2.38		-0.48	
Virginia	25.47	1.17	20.77	0.69	-4.70		-2.37		1.44		3.81		0.07	
Washington	24.14	0.97	20.13	0.92	-4.01		4.40		8.45		4.05		0.23	
West Virginia	30.25	1.33	26.38	1.37	-3.87		-2.48		1.77		4.24		-0.53	
Wisconsin	26.15	1.34	24.54	1.19	-1.61		1.20		5.74		4.54		-0.04	
Overall average	25.19	0.64	22.17	0.57	-3.02	0.33	0.21	0.60	4.68	0.73	4.47	0.32	0.06	0.20
Non–ASSIST														
Alabama	25.74	0.74	22.29	1.13	-3.45		-2.62		0.89		3.51		-0.18	
Alaska	27.61	1.40	26.69	1.69	-0.92		4.57		10.55		5.99		0.30	
Arizona	22.37	0.87	19.86	0.78	-2.51		1.06		5.25		4.20		4.04	
Arkansas	28.73	1.19	25.99	1.19	-2.74		-2.20		1.99		4.19		0.08	
California	18.94	0.34	16.59	0.43	-2.35		4.25		6.74		2.48		3.73	
Connecticut	22.31	0.83	20.56	1.37	-1.75		0.44		4.22		3.78		0.37	

States	Prevalence (%)						IOI (%)						SoTC (%)	
	Baseline	SE	Final	SE	Final–baseline	SE	Baseline	SE	Final	SE	Final–baseline	SE	Only at final	SE
Delaware	23.30	1.38	23.34	1.06	0.04		-1.31		2.07		3.38		-1.07	
District of Columbia	23.23	0.85	23.54	1.14	0.31		3.10		6.85		3.76		-0.87	
Florida	23.89	0.57	20.66	0.51	-3.23		1.23		3.53		2.30		1.70	
Georgia	24.32	1.18	19.89	0.77	-4.43		-1.87		1.73		3.61		0.34	
Hawaii	22.18	1.18	18.34	1.03	-3.84		3.10		9.04		5.93		0.96	
Idaho	23.61	1.10	21.84	1.52	-1.77		1.02		3.78		2.76		0.13	
Illinois	24.47	0.56	22.92	0.49	-1.55		-1.13		4.61		5.75		-0.71	
Iowa	23.50	0.93	22.37	0.98	-1.13		-1.24		2.17		3.42		0.41	
Kansas	24.22	1.26	22.45	1.07	-1.77		0.93		4.90		3.95		0.47	
Kentucky	31.98	1.07	29.81	1.22	-2.17		-4.81		-1.09		3.72		-0.19	
Louisiana	25.37	1.32	22.74	1.10	-2.63		-1.99		2.64		4.63		-2.30	
Maryland	23.59	1.08	19.46	1.09	-4.13		0.65		8.24		7.59		0.97	
Mississippi	25.46	0.96	21.53	1.23	-3.93		-2.37		0.76		3.13		1.28	
Montana	23.53	1.12	23.29	0.99	-0.24		-0.40		2.88		3.28		-1.60	
Nebraska	21.97	0.99	21.18	0.91	-0.79		-0.33		3.61		3.94		-0.31	
Nevada	28.37	1.03	24.06	1.12	-4.31		-1.12		1.27		2.39		-1.42	
New Hampshire	24.69	1.21	22.04	1.08	-2.65		1.39		5.42		4.03		-0.45	
North Dakota	22.18	1.53	20.47	1.21	-1.71		1.10		5.04		3.94		-0.93	
Ohio	25.96	0.48	24.01	0.77	-1.95		-1.96		2.40		4.36		-1.05	
Oklahoma	26.74	1.34	27.52	0.70	0.78		-2.13		1.46		3.58		0.84	
Oregon	22.93	0.95	21.16	0.96	-1.77		1.68		4.96		3.28		0.90	
Pennsylvania	23.34	0.54	22.88	0.50	-0.46		-1.87		1.79		3.66		-0.68	
South Dakota	25.51	1.12	24.08	1.24	-1.43		-1.40		0.75		2.14		-1.20	
Tennessee	28.53	1.13	25.99	0.98	-2.54		-3.08		0.58		3.66		-1.28	
Texas	23.45	0.60	20.89	0.52	-2.56		1.54		3.75		2.22		-0.61	
Utah	16.90	0.95	13.73	1.11	-3.17		3.68		7.77		4.09		-0.29	
Vermont	26.26	1.45	22.34	0.97	-3.92		1.09		6.37		5.28		-1.50	
Wyoming	24.82	1.02	23.70	1.08	-1.12		-2.51		0.33		2.84		-0.92	
Overall average	24.41	0.48	22.30	0.52	-2.11	0.33	-0.10	0.39	3.74	0.47	3.85	0.20	-0.03	0.23

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