Measurement Issues in Social Determinants

Measuring Contextual Characteristics for Community Health

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Objective. To conceptualize and measure community contextual influences on population health and health disparities.
Data Sources. We use traditional and nontraditional secondary sources of data comprising a comprehensive array of community characteristics.
Study Design. Using a consultative process, we identify 12 overarching dimensions of contextual characteristics that may affect community health, as well as specific subcomponents relating to each dimension.
Data Collection. An extensive geocoded library of data indicators relating to each dimension and subcomponent for metropolitan areas in the United States is assembled.
Principal Findings. We describe the development of community contextual health profiles, present the rationale supporting each of the profile dimensions, and provide examples of relevant data sources.
Conclusions. Our conceptual framework for community contextual characteristics, including a specified set of dimensions and components, can provide practical ways to monitor health-related aspects of the economic, social, and physical environments in which people live. We suggest several guiding principles useful for understanding how aspects of contextual characteristics can affect health and health disparities.

Key Words. Health disparity, residence characteristics, contextual data, population health, socioeconomic factors

Much has been accomplished to improve health and reduce disparities through understanding and intervening on individual-level risk factors for major causes of morbidity and mortality (U.S. Preventive Services Task Force 1996; Ketola, Sipila, and Makela 2000). However, far less attention has been paid to understanding the effect of community contextual characteristics on health outcomes and disparities. Although research interest in the role of socioenvironmental factors in the etiology of disease has surged over the past decade (for reviews see Pickett and Pearl 2001; Macintyre, Ellaway, and Cummins 2002; Yen and Syme 1999), a recurrent theme in this literature is the need for greater attention to the conceptualization and empirical assessment of

ways in which contextual characteristics of places impact health (Pickett and Pearl 2001; Macintyre, Ellaway, and Cummins 2002; Kaplan and Lynch 1997, 2001; Yen and Syme 1999; Diez-Roux 1998). In addition, there has been great academic and policy interest in implementing interventions aimed at improving socioenvironmental factors that could produce wide-ranging health benefits (for example see articles in the April 2003 supplement to the *American Journal of Preventive Medicine* on this topic). Many in public health believe these represent a promising approach to reducing the marked health disparities that remain a high-priority public health concern (U.S. Department of Health and Human Services 2000). Furthermore, this approach provides critical data to ensure that decisions regarding the provision of health care services do not occur in a vacuum, but instead are integrated into the larger picture of health-promoting and health-endangering characteristics of communities.

Just as risk factor profiles have been developed based upon our knowledge of how individual-level determinants affect health outcomes—it may also be important to develop profiles using information about the contextual characteristics of communities. In collaboration with the Centers for Disease Control and Prevention, we have undertaken a project to address the conceptualization and assessment of community contextual characteristics that are believed to impact population health and disparities in population health. Our goals include (1) providing a conceptualization of which contextual characteristics could plausibly affect patterns of population health; and (2) developing an extensive data library of geocoded datasets containing data to measure community contextual characteristics.

The main purpose of this article is to share ideas about how to conceptualize the contextual characteristics of communities that may affect health, and to present this work as a resource for public health research and advocacy. We describe the consultative process we followed to identify 12

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overarching dimensions of a community contextual health profile with specific subcomponents and indicators within each dimension. We then present the rationale supporting each dimension and provide examples of the data sources assembled in our data library. We conclude with a discussion of three important research approaches for addressing the impact of community contextual characteristics on population health and health disparities.

Background on Contextual Characteristics and Health

In recent years, there has been growing research interest in examining associations between characteristics of places and a wide range of health outcomes including all-cause mortality (Lynch et al. 1998; Waitzman and Smith 1998a, 1998b; Bosma et al. 2001; Ross et al. 2000), cardiovascular disease and mortality (Diez-Roux et al. 2001; Casper et al. 1999; Armstrong et al. 1998; LeClere et al. 1998), tuberculosis (Barr et al. 2001; Acevedo-Garcia 2001), injury (Cubbin, LeClere, and Smith 2000; Reading et al. 1999), suicide (Kaplan and Geling 1999; Whitley et al. 1999), AIDS (Zierler et al. 2000), self-rated health (Subramanian, Kawachi, and Kennedy 2001; Malmstrom, Sundquist, and Johansson 1999), mental illness (Ross 2000; Aneshensel and Sucoff 1996), and adverse birth outcomes (Gorman 1999; Matteson, Burr, and Marshall 1998; Collins and David 1997). There has also been increasing awareness that health risks traditionally seen as arising from individual lifestyle choices are strongly influenced by the characteristics of the environments in which individuals grow and live out their daily lives (Lynch and Kaplan 2000; Lynch, Kaplan, and Salonen 1997; Macintyre, Ellaway, and Cummins 2002). For example, unhealthy dietary patterns and obesity (Diez-Roux et al. 1999; Ellaway, Anderson, and Macintyre 1997), smoking (Duncan, Jones, and Moon 1999; Kleinschmidt, Hills, and Elliot 1995), reduced physical activity levels (Yen and Kaplan 1998; Ellaway and Macintyre 1996), and greater alcohol consumption (Diehr et al. 1993; Hart, Ecob, and Smith 1997) have each been shown to be related to aspects of the communities in which people live, over and above the characteristics of the individuals living there.

Although there are now a large number of empirical studies documenting relationships between particular aspects of residential areas and selected health outcomes, critics have noted a relative paucity of attention to conceptualizing and testing the particular pathways underlying the observed associations (Pickett and Pearl 2001; Macintyre, Ellaway, and Cummins 2002;

Diez-Roux 1998; Yen and Syme 1999). In the absence of conceptual frameworks, selection of contextual variables for study has been somewhat ad hoc and constrained within the range of those commonly used or readily available through routinely collected data (Mitchell et al. 2000). To some extent contextual effects research on health remains mired in a "poverty paradigm" (Rowley et al. 1993), focusing mostly on the association between census-based indicators of community socioeconomic position and individual health outcomes, with a heavy emphasis on the deleterious effects of concentrated poverty and other forms of disadvantage. The main thrust of such studies has been to show that poorer places are associated with worse health outcomes, above and beyond the characteristics of the individuals who live there (Robert 1999). This emphasis on disadvantage, to the exclusion of other facets of contextual environments, is partly the result of a lack of appropriate data, but it also reflects a paucity of alternative models to inform questions about how community contextual characteristics may plausibly affect specific types of health outcomes.

For instance, studies have found smoking to be significantly associated with neighborhood deprivation level after accounting for individual characteristics (Duncan, Jones, and Moon 1999; Kleinschmidt, Hills, and Elliot 1995). The area-level variables generally included in these analyses, however, consist largely of census-based indicators of economic status such as mean household income, unemployment rate, proportion of the population living in overcrowded housing, proportion without access to a car, and proportion of household heads with lower social class occupations, considered either separately or in an aggregate index. While living in deprived communities is found to be associated with higher smoking levels in the analyses, it may be instructive to examine a wider set of characteristics of poor areas that are theoretically relevant to smoking rates, including the cost and availability of cigarettes, targeted advertising, the quality and quantity of preventive and smoking cessation services available, and smoking policies in schools and other public areas.

In the sections that follow we describe the process of developing a set of community characteristics that can affect health and we provide details of the specific factors within each dimension.

Expert Consultation Process

Drawing upon relevant theoretical and empirical literature on community contextual characteristics and their relationship to health status, a preliminary

set of contextual dimensions was developed. This framework served as a basis for a structured workshop for invited consultants, which included prominent investigators from the United States and around the world engaged in cutting-edge research on community contextual characteristics and their relation to health, in a wide range of disciplines including epidemiology, sociology, geography, medicine, demography, economics, developmental psychology, education, and toxicology. Others with interests and expertise in the conceptual design and practical implementation of the indices were also invited, including government experts on data sources and geographic information systems, public health practitioners, and experts on community consultation and processes. The names and affiliations of those attending the workshop are available from the authors.

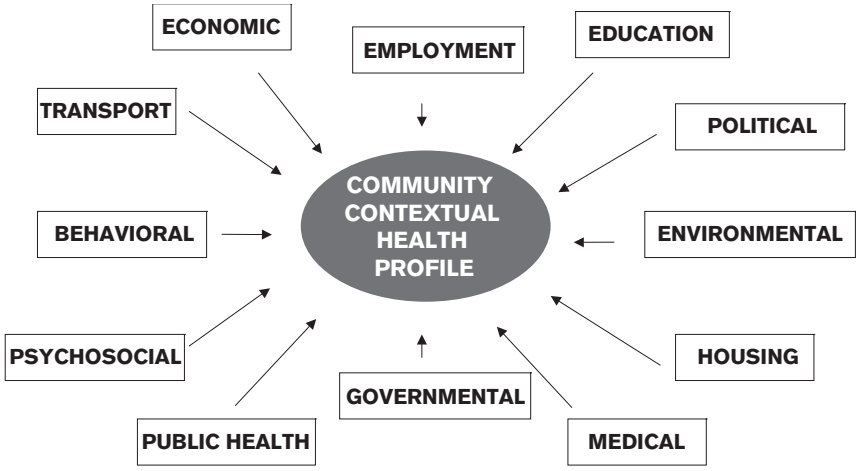
The initial sessions were full group discussions, in which participants addressed fundamental issues including:

- Is it worthwhile to create indices measuring community contextual health characteristics?
- Would such an effort be feasible?
- For which audiences would the indices be useful?
- Is the preliminary set of dimensions reasonable, and what others should be included?

In the course of the discussion general consensus was reached on a core set of 12 contextual dimensions plausibly linked to health status. These dimensions are diagrammed in Figure 1. There was widespread agreement among the participants that the construction of these dimensions and the identification of traditional and nontraditional data sources to measure these dimensions would potentially be of significant benefit to both the research community and to public health practitioners and advocates.

In the next phase of the workshop, participants formed smaller working groups to brainstorm ideas for sets of components within each dimension that would most optimally quantify that dimension of contextual health. Each working group generated detailed lists of these components, along with suggestions for possible data sources and specific variables that might be used to measure the components of each dimension. This content was then presented to the full group for further input and revision. The workshop concluded with a discussion of issues related to measurement design and index construction, with participants sharing their own experiences and recommendations concerning assessment of contextual factors and their relationship to health outcomes.

Figure 1: Twelve Dimensions of the Proposed Community Contextual Health Profile



After the workshop, we evaluated and further refined the lists of components and data indicators for each dimension, taking into consideration both conceptual relevance and availability of appropriate data at the local level. Table 1 presents the resulting set of contextual dimensions, components, and indicator variables. In the next section we discuss the rationale for inclusion of the components within each dimension, based on input from meeting participants as well as reviews of relevant literature.

Contextual Dimensions and Related Components

It is important to note that although all the proposed indicators offer further plausible conceptual differentiation of the various dimensions of context, it remains to be seen whether their effects on health can be empirically distinguished from more traditional indicators such as poverty (Krieger et al. 2002, 2003). Thus we make no claims about their empirical veracity; rather our goal is to take the first step in providing a broader conceptualization of the specific contextual factors that may affect health.

Economic Dimension

The association between higher levels of economic resources and more optimal health is one of the most well-documented relationships in public

Table 1: Contextual Dimensions, Components, and Indicators Potentially Related to Health

ECONOMIC DIMENSION

1. *Income*
   - A. Summary income measures
   - B. Income components
   - C. Disposable income
   - D. Income distribution
   - E. Geographic concentration of income
   - F. Economic segregation
2. *Wealth*
   - A. Geographic concentration of wealth
   - B. Debt levels
   - C. Savings rates
   - D. Real estate ownership/values
3. *Poverty*
   - A. Geographic concentration of poverty
   - B. Deprivation associated with poverty-level income
4. *Economic Development*
   - A. Productivity
   - B. Industrial mix
   - C. Business lending indicators
   - D. Informal economy
5. *Financial Services*
   - A. Availability of credit
   - B. Availability of banking and check-cashing services
6. *Cost of Living*
   - A. Local cost of living indexes
   - B. Spending/consumption patterns
   - C. Income to spending ratios
7. *Redistribution*
   - A. Taxes
   - B. Transfers
8. *Fiscal Capacity*
   - A. Property values
   - B. Sales levels
   - C. Income capacity
9. *Exploitation*
   - A. Ratio of wages to corporate profits
   - B. Commuter taxes
   - C. Commuting patterns

EMPLOYMENT DIMENSION

1. *Employment/Unemployment Rates*
   - A. Job security
   - B. Labor market turnover
2. *Workforce Characteristics*
   - A. Racial/ethnic diversity

continued

Table 1: *Continued*

- B. Skill level
- C. Unionization
- D. Migrant workers

3. *Area Business Capacity*
   - A. Tax breaks offered
   - B. Number and size of businesses
   - C. Business space available

4. *Job Access*
   - A. Geography of job growth
   - B. Discrimination/affirmative action policies
   - C. Distance traveled to work
   - D. Transportation system
   - E. Training/retraining

5. *Occupational Safety*
   - A. Laws, regulations, and company-specific policies
   - B. Enforcement/number of violations

6. *Job Quality*
   - A. Compensation
   - B. Ratio of CEO to worker earnings
   - C. Family-friendly policies
   - D. Demand/control characteristics

7. *Job Characteristics*
   - A. Unionized employers/size and power of unions
   - B. Skills needed by employers
   - C. Full vs. part-time employment

EDUCATION DIMENSION

1. *Educational Attainment*
   - A. Graduation rates
   - B. Dropout rates
   - C. Literacy rates
   - D. Test scores
   - E. Rates of progression to post-secondary education

2. *Funding*
   - A. Teacher salaries
   - B. Facilities
   - C. Teacher training/support
   - D. Fiscal capacity of school district
   - E. Proportion of funds by source
   - F. Corporate presence in schools

3. *Private Schools*
   - A. Number
   - B. Enrollment

4. *School Characteristics*
   - A. Size of schools/classes
   - B. Student/teacher ratios
   - C. Teacher turnover
   - D. Parental attitude/involvement in schools
   - E. School segregation

Table 1: *Continued*

1. Race/ethnicity
2. Economic status

F. Curriculum quality
1. Physical education requirements
2. Health education
3. Nutrition education
4. Sex education
5. Language requirements
6. Vocational education
7. Enrichment programs

G. Preschool/Kindergarten/Early Intervention
H. School-based clinics
I. Physical environment of school/safety
J. Disciplinary climate
1. Violence prevention programs
2. Police involvement

K. School-based nutrition programs

5. *Community Climate*
A. Television viewing
B. Radio stations
C. Reading/reading to children
D. Libraries
E. Corporate-sponsored educational programs

POLITICAL DIMENSION

1. *Civic Participation*
A. Voting
1. Registration and voting rates
2. Ease of registration
3. Racial/ethnic representativeness of registered voters

B. Political party membership
C. Donations to parties and candidates

2. *Political Structure*
A. Gender/racial/ethnic representation in elected office
B. Percent of local budget for public health investments

3. *Power Groups*
A. Community organizations
B. Unions
C. Advocacy Groups

ENVIRONMENTAL DIMENSION

1. *Air Quality*
A. Outdoor (exhaust, ozone, pollutants, particulate)
B. Indoor (tobacco, insect, mold, dust)

2. *Water Quality* (PCBs, dioxin)

3. *Environmental Hazards*
A. Hazardous waste
B. Heavy metals
C. Pesticides

continued

Table 1: *Continued*

- D. Climate extremes
- E. Noise

4. *Physical Safety*
   - A. Traffic
   - B. Street repair
   - C. Sidewalk availability/quality
   - D. Street signs/lights
   - E. Safety structures (e.g. guard rails)

5. *Land Use*
   - A. Public recreational space/number of parks
   - B. Waste disposal/dumping/sanitation services
   - C. Curbside recycling programs

HOUSING DIMENSION

1. *Housing Stock*
   - A. Age
   - B. Scarcity
   - C. Value
   - D. Characteristics
   - E. Gentrification/gatedness
   - F. Rental vs. owner occupied
   - G. Safety violations

2. *Residential Patterns*
   - A. Homelessness
   - B. Number of institutional facilities
   - C. Segregation
     1. Racial/ethnic
     2. Economic
   - D. Vacancy rates
   - E. Crowded housing
   - F. Population density
   - G. Abandoned housing
   - H. Social isolation

3. *Regulation*
   - A. Zoning policies
   - B. Industrial/residential segregation
   - C. Housing policies (e.g. Section 8)

4. *Financial Issues*
   - A. Housing costs
   - B. Low-income housing
     1. Percent of total housing
     2. Ratio of low-income units to low-income workers
     3. Elderly housing
   - C. Mortgage lending practices by race/ethnicity
   - D. Community reinvestment initiatives

MEDICAL DIMENSION

1. *Primary Care*
   - A. Number of providers
   - B. Provider training/competence/certification

Table 1: *Continued*

- C. Rates of ambulatory care sensitive hospitalizations
- D. Medicaid reimbursement levels

2. *Specialty Care*
   - A. Number of providers
   - B. Provider training/competence/certification
3. *Emergency Services*
4. *Home Health Care Services*
5. *Mental Health Care*
6. *Long-Term Care*
7. *Oral Health Care*
8. *Access to/Utilization of Care*
   - A. Insurance coverage
   - B. Race/ethnic staff to population ratios
   - C. Provision of indigent care
   - D. Costs of care
   - E. Rates of ambulatory care sensitive hospitalizations
   - F. Cultural competence among providers and institutions
9. *Alternative Care*

GOVERNMENTAL DIMENSION

1. *Funding*
   - A. Revenue
     1. Intergovernmental
     2. Taxes
     3. Lottery
   - B. Debt
2. *Policy/Legislation*
   - A. Obstacles to unionization
   - B. Living wage/minimum wage ordinances
   - C. Employer requirements to provide health benefits
3. *Services*
   - A. Privatization
   - B. Local safety net resources
4. *Municipal Fragmentation (number of subunit governments within a metro area)*

PUBLIC HEALTH DIMENSION

1. *Programs*
   - A. Screening
   - B. Nutrition
   - C. Family planning
   - D. Chronic disease control
   - E. Home visiting
   - F. Outreach
   - G. School-based clinics/education
   - H. Substance abuse prevention
   - I. Domestic violence prevention
   - J. Mental health services
   - K. Immunization

continued

Table 1: *Continued*

2. *Regulation/Enforcement*
   A. Sanitation
   B. Health/food inspection
   C. Health violations
   D. Legislative efforts
4. *Funding*
   A. Budget allocations
   B. Private sector provision of public health services

PSYCHOSOCIAL DIMENSION

1. *Political*
   A. Contributions to parties, candidates
   B. Women in elected office
   C. Number of registered voters
   D. Voter registration procedures
2. *Volunteer Organizations*
   A. Types/functions
   B. Number of members
3. *Union Participation*
4. *Charitable Giving*
5. *Jails*
   A. Expenditures
   B. Incarceration rates
   C. Crime
6. *Lawsuits*
   A. Civil lawsuits
   B. Small claims court cases
   C. Lawsuits against businesses
7. *Protective Services*
   A. Government services
   B. Household systems

BEHAVIORAL DIMENSION

1. *Tobacco Use*
   A. Smoking rates
   B. Cessation programs
   C. Smoking prevention
   D. Workplace/public space smoking restrictions
   E. Cost/accessibility of cigarettes
   F. Advertising
2. *Physical Activity*
   A. Physical activity levels
   B. Physical education requirements in schools
   C. Public and private recreational facilities
   D. Television viewing patterns
   E. Workplace exercise programs/facilities
   F. Participation in local sports/recreational activities
   G. Video game sales/use
3. *Diet/Obesity*
   A. Fresh fruit and vegetable consumption

Table 1: *Continued*

- B. High fat, high sugar food consumption
- C. Food quality/availability/cost
- D. Number of fast food establishments
- E. School nutrition
  - 1. Regulation of subcontracting to vendors
  - 2. Nutrition education
  - 3. Breakfast/lunch programs

4. *Alcohol and Illicit Drug Use*
   - A. Number of liquor stores
   - B. Drug and alcohol treatment services
   - C. Syringe laws/exchange programs
   - D. Liquor marketing laws
   - E. Advertising

5. *Violence*
   - A. Guns
     - 1. Availability
     - 2. Gun Shows
     - 3. Licensing
   - B. Exposure to violence
   - C. Police protection
   - D. Gang activity

TRANSPORT DIMENSION

1. *Safety*
   - A. Seat belts/child restraints
   - B. Helmets
   - C. Age curfews/graduated driver's license program
   - D. Driving while intoxicated laws/enforcement
   - E. Speed restriction/enforcement

2. *Infrastructure*
   - A. Roads
     - 1. Quantity
     - 2. Quality
     - 3. Speed bumps
     - 4. Buffers from pedestrians
   - B. Sidewalks
   - C. Bike lanes
     - 1. Quantity
     - 2. Mandating legislation

3. *Traffic Patterns*
   - A. Spatial location of jobs
   - B. Traffic volume
   - C. Car pooling

4. *Vehicles*
   - A. Number of heavy/diesel vehicles
   - B. Cars per capita
   - C. Types and ages of vehicles

continued

Table 1: *Continued*

5. *Public Transportation*
A. Availability/density/efficiency
B. Types of public transportation available
C. Cohesiveness/integration
D. Reliability/quality
E. Geographic equity
F. Environmental soundness
G. Transportation for special needs groups
H. Employer promotion of public transportation
6. *Economic Issues*
A. Expenditures
B. Spending on local roads vs. alternative transportation
C. Percent of transit revenue from fares
D. Insurance rates
E. Commuter taxes

health research (for reviews see Susser, Watson, and Hopper 1985; Krieger et al. 1993; Lynch and Kaplan 2000), and economic aspects of local areas have been among the most frequently analyzed contextual factors with regard to mortality and other outcomes. Significant associations have been shown between health status and community economic characteristics including income (Anderson et al. 1997; Diez-Roux et al. 1997) and inequality in income distribution (Lynch et al. 1998; Kennedy et al. 1998), wealth (Diez-Roux et al. 1997; O'Campo et al. 1997), and poverty (Yen and Kaplan 1999; Shaw et al. 2000) and the geographic concentration of poverty (Waitzman and Smith 1998a, 1998b).

The fact that data for most of these economic indicators are readily available for small areas in census data is undoubtedly an important factor accounting for their widespread use (Mitchell et al. 2000). Our consultants encouraged a broadened perspective to more fully assess the economic status of communities. On one hand, this involved identifying a more diversified set of indicators for commonly studied components, such as considering various types of income (earnings, investments, and transfers) in addition to the overall mean or median income in an area. On the other hand, a number of additional components of economic well-being were also suggested for inclusion. For example, the opportunities for community residents to obtain financial resources would be influenced by characteristics of economic development in an area such as productivity, industrial mix, amount of area business lending, as well as exchanges of goods and services through the informal economy. The

availability of financial services including banks and other sources of credit were considered important, as were local costs of living, patterns of redistribution through taxes and transfers, and the fiscal capacity of the area. One other seldom-considered aspect of the economic milieu concerns the degree to which segments of the community are differentially exploited, and thereby constrained in their access to monetary resources. Indicators of exploitation include the ratio of wages to corporate profits, as well as issues related to location of jobs, such as length of commute and commuter taxation.

Employment Dimension

Aspects of employment in residential areas have also been among the more frequently considered factors in research on context and health. Adverse outcomes have generally been found to be positively associated with higher community levels of unemployment (Guest, Almgren, and Hussey 1998; LeClere, Rogers, and Peters 1998), as well as with larger proportions of employed residents working at lower social class occupations (Armstrong et al. 1998; Cubbin, LeClere, and Smith 2000). Unemployment rates or occupational status measures are also frequently combined with other indicators of areal deprivation including median income, car ownership, education level, and overcrowded housing to form summary measures that are associated with poorer health (e.g. Townsend, Phillimore, and Beattie 1988; Carstairs and Morris 1989).

In addition to the usual employment indicators, we include a number of other measures. Looking in detail at characteristics of the workforce, for example, along with the area business capacity and the geography of job growth, would facilitate assessment of job access, as well as the degree of spatial "mismatch" which may adversely affect the employment opportunities of central city residents (Holzer 1991; Mouw 2000). Racial, gender-based, and antigay discrimination also limit access to employment, as well as having possible stress-related consequences for health (Williams 1999; Krieger and Sidney 1997; Yen et al. 1999). The degree to which occupational safety regulations and policies are in place and enforced is likely to influence the frequency and severity of work-related injuries (McQuiston, Zakocs, and Loomis 1998), while aspects of job quality including wage equity, family-friendly policies and demand/control characteristics of jobs can reduce or exacerbate job-related stress and its sequellae (Cheng et al. 2000; de Jonge et al. 2000; Saltzstein, Ting, and Saltzstein 2001). The presence of labor unions

is also associated with more optimal working conditions and employee compensation (Hirsch and Macpherson 2001).

Education Dimension

Researchers studying educational context and health have generally used percentage of the adult population not completing high school as an indicator, finding positive associations with all-cause mortality (Guest, Almgren, and Hussey 1998; Bosma et al. 2001), homicide (Cubbin, LeClere, and Smith 2000), motor vehicle deaths (Cubbin, LeClere, and Smith 2000), coronary heart disease prevalence (Diez-Roux et al. 1997), neural tube defects (Wasserman et al. 1998), smoking (Diez-Roux et al. 1997), severe pediatric injury (Durkin et al. 1994), and elevated serum cholesterol (Diez-Roux et al. 1997). High school noncompletion rate and median educational level have also been used in combination with other areal economic and employment measures to form aggregate socioeconomic scores that are correlated with adverse health outcomes (Diez-Roux et al. 2001; Roberts 1997).

In these studies the contextual educational variable tends to be treated as a marker for a more generalized concept of community socioeconomic status and resources, rather than being considered in its own right. Our consultants suggested that a focused assessment of aspects of education that are likely to vary among communities is warranted. Multiple measures of the population's educational attainment and functioning are included in the recommended indicators. Moreover, the levels of funding, characteristics of school systems and curricula, and learning-related aspects of community life such as prevalence of television viewing and numbers of library books per capita, can provide insights into the priority placed on education and corresponding investment within an area, which itself may be related to health outcome.

Specific aspects of the curriculum also have implications for the health of children at school ages and throughout their lives. For instance, bullying and violence is a serious problem among children and adolescents (Nansel et al. 2001), and the presence of violence prevention programs has been found to be effective in decreasing physically aggressive behavior (Twemlow et al. 2001; Grossman et al. 1997). Similarly, obesity in children is approaching epidemic proportions, and is related to adult obesity and levels of lipids, cholesterol, triglycerides, insulin, blood pressure, and to risk of coronary heart disease (Styne 2001). Incorporation of nutrition modification programs and optimal physical education curricula in schools can be effective in modifying these risks (Stone et al. 1998; Snyder et al. 1999).

Political Dimension

Aspects of community political participation have been found to be associated with population health status. Davey Smith and Dorling (1996), for example, showed that in England and Wales mortality rates in electoral constituencies were negatively correlated with Conservative voting patterns and positively correlated with Labour voting. Area deprivation was also negatively associated with Conservative voting while positively related to Labour voting. The authors concluded that in areas with better material circumstances and more optimal health, voters were more likely to support leadership that favors reducing public assistance programs. In the United States, Blakely and colleagues (2001) studied disparities among states in voting across socioeconomic status groups. Individuals living in states with the highest voting inequality were shown to have increased odds of fair or poor self-rated health relative to those in other states. They reasoned that disproportionate political participation by the more economically well-off skews subsequent policymaking toward their interests, a conclusion supported in the political science literature (Hill and Leighley 1992).

More broadly, political participation has been of recent interest as an indicator of embeddedness in the institutions of civil society. As such, it is considered to be a reflection of social capital within a community (Kawachi 1999). Social capital, measured in several different ways, has been associated with positive health outcomes (Subramanian, Kawachi, and Kennedy 2001; Kawachi, Kennedy, and Glass 1999; Kawachi et al. 1997) (see the Psychosocial Dimension section below for further discussion of the social capital concept).

Within the political contextual dimension, we include aspects of political participation such as voting and political party membership, as well as donations to parties and candidates, which are known to influence public policy (Ferguson 1995). Likewise the degree to which elected officials are representative of their areas in terms of gender and race/ethnicity may be an important factor in their responsiveness to constituents' needs (Whitby 1997; Bratton and Haynie 1999). The percent of the local budget devoted to public health investments can be considered an indication of the priority placed on health by the community as well as a measure of available fiscal resources. We also include the number and influence of various politically active community groups.

Environmental Dimension

The environmental dimension includes physical and chemical components that have known associations with adverse health outcomes: air pollutants

(American Lung Association 2001; Pope, Baitz, and Raizenne 1995), water pollutants (Griffith et al. 1989), and environmental hazards including hazardous waste (Johnson 1999; Schell 1991), heavy metals (Goldman, Shannon, and the American Academy of Pediatrics 2001; Mendelsohn et al. 1999), pesticides (Blindauer, Jackson, and McGeehin 1999; Landrigan et al. 1999), climatic extremes (Greenough et al. 2001; Patz, McGeehin, and Bernard 2001), and excessive noise (Passchier-Vermeer and Passchier 2000; Schell 1991). These exposures are known to vary by area and to be disproportionately concentrated among disadvantaged populations (American Lung Association 2001; Brown 1995).

In addition, this contextual dimension encompasses structural features of communities such as physical design of streets, sidewalks, and safety structures that are associated with level of injury risk (Navin, Zein, and Felipe 2000; Agran et al. 1996). Aspects of land usage are also considered, such as public spaces and parks that may facilitate greater physical activity levels (French, Story, and Jeffery 2001), as are services related to environmental quality like waste disposal and recycling programs.

Housing Dimension

Associations between housing and health have been studied from several perspectives. Most concretely, physical characteristics of housing have been linked to adverse outcomes. For example, the presence of dampness and mold lead to increased risk of respiratory and other illnesses (Platt et al. 1989; Packer, Stewart-Brown, and Fowle 1994). Dilapidated and abandoned housing in the local area increases the risk of accidental injury among residents (Gielen et al. 1995), is associated with increased emotional stress (Ellaway and Macintyre 2000), and may provide situational opportunities for high-risk behaviors (Cohen et al. 2000). Population density and overcrowding have also been associated with increased chances of contracting infections and sustaining injury (Agran et al. 1998; Acevedo-Garcia 2000).

Home ownership has been associated with reduced morbidity and mortality risk (Filakti and Fox 1995; O'Campo et al. 1997). In most cases this housing variable is regarded as a marker for general material well-being. It has been suggested, however, that long-term exposure to specific health-promoting or health-damaging characteristics of housing itself is likely to account for some of the observed health effects (Macintyre et al. 1998; Ellaway and Macintyre 1998).

There is also some evidence that poor housing conditions during childhood can adversely affect health in later life. For example, Barker and colleagues (1990) found an association between domestic crowding during childhood and later stomach cancer mortality rates, suggesting that overcrowding may promote the transmission of causative organisms among children that exert negative health effects later in life. Similarly, Dedman et al. (2001) noted aspects of poorer childhood housing conditions were associated with increased mortality risk from common diseases in adulthood.

Our consultants suggested that we include characteristics of housing discussed above in our framework, as well as other aspects of residential patterns within communities. Homelessness, for example, has known associations with differentially poorer health (Barrow et al. 1999; Hwang 2001). Segregation by race has been associated with adverse health outcomes among blacks (Williams and Collins 2001; Jackson et al. 2000), as well as among whites in some cases (Collins and Williams 1999). Similarly, concentration of poverty has been found to be associated with elevated mortality risk (Waitzman and Smith 1998a).

We also include two other components within the housing dimension. Regulations such as zoning and industrial/residential segregation can affect the degree to which residential areas are exposed to industrial pollution and other health threats such as increased traffic. Financial issues specific to housing are also considered, such as housing costs, the availability and characteristics of low-income housing, mortgage lending practices, and community reinvestment initiatives.

Medical Dimension

Health care services are generally considered to be an important determinant of health status (Andrulis 1998; Frenk 1998), although the degree to which medical care impacts health status over and above social and economic conditions has been the subject of considerable controversy (Pincus et al. 1998; McKeown 1979). The medical contextual dimension encompasses a range of health care services, including primary care, specialty care, emergency services, home health care, emergency services, mental health services, long-term care, oral health care, and alternative care.

We also look specifically at aspects of access to health care services, which is related to health status and known to vary among population groups (U.S. Department of Health and Human Services 2000). Some of the factors included, such as insurance coverage and the availability of indigent care, are

well-known determinants of access (Baker, Shapiro, and Schur 2000; Newacheck et al. 1998; Nelson et al. 1999). The racial/ethnic makeup of medical staff in relation to the patient population and the cultural competence of providers and institutions may also be important in encouraging utilization of health care resources that are present in an area (Flores et al. 1998; Langer 1999). In addition to traditional measures of access, we also include rates of hospitalization for ambulatory care sensitive conditions. These are conditions considered to be manageable on an outpatient basis given access to high quality primary care, and therefore higher hospitalization rates can be used as an indicator of poorer access to appropriate care (Institute of Medicine 1993).

Governmental Dimension

Within this dimension we consider characteristics and functioning of local area governments. Levels of funding are assessed, as well as the relative contributions from various revenue sources. Policies and legislation that have potential health effects are included, such as obstacles to unionization, living wage or minimum wage ordinances, and employer requirements for provision of health benefits. The nature and quality of local governmental services are also considered.

Another aspect of local governance with potential health relevance concerns the degree to which there is municipal fragmentation. This term refers to a situation in which large numbers of smaller governmental entities exist within a metropolitan area. It has been argued that in cases where there are high levels of municipal fragmentation and no single government empowered to act for the good of the entire region, a host of problems result, including resource and public service imbalances within the area and the protection of privilege (Mitchell-Weaver, Miller, and Deal 2000; Ross and Levine 1996).

Public Health Dimension

This dimension includes assessment of the implementation of core public health functions of assessment, policy development, and assurance at the local level (Turnock and Handler 1997; Institute of Medicine 1988). We focus on three primary areas of interest. First, there are a variety of programs aimed at prevention, early detection, and optimal management of a range of health problems. Local public health departments may provide these services directly, or oversee their implementation by other organizations, both governmental and private sector. The second category concerns development,

regulation, and enforcement of standards, which has become a salient issue as provision of traditional public health services is increasingly being privatized (Beauchamp 1997). Third, funding issues, including budget allocations and financial arrangements for service provision are of interest in gauging the priority given to public health issues in the community.

Psychosocial Dimension

There has been longstanding scientific interest in the organization of social life, and the implications of interpersonal and group interactions for emotional and physical health status (for reviews see House, Landis, and Umberson 1988; Yen and Syme 1999). Research in the 1970s on social support suggested a health-enhancing role for social relationships in buffering the ill effects of stress (Cassel 1976), and subsequent studies confirmed an inverse relationship between social relationships and mortality risk (House, Robbins, and Metzner 1982; Schoenbach et al. 1986).

More recently, aspects of social interactions and relationships have been increasingly conceptualized as forms of social capital, although there is widespread disagreement about the meaning of the term and the level of aggregation at which it operates (Lynch, Due et al. 2000; Woolcock 2001). Portes (1998, p. 6) defines social capital as "the ability of actors to secure benefits by virtue of social membership in other networks or social structures." Coleman (1988, p. 598) sees social capital as a resource for organizations as well as individuals: "Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors—whether persons or corporate actors—within the structure. Like other forms of capital, social capital is productive, making possible the achievement of certain ends that in its absence would not be possible." Putnam et al. (1993, p. 167) consider social capital broadly as "features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions."

Social capital has been operationalized in different ways in health-related empirical research. Per capita membership in groups and associations has been used to assess civic engagement (Kawachi et al. 1997; Kawachi, Kennedy, and Glass 1999), as has political participation (Blakely, Kennedy, and Kawachi 2001). Several studies have considered greater mistrust to be indicative of lower levels of social capital (Kawachi et al. 1997; Kawachi, Kennedy, and Glass 1999; Subramanian, Kawachi, and Kennedy 2001).

Mistrust is generally defined as the percentage in an area who agree with the second part of the statement: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people". A related indicator is perceived lack of fairness, indexed by percent agreeing that "most people would try to take advantage of you if they got the chance" (Kawachi et al. 1997). Perceived helpfulness/reciprocity has also been used as a gauge of social capital, based on answers to the question "Would you say that most of the time people try to be helpful, or are they mostly looking out for themselves?" (Kawachi et al. 1997). It has also been hypothesized that crime level is an indicator of collective well-being that is influenced by the degree of cohesiveness in social relations or social capital (Sampson, Raudenbush, and Earls 1997; Kawachi, Kennedy, and Wilkinson 1999).

Within the psychosocial dimension we include theorized aspects of social capital such as civic engagement via political participation, membership in voluntary organizations and unions, and charitable giving. Crime as a marker for social cohesion is assessed through expenditures on jails and incarceration rates. Collection of information on lawsuits and the presence and utilization of protective services was also suggested as an indicator of the level of trust in communities.

Behavioral Dimension

As mentioned earlier, there has been increasing recognition that aspects of social, physical, and cultural context can affect health status in a community by facilitating or inhibiting behaviors that impact well-being (Macintyre, Ellaway, and Cummins 2002). We focus on behavior areas identified as being among the nation's leading health indicators and which have been repeatedly cited as major determinants of premature morbidity and mortality (U.S. Department of Health and Human Services 2000; McGinnis and Foege 1998; Wilson 1994): tobacco use, physical activity, diet/obesity, alcohol and illicit drug use, and violence.

For each of the behaviors, we examine specific characteristics of communities that might influence the degree to which they will be adopted by residents. In the case of tobacco use, these characteristics include current smoking rates, the presence of cessation and preventive education programs, workplace smoking restrictions, the cost and accessibility of cigarettes, and targeted advertising. In the area of physical activity, we include reported activity levels, physical education requirements in schools, participation in local sports and recreational activities, as well as availability of exercise

facilities in the workplace and in the area more generally. We also consider indicators of sedentary activities such as television viewing patterns and video game sales and use. Regarding diet and obesity, we look at consumption patterns of healthy foods such as fruit and vegetables as well as high-fat and high-sugar foods. The quality, availability, and cost of a range of different foods is of interest, as is the availability of generally less-nutritious "fast food" as indexed by the number of such establishments in the area. We also include aspects of nutrition in the schools, including the prevalence of subcontracting to vendors of nonnutritious items and the presence of nutrition education programs. In the area of alcohol and illicit drug use, we consider availability as indicated by number of liquor stores and marketing laws as well as the nature of public advertising. We also include drug and alcohol treatment service availability, and the presence of syringe laws and exchange programs. Violence in the community is indicated by factors such as the availability of guns and the level of exposure to violence perceived by residents.

Transport Dimension

The transportation system in place in communities has multiple implications for the health of residents. Most directly, motor vehicles are the leading cause of injury in the United States, and are responsible for about one-third of all injury deaths (Fingerhut and Warner 1997). The nature of the transportation modes and the volume of use also influence the types and magnitude of pollution introduced into the environment (Sharpe 1999). A third consideration is the degree to which employment patterns and, therefore, economic well-being are determined by the accessibility of jobs through adequate and affordable transportation systems (Pugh 1998).

In our framework we include measures within each of these health-related aspects of transportation. Vehicle occupant and pedestrian safety factors are included, as well as characteristics of the infrastructure of roads, sidewalks, and bike lanes. We examine characteristics and numbers of vehicles, and aspects of the public transportation system. Finally, we include economic issues such as government transportation spending priorities, funding for public transportation, and personal insurance rates.

NEXT STEPS

With this conceptual "road map" as a framework, the next phase was to attempt to find out what measures of these recommended dimensions actually

existed. Thus, we proceeded with building a data library with datasets containing information for Metropolitan Statistical Areas (MSAs) relevant to each dimensional component. We chose to focus on MSAs as our unit of analysis in quantifying contextual factors because they are the smallest census-defined geographic unit for which a broad range of data is routinely collected and geocoded. We recognize, however, that there is no single ideal level at which to measure context in terms of its relationship to health-damaging and health-promoting factors. In fact different characteristics may operate at different levels. An argument can be made that using more localized units, such as county, zip code, census tract, and census block, increases the likelihood that certain aspects of the social and physical environment actually experienced by individuals are being measured. Conversely, there are considerably more richly detailed contextual data sources available for larger units such as states and MSAs. Given the inevitable tradeoffs between data availability and proximity to lived experience, we find the MSA to be the most satisfactory alternative for our purposes.

An important aspect of our project is the exploration of data sources not traditionally used by public health researchers but which can provide valuable information about the health enhancing aspects of the local environment. Tables 2–13 provide lists of such data sources related to each of the 12 dimensions. The majority of these sources provide data for MSAs or smaller geographic units such as counties; a few sources at the state level have been included when more localized data did not exist.

Some sources are familiar to many researchers and practitioners, such as the Census Bureau decennial data files and the *State and Metropolitan Area Data Book*, a resource that is compiled by the Bureau and incorporates a wide variety of data from governmental agencies and the private sector. Others may not be so well known, such as aggregate databases assembled by research, governmental, or private sector organizations with particular interests in MSA- or county-level information. One example is Demographics USA, a commercially available database containing measures of disposable income, income capacity, consumer expenditures, and information on area retail trade establishments and retail sales. Another is the State of the Nation's Cities, which was compiled by the Center for Urban Policy Research in collaboration with the U.S. Department of Housing and Urban Development. This database has measures of area income inequality, gross metropolitan product, and fiscal health. A third such source is the Contextual Data Archive, containing indices of economic segregation. We have also obtained economic indicator data from organizations including the Brookings Institution, the Federal Financial

Table 2: Selected Data Sources Relevant to the Economic Dimension

INDICATORS	*DATA SOURCES/NOTES*
1. Income	
A. Summary income measures	
1. Median and per capita annual income	Census Bureau (http://www.census.gov)
B. Income components	
1. Mean hourly and annual wage	Bureau of Labor Statistics (http://www.stat.bls.gov/oes/home.htm). Data by occupation available in downloadable *Excel* files
2. Hourly wage union and nonunion workers	Union Membership and Earnings Data Book (http://www.bna.com/bnaplus/labor/laborrpts.html). Separate tables for public and private sector workers and for manufacturing and nonmanufacturing workers; customized reports available for any or all years since 1983
3. Per capita personal income	Bureau of Economic Analysis (http://www.bea.doc.gov/bea/regional/reis). Downloadable compressed comma-separated-value files
C. Disposible income	
1. Median and per capita Effective Buying Index	Demographics USA (http://www.tradedimensions.com/p_demographics.html). Effective Buying Index represents money income minus taxes Data available on CD-ROM
D. Income distribution	
1. Gini coefficient of income inequality; 90 percentile/10 percentile ratio	Census Bureau (http://www.census.gov)
E. Geographic concentration of income	
1. Concentration of poverty	Jargowsky, P. A. 2003. *Stunning Progress, Hidden Problems: The Dramatic Decline of Concentrated Poverty in the 1990s* (http://www.brookings.edu/dybdocroot/es/urban/publications/jargowskypoverty.pdf). Percentage of the poor residing in high poverty neighborhoods; total and race-specific rates
F. Economic segregation	
1. Dissimilarity index (d), poor/nonpoor segregation; Contact index (xpy^*), poor/nonpoor segregation	Sociometrics Contextual Data Archive (http://www.socio.com). Downloadable compressed data files for PC and UNIX, including raw data and *SPSS* and *SAS* program files

continued

Table 2: *Continued*

INDICATORS	*DATA SOURCES/NOTES*
2. Wealth	
A. Geographic concentration of wealth	
1. Mean and median net worth	ESRI Business Information Solutions (http://www.esribis.com). Data tables can be integrated into *AreGIS*
B. Debt levels	
1. Bankruptcy filings	Economy.com (http://www.econoray.com/research). Personal and business bankruptcy filings and rates per thousand households, by type
C. Savings rates	
1. Dollar amount of deposits in savings institutions and banks	Federal Deposit Insurance Corporation (http://www3.fdic.gov/sod/index.asp). From webpage choose "Summary Tables" then MSA or county tables
D. Real estate ownership/values	
1. Median value owner-occupied housing units	Census Bureau (http://www.census.gov/)
3. Poverty	
A. Geographic concentration of poverty	
1. Poverty rate	Census Bureau (http://www.census.gov/)
2. Concentration of poverty	See Jargowsky 2003 above
B. Deprivation associated with poverty-level income	
1. Percent of families with incomes < half of the poverty line	Census Bureau (http://www.census.gov/)
4. Economic Development	
A. Productivity	
1. Gross metropolitan product (GMP) and GMP growth rate	U.S. Metro Economies (http://www.usmayors.org/usom/home.asp)

Table 3: Selected Data Sources Relevant to the Employment Dimension

INDICATORS	*DATA SOURCE*
1. Employment/Unemployment Rates	
A. Job security	
1. Employment volatility	State of the Nation's Cities Database (http://policy.rutgers.edu/cupr/sonc/sonc.htm). Variable calculated by Center for Urban Policy Research for this database indicating employment volatility relative to volatility in the U.S. as a whole. Database available in 4 PC formats (tab-delimited ASCII; *SPSS* portable file; Excel file; *SAS* formatted file) and MAC
B. Labor market turnover	
1. Unemployment rates, total; by race/ethnicity and sex; by occupation and by industry	1. Bureau of Labor Statistics, Local Area Series (http://www.stats.bls.gov/lau/). From webpage select monthly or annual average tables of total unemployment rates for metropolitan areas; tables available as pdf files 2. Bureau of Labor Statistics, Geographic Profile Series (http://www.stats.bls.gov/opub/gp/laugp.htm). From webpage select "Estimates for Metropolitan Areas and Cities"; tables available as pdf files
2. Labor force participation rates, total, by race/ethnicity, by sex	Bureau of Labor Statistics, Geographic Profile Series (http://www.stats.bls.gov/opub/gp/laugp.htm). From webpage select "Estimates for Metropolitan Areas and Cities" as above
2. Workforce Characteristics	
A. Racial/ethnic/gender diversity	
1. Percent distribution of employed persons by sex, race/ethnicity, and occupation	Bureau of Labor Statistics, Geographic Profile Series (http://www.stats.bls.gov/opub/gp/laugp.htm). From webpage select "Estimates for Metropolitan Areas and Cities" as above
2. Percent of workers who are female	Union Membership and Earnings Data Book (http://www.bna.com/bnaplus/labor/laborrpts.html). Total, private, public sector, and private manufacturing workers; customized reports available for any or all years since 1983

Table 3: *Continued*

INDICATORS	*DATA SOURCE*
B. Skill level	
1. Percent distribution of employed persons as above	Bureau of Labor Statistics, Geographic Profile Series (http://www.stats.bls.gov/opub/gp/laugp.htm) as above
C. Unionization	
1. Percent of workforce unionized; percent of workers covered by union contract	Union Membership and Earnings Data Book (http://www.bna.com/bnaplus/labor/laborrpts.html). Total, private, public sector, and private manufacturing workers; customized reports available for any or all years since 1983
2. Collective bargaining protection laws covering state and local employees; laws protecting public employees' right to strike	Dilts, D. A., C. R. Deitsch, and A. Rassuli. 1992. *Labor Relations Law in State and Local Government.* Westport CT: Quorum Books.
3. Area Business Capacity	
A. Tax breaks offered	
1. Corporate income tax rate	Tax Foundation (http://www.taxfoundation.org). From webpage select "State Finance"; select "Corporate Income Tax Rates"
B. Number and size of businesses	
1. Number establishments by employment size (1-4/5-9/10-19/20-49/50-99/100-249/250-499/500-999/1000+)	County Business Patterns (http://www.census.gov/pub/epcd/cbp/download/cbpdownload.html). Downloadable comma-delimited data files and record layout documentation
C. Business space available	
1. Commercial office space (sq ft) in and outside central business district	Society of Industrial and Office Realtors (http://www.sior.com). From webpage select "Publications"; on-line data from *Comparative Statistics of Industrial and Office Real Estate Markets* available for purchase
2. Commercial office space vacancy rate in and outside central business district	Society of Industrial and Office Realtors as above
4. Job Access	
A. Geography of job growth	
1. Central city and suburban: employment growth rate; number and % change in number of jobs;	Brookings Institution (http://www.brook.edu/es/urban/hillfa.pdf). Brennan J. Hill E. W. 1999. *Where Are The Jobs? Cities, Suburbs, and the Competition for Employment.*

share and % change in share of private employment 2. Number and increase in nonagricultural jobs	Blue Chip Job Growth Update: Arizona State University (http://www.cob.asu.edu/seid/eoc/pubs/JGUsample). From webpage select "Ranking of MSAs"
B. Discrimination/affirmative action policies 1. Employment-population ratio by race, by sex	Bureau of Labor Statistics, Geographic Profile Series (http://www.stats.bls.gov/opub/gp/laugp.htm). From webpage select "Estimates for Metropolitan Areas and Cities"; tables available as pdf files
C. Distance traveled to work 1. Share of metro employment >10 mi from central business district	Brookings Institution (http://www.brook.edu/es/urban/publications/glaeserjobsprawlexsum.htm). Glaeser E. L., Kahn M., Chu C. 2001. *Job Sprawl: Employment Location in U.S. Metropolitan Areas.* Downloadable pdf
D. Transportation system 1. Percent of workers 16+ using various means of transportation to work 2. Percent of residents without satisfactory public transportation available in neighborhood	Census Bureau (http://www.census.gov) American Housing Survey (http://www.census.gov/hhes/www/ahs.html). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII
5. Occupational Safety **A. Laws, regulations, and company-specific policies** 1. Directory of states with approved occupational safety and health plans	Occupational Safety and Health Administration (http://www.osha.gov/oshdir/states.html)
B. Enforcement/number of violations 1. OSHA workplace inspections and penalties for violations	Occupational Safety and Health Administration Workplace Safety Data (http://www.nicar.org/data/osha/). Businesses classified by city; data since 1972 available for purchase

continued

Table 3: *Continued*

INDICATORS	*DATA SOURCE*
6. Job Quality	
A. Compensation	See Economic Dimension, Income
B. Ratio of CEO to worker earnings	
1. Ratio of mean annual wages, chief executives to production workers	Can be calculated from 1999 Occupational Employment Statistics data (http://www.bls.gov/oes/oes_data.htm)
7. Job Characteristics	
A. Unionized employers/size and power of unions	See Unionization above
B. Skills needed by employers	
1. Percent of total employment in various industries	Bureau of Economic Analysis (http://www.bea.doc.gov/bea/regional/reis/). Can be calculated from data in downloadable compressed comma-separated-value files
C. Full- vs. part-time employment	
1. Percent of workers who work part time	Census Bureau (http://www.census.gov)

Table 4: Selected Data Sources Relevant to the Education Dimension

INDICATORS	*DATA SOURCE*
1. Educational Attainment	
A. Graduation rates	
1. Educational attainment among persons 25+	Census Bureau (http://www.census gov/)
2. Number of diploma recipients; number of other high school completers	National Center for Education Statistics Common Core of Data (CCD). Downloadable comma-separated-value and excel data tables for MSAs, counties, districts, schools can be created with "Build a Table" tool (http://www.nces.ed.gov/ccd/bat). Source CCD datasets also downloadable in ASCII format (http://www.nces.ed.gov/ccd/ccddata.asp)
3. High school graduation rates	U.S. Department of Education, No Child Left Behind (http://www.nochildleftbehind.gov/index.html). Starting with 2002–3 school districts will publicly report graduation rates
B. Dropout rates	
1. Percent of 16–19 years not enrolled, not high school grads	Census Bureau (http://www.census gov)
2. Dropout rates for 7–12 and 9–12 grades	CCD Local Education Agency (School District) Universe Dropout Data (http://www.nces.ed.gov/ccd/drpagency.asp). Downloadable in ASCII format
3. High school dropout rates	U.S. Department of Education, No Child Left Behind (http://www.nochildleftbehind.gov/index.html). Starting with 2002–3 school districts will publicly report dropout rates
C. Literacy rates	
1. Reading assessment results	U.S. Department of Education, No Child Left Behind (http://www. nochildleftbehind.gov/index.html). Starting with 2002–3 school districts will publicly report test results
D. Test scores	
1. Reading, math, and science assessment results	U.S. Department of Education, No Child Left Behind (http://www.nochildleftbehind.gov/index.html). Starting with 2002–3 school districts will publicly report test results

continued

Table 4: *Continued*

INDICATORS	*DATA SOURCE*
2. Average SAT scores	The College Board (http://www.collegeboard.com). Releases data to states/districts
E. Rates of progression to post-secondary education	
1. Post-secondary enrollment	Census Bureau (http://www.census gov)
2. Funding	
A. Teacher salaries	
1. Mean annual wage, preschool, elementary, middle school, and secondary teachers	Bureau of Labor Statistics (http://www.stat.bls.gov/oes/home.htm). Downloadable excel files
B. Facilities	
1. Percent of schools with at least 1 inadequate building feature	National Education Association (http://www.nea.org/lac/modern/modchart.html). State-level data
C. Teacher training/support	
1. Professional qualifications of teachers	U.S. Department of Education, No Child Left Behind (http://www.nochildleftbehind.gov/index.html). Starting with 2002–3 school districts will publicly report this information
2. Percent of expenditures on instructional staff support	School District Data Book (http://www.census.gov/mp/www/rom/msrom6i.html). Data on CD-ROM available for purchase
D. Fiscal capacity of school district	
1. Expenditures per pupil	School District Data Book (http://www.census.gov/mp/www/rom/msrom6i.html) as above
2. Long-term debt outstanding	School District Data Book (http://www.census.gov/mp/www/rom/msrom6i.html) as above
E. Proportion of funds by source	
1. Revenues by source for public schools	School District Data Book (http://www.census.gov/mp/www/rom/msrom6i.html) as above
2. Local government expenditures on education	Census of Governments (http://www.census.gov/govs/www)
4. Consumer expenditures on education	See Economic Dimension, Cost of Living

3. Private Schools	
A. Number	
1. Number of private schools	National Private Schools Association Group (http://www.npsag.com/database.html). Commercially available database on CD-ROM or diskette
B. Enrollment	
1. Percent enrolled students not enrolled in public school	School District Data Book (http://www.census.gov/mp/www/rom/msrom6i.html) as above
2. Enrollment in private schools	National Private Schools Association Group (http://www.npsag.com/database.html) as above
4. School Characteristics	
A. Size of schools/classes	
1. Public school enrollment	School District Data Book (http://www.census.gov/mp/www/rom/msrom6i.html) as above. CCD data (http://nces.ed.gov/ccd/ccddata.asp) as above
2. Mean number students in primary, middle, and high school	Characteristics of the 100 Largest Public Elementary and Secondary School Districts in th U.S. (http://www.nces.ed.gov/pubs2001/100_largest/index.asp)
B. Student/teacher ratios	
1. Pupils per teacher	National Center for Education Statistics Common Core of Data (CCD). Downloadable comma-separated-value and excel data tables for MSAs, counties, districts, schools can be created with "Build a Table" tool (http://www.nces.ed.gov/ccd/bat)
C. Teacher turnover	
1. Rates of teacher turnover	Schools and Staffing Survey and Teacher Follow-up Survey (http://www.nces.ed.gov)
D. Parental attitude/involvement in schools	
1. Percent of households with kids 0–13 years old reporting unsatisfactory public schools in their neighborhood	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII

continued

Table 4: *Continued*

INDICATORS	*DATA SOURCE*
E. School segregation	
1. Race/ethnicity	
A. Enrollment by race/ethnicity	National Center for Education Statistics Common Core of Data (CCD). Downloadable comma-separated-value and excel data tables for MSAs, counties, districts, schools can be created with "Build a Table" tool (http://www.nces.ed.gov/ccd/bat)
B. Exposure of minority students to white students	Frankenberg, E., C. Lee, and G. Orfield. 2003. *A Multi-Racial Society with Segregated Schools: Are We Losing the Dream?* (http://www.civilrightsproject.harvard.edu/research/reseg03/reseg03_full.php)
2. Economic status	
A. Percent of students eligible for free lunch	Calculated from data in School District Data Book (http://www.census.gov/mp/www/rom/msrom6i.html) as above
F. Curriculum quality	
1. Physical education requirements	
A. Mandated requirements for physical education	School Health Policies and Programs Study (http://www.cdc.gov/nccdphp/dash/shpps/index.htm). Data available in ASCII, *SAS*, and *SPSS* formats
2. Health education	
A. Health education coordinator in place; health education standards required; curriculum required for accident/injury prevention, alcohol/drug use prevention, consumer health, CPR, death and dying, dental and oral health, emotional and mental health, first aid, growth and development, HIV prevention, immunizations, personal hygiene, suicide prevention, sun safety or skin cancer prevention, tobacco use, violence prevention	School Health Policies and Programs Study (http://www.cdc.gov/nccdphp/dash/shpps/index.htm). Data available in ASCII, *SAS*, and *SPSS* formats
3. Nutrition education	
A. Nutrition and dietary behavior curriculum required	School Health Policies and Programs Study (http://www.cdc.gov/nccdphp/dash/shpps/index.htm). Data available in ASCII, *SAS*, and *SPSS* formats

4. Sex education	
A. Required human sexuality curriculum, pregnancy prevention curriculum, STD prevention curriculum	School Health Policies and Programs Study (http://www.cdc.gov/nccdphp/dash/shpps/index.htm). Data available in ASCII, *SAS*, and *SPSS* formats
G. Preschool/Kindergarden/Early Intervention	
1. Nursery school, preschool enrollment	Census Bureau (http://www.census.gov)
H. School-based clinics	
1. Number of school-based health centers	Center for Health and Health Care in Schools (http://www.healthinschools.org/home.asp)
I. Physical environment of school/safety	
1. Availability of drugs on school property; on school property % students threatened/injured with weapon, involved in physical fights, carrying a weapon; % students who do not feel safe on school property; % teachers victimized	National Education Goals Panel (http://www.negp.gov)
5. Community Climate	
A. Television viewing	
1. Hours per week of TV viewing, by age	Nielson Media Research (http://www.nielsonmedia.com)
B. Radio stations	
1. Number of radio stations	Gale Directory of Publications and Broadcast Media (http://www.galenet.gale.com/a/acp/db/gdpbm)
C. Reading/reading to children	
1. Proportion of households receiving daily newspapers	SRDS Corporation (http://www.srds.com)
2. Number of local newspapers	Gale Directory of Publications and Broadcast Media (http://www.galenet.gale.com/a/acp/db/gdpbm)
D. Libraries	
1. Number of libraries; number of library books and serial volumes	Public Libraries Survey (http://www.nces.ed.gov/surveys/libraries)

Table 5: Selected Data Sources Relevant to the Political Dimension

INDICATORS	*DATA SOURCE*
1. Civic Participation	
A. Voting	
1. Voting and registration rates	
A. Votes cast for president, by party	U.S.A. Counties (http://www.census.gov/statab/www/county.html). Data available on CD-ROM; online data for single counties downloadable as text or comma-separated-value file
B. Percent of persons registered to vote and voting by race/ethnicity	Census Bureau (http://www.census.gov/prod/3/98pubs/p20-504u.pdf). State data in pdf file
2. Ease of registration	
A. Voter registration by mail allowed; registration deadline prior to election	*Moving and Relocation Sourcebook and Directory* (http://www.omnigraphics.com). Hardcover book available for purchase. See Voting and registration rates above
3. Racial/ethnic representativeness of registered voters	
B. Census participation	
1. Census response rates	Census Bureau (http://www.census.gov). See Voting and registration rates above
C. Political party membership	
D. Donations to parties and candidates	
1. Donations to Republican and Democratic candidates, parties, and political action committees	Center for Responsive Politics (http://www.opensecrets.org). Contributions for selected metropolitan areas and zip codes, and for states
2. Political Structure	
A. Gender/racial/ethnic representation in elected office	
l. Women in governing body	Carpenter, A. 1996. *Facts about the Cities.* New York: H.W. Wilson
2. Elected officials in local governments by sex and race and state	Census of Governments (http://www.census.gov/govs/www). From webpage select Census of Governments for 1992; select Vol. 1, Nov. 2, "Popularly Elected Officials." Pdf file
3. Percent women in statewide elective office	Center for American Women and Politics (http://www.rci.rutgers.edu/-cawp/)
4. Blacks in elected office	Joint Center for Political and Economic Studies' DataBank (http://www.jointcenter.org/DB/index.htm)

B. Percent of local budget for public health investments	
1. Expenditures for health and welfare	Census of Governments (http://www.census.gov/govs/www). From webpage select year of interest; select Vol. 4, No. 3 or 4, "Finances of County or Municipal and Township Governments" or downloadable spreadsheet or comma-separated-value files
3. Power Groups	
A. Community organizations	
1. Number and size of organizations: religious, political civic and social, social advocacy, human rights, environmental and wildlife, business, labor, grant making and giving	County Business Patterns (http://www.census.gov/epcd/cbp/view/cbp/view/cbpview.html). From webpage select "County, State, U.S., ZIP or MSA Database on a NAICS Basis," select area of interest; in "Number of Establishments" table select detail for Industry Code 81, Other Services. Data downloadable as text or comma-separated-value tables; CD-ROM also available
B. Unions	See Employment Dimension, Workforce Characteristics

Table 6: Selected Data Sources Relevant to the Environmental Dimension

INDICATORS	*DATA SOURCE*
1. Air Qualify	
A. Outdoor	
1. Peak air concentration carbon monoxide, lead, nitrogen dioxide, ozone, sulfur dioxide; particulate matter air concentration; days Air Quality Index >100	Environmental Protection Agency (http://www.epa.gov/airtrends). From webpage select "Metropolitan Area Trends"; choose Table A-15 for peak concentrations, Table A-17 for Air Quality Index. Pdf files
2. Total pounds air chemicals emitted by industry, by chemical	Environmental Protection Agency, Toxics Release Inventory (http://www.epa.gov/tri). From webpage select "Get TRI Data"; select "TRI Explorer"; under "Chemical Released" choose "Select a Chemical Group," then "Hazardous Air Pollutants"; select geographic area of interest, then generate downloadable report
B. Indoor	
1. Percent of households reporting neighborhood odor to be a problem or bothersome	American Housing Survey (http://www.census.gov/hhes/www/abs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII
2. Water Quality	
A. Number of violations per year for federally regulated drinking water contaminants	Environmental Protection Agency (http://www.epa.gov/safewater/data/pivottables.html#summdetails). Downloadable compressed *Excel* files
B. Total pounds surface water chemicals discharged by industry, by chemical	Environmental Protection Agency, Toxics Release Inventory (http://www.epa.gov/tri). From webpage select "Get TRI Data"; select "TRI Explorer"; select report by industry or chemical, choose geographic area of interest, then generate downloadable report
3. Environmental Hazards	
A. Hazardous waste	
1. Total pounds of chemical waste released by industry, by chemical	Environmental Protection Agency, Toxics Release Inventory (http://www.epa.gov/tri). From webpage select "Get TRI Data"; select "TRI Explorer"; select report by industry or chemical, choose geographic area of interest, then generate downloadable report

B. Heavy metals	
1. Total pounds of selected heavy metals released by industry	Environmental Protection Agency, Toxics Release Inventory (http://www.epa.gov/tri). From webpage select "Get TRI Data"; select "TRI Explorer"; under "Chemical Released" choose "Select a Chemical Group," then "Metals and Metal Compounds"; select geographic area of interest, then generate downloadable report
C. Pesticides	
1. Total pounds of pesticide chemicals	Environmental Protection Agency, Toxics Release Inventory (http://www.epa.gov/tri). From webpage select "Get TRI Data"; select "TRI Explorer"; select report by industry or chemical, choose geographic area of interest, then generate downloadable report
D. Climate extremes	
1. Maximum and minimum temperatures	Statistical Abstract of the United States (http://www.census.gov/statab/www). From webpage select desired year; select "Geography and Environment"
E. Noise	
1. Percent of households reporting noise to be a problem or bothersome	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII
4. Physical Safety	
A. Traffic	
1. Total miles of local roads; total vehicle miles of local road travel daily	Federal Highway Administration (http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubs.htm). From webpage select "Highway Statistics" for desired year; select "Roadway Extent, Characteristics, and Performance." Pdf and *Excel* files
2. Percent of households perceiving traffic as a problem or bothersome	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII

continued

Table 6: *Continued*

INDICATORS	*DATA SOURCE*
B. Street repair	
1. Percent of households reporting major street repair needed in their neighborhood	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII
5. Land Use	
A. Public recreational space/number of parks	
1. Expenditures on natural resources, parks, and recreation	Census of Governments (http://www.census.gov/goys/www). From website select desired year; select Vol. 4, No. 3, 4, "Finances of County or Municipal and Township Governments," or downloadable state and local government finance data
B. Waste disposal/dumping/sanitation services	
1. Pounds of waste managed	Environmental Protection Agency, Toxics Release Inventory (http://www.epa.gov/tri). From webpage select "Get TRI Data"; select "TRI Explorer"; select report by industry or chemical, choose geographic area of interest; choose waste quantity reports; generate downloadable report
2. Percent households reporting major trash, litter, or junk on streets near their home; reporting neighborhood litter/deterioration to be a problem or bothersome; reporting poor city or county services in neighborhood	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII
C. Curbside recycling programs	
1. Pounds of waste transferred to recycling	Environmental Protection Agency, Toxics Release Inventory (http://www.epa.gov/tri). From webpage select "Get TRI Data"; select "TRI Explorer"; select report by industry or chemical, choose geographic area of interest; choose waste quantity reports; generate downloadable report

Table 7: Selected Data Sources Relevant to the Housing Dimension

INDICATORS	*DATA SOURCE*
1. Housing Stock	
A. Age	
1. Median age of housing units	Census Bureau (http://www.census.gov)
2. New private housing units authorized by building permits as a percent of housing stock	1. State and Metropolitan Area Data Book (http://www.census.gov/statab/www/smadb.html) 2. State of the Nation's Housing (http://www.jchs.harvard.edu). From webpage choose publications, then most recent edition
B. Scarcity	
1. Percent housing units vacant	Census Bureau (http://www.census.gov)
C. Value	
1. Median value, owner-occupied housing units	Census Bureau (http://www.census.gov)
2. Median sales price of existing homes	State of the Nation's Housing (http://www.jchs.harvard.edu). From webpage choose publications, then most recent edition
3. Valuation of residential construction	See Economic Dimension, Fiscal Capacity
D. Characteristics	
1. Percent of housing units lacking complete kitchen facilities, complete plumbing facilities, and/or telephone	Census Bureau (http://www.census.gov)
2. Percent of households reporting 1 or more vandalized buildings in neighborhood; percent of households with best/worst opinion of their neighborhood (10 point scale)	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included in each year. Downloadable data in *SAS* and ASCII
E. Gentrification/gatedness	
1. Percent of home loans to high-income borrowers made in low-income areas of central cities	State of the Nation's Housing (http://www.jchs.harvard.edu). From webpage choose publications, then most recent edition

continued

Table 7: *Continued*

INDICATORS	*DATA SOURCE*
F. Rental vs. owner occupied	
1. Percent of occupied housing units that are owner occupied	Census Bureau (http://www.census.gov)
2. Residential Patterns	
A. Homelessness	
1. Estimated homeless population	U.S. Conference of Mayors (http://www.usmayors.org/uscm/home.asp). From webpage select "Hunger and Homelessness" from "Reports and Publications"
B. Number of institutional facilities	
1. Number of homeless shelter beds; number of months wait for public housing and Section 8 vouchers	U.S. Conference of Mayors (http://www.usmayors.org/uscm/home.asp) as above
C. Segregation	
1. Racial/ethnic	
A. Indices of dissimilarity, isolation, delta, absolute centralization, and spatial proximity	Iceland, J., D.H. Weinberg, and E. Steinmetz *Racial and Ethnic Residential Segregation in the United States: 1980–2000.* Census 2000. Special Report (http://www.landview.census.gov/hhes/www/housing/resseg/pdftoc.html)
2. Economic	See Economic Dimension, Income
D. Vacancy rates	
1. Percent housing units vacant	Census Bureau (http://www.census.gov)
E. Crowded housing	
1. Mean number of persons per room	Census Bureau (http://www.census.gov)
F. Population density	
1. Persons per square mile	Census Bureau (http://www.census.gov)
3. Regulation	
A. Zoning policies	
1. Percent of households perceiving undesirable commercial, institutional, or industrial use as a problem or bothersome	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII

B. Industrial/residential segregation	
1. Segregation indices for blacks, whites, and Hispanics from high-employment and hazardous manufacturing industries	Anderton, D. L. and K. L. Egan 2002 *Industrial and Residential Segregation: Employment Opportunities and Environmental Burdens in Metropolitan Areas.* (http://www.umass.edu/sadri/papers/wp20002.pdf).
4. Financial issues	
A. Housing costs	
1. Cost of living index, housing and utilities; average 950 sq. ft. apartment rent, 2,400 sq. ft. new home price, house payment, monthly energy costs	American Chamber of Commerce Researchers Association (http://www.accra.org). Quarterly and annual average data may be purchased as downloadable spreadsheet or hard copy
2. Basic family budgetary need for housing	Economic Policy Institute Hardships in America (epinet.org). From webpage choose "Basic Family Budget Calculator"; select a metropolitan area of interest or download budget tables for all areas in *Excel* format
3. Consumer expenditures on housing	Bureau of Labor Statistics (BLS) (http://www.bls.gov). From webpage select "Consumer Expenditures"; select "Tables Created by BLS"; select current MSA tables grouped by region in text or pdf format
4. Percent of income spent on mortgage/rent	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII
5. Median gross rent as a percent of household income	Census Bureau (http://www.census.gov)
B. Low-income housing	
1. Percent of total housing	
A. % households receiving federal housing assistance	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII
B. Percent of home loans to low-income borrowers	State of the Nation's Housing (http://www.jchs.harvard.edu) as above
2. Ratio of low-income units to low-income workers	
A. Ratio of low-rent units and Section 8 units to low-income families	Can be calculated from Housing Authority Profile data on low-rent units (http://www.hnd.gov) and census data

continued

Table 7: *Continued*

INDICATORS	*DATA SOURCE*
C. Mortgage lending practices by race/ethnicity	
1. Share of all home loans made to minority borrowers	State of the Nation's Housing (http://www.jchs.harvard.edu) as above
2. Home loan denial rates by race	See Economic Dimension, Financial Services
D. Community reinvestment initiatives	
1. Expenditures for housing and community development	Census of Governments (http://www.census.gov/govs/www). From webpage select "State and Local Government Finances"; select year of interest. Downloadable spreadsheet or comma-separated-value files

Table 8: Selected Data Sources Relevant to the Medical Dimension

INDICATORS	*DATA SOURCE*
1. Primary Care	
A. Number of providers	
1. Total number non-federal MD/DOs in primary care, family practice, general practice, internal medicine, ob/gyn, and pediatric primary care practice	American Medical Association Physicians' Professional data, Medical Marketing Systems (http://www.mmslists.com/main.asp). Custom data tables may be purchased in *Excel* format
B. Provider training/competence/certification	
1. Non-federal physicians in primary care who are foreign medical graduates, and who are board certified; hospital-associated medical staff who are board certified	Area Resource File (http://www.arfsys.com). Data available for purchase on CD-ROM, magnetic tape, and cartridge
C. Medicaid/Medicare reimbursement levels	
1. Medicaid reimbursement rates for various medical services including preventive care visits, immunization, critical care, emergency care, and surgery	American Academy of Pediatrics: Medicaid Reimbursement Survey (http://www.aap.org/research/medreimPDF01/all_states.PDF)
2. Age, sex, race, illness, and price-adjusted reimbursements for noncapitated Medicare per enrollee	Dartmouth Atlas of Health Care (http://www.dartmouthatlas.org). Downloadable *Excel* files
2. Specialty Care	
A. Number of providers	
1. Total number non-federal MD/DOs in medical and surgical specialty office practice	American Medical Association Physicians' Professional data Medical Marketing Systems (http://www.mmslists.com/main.asp). Custom data tables may be purchased in *Excel* format
B. Provider training/competence/certification	
1. Non-federal physicians in specialty care who are foreign medical graduates, and who are board	Area Resource File (http://www.arfsys.com) as above

continued

Table 8: *Continued*

INDICATORS	*DATA SOURCE*
certified; hospital-associated medical staff who are board certified	
3. Emergency Services	
A. Number non-federal physicians in Emergency medicine patient care; number hospitals with Emergency Depts.	Area Resource File (http://www.arfsys.com) as above
4. Home Health Care Services	
A. Number of hospitals with Home Health Services	Area Resource File (http://www.arfsys.com) as above
5. Mental Health Care	
A. Total number non-federal physicians in Psychiatric, office-based patient care; number of hospitals with psychiatric emergency, outpatient, emergency social work, and outpatient social work services	Area Resource File (http://www.arfsys.com) as above
6. Long-Term Care	
A. Number of nursing and board and care homes and beds; number of long-term hospitals and beds	Area Resource File (http://www.arfsys.com) as above
7. Oral Health Care	
A. Total number of active dentists in private practice	Area Resource File (http://www.arfsys.com) as above
8. Access to/Utilization of Care	
A. Insurance coverage	
1. Percent 0–64 uninsured, with job-based insurance, with no usual care source, and who delayed or went without needed care	Brown, E. R., R. Wyn, and S. Teleki. 2000. *Disparities in Health Insurance and Access to Care for Residents across US Cities.* (http://www.cmwf.org/programs/insurance/Brown85MSAsreport.pdf).
B. Race/ethnic staff to population ratios	
1. Race/ethnic staff to population ratios for primary care family practice, general practice, pediatric	Can be calculated from American Medical Association Physicians' professional data, Medical Marketing Systems (http://www.mmslists.com) and census data

practice, internal medicine, ob/gyn, and medical and surgical subspecialties	
C. Provision of care in total and indigent care	
1. Number of short-term general hospital admissions and emergency hospital outpatient visits	Area Resource File (http://www.arfsys.com) as above
D. Costs of care	
1. Average cost of routine MD visit, hospital room	American chamber of Commerce Researchers Association (http://www.accra.org). Quarterly and annual average data may be purchased as downloadable spreadsheet or hard copy
2. Consumer expenditures on health care	Bureau of Labor Statistics (BLS) (http://www.bls.gov). From webpage select "Consumer Expenditures"; select "Tables Created by BLS"; select current MSA tables grouped by region in text or pdf format
E. Rates of ambulatory care sensitive hospitalizations	
1. Rates of ambulatory care sensitive hospitalizations per 1,000 Medicare enrollees	Dartmouth Atlas of Health Care (http://www.dartmouthatlas.org) as above

Table 9: Selected Data Sources Relevant to the Governmental Dimension

INDICATORS	*DATA SOURCE*
1. Funding	
A. Revenue	
1. Intergovernmental	
A. Revenue from federal, state, and local government sources	Census of Governments (http://www.census.gov/govs/www). From webpage select year of interest; select Vol. 4, No. 3 or 4, "Finances of County or Municipal and Township Governments" or downloadable spreadsheet or comma-separated-value files
2. Taxes	
A. Revenue from all taxes, property, income, and sales taxes	Census of Governments (http://www.census.gov/govs/www). From webpage select "State and Local Government Finances"; select year of interest. Downloadable spreadsheet or comma-separated-value files
3. Lottery	
A. Revenue from lottery	Christiansen Capital Advisors (http://www.cca-i.com). From webpage select "Research"; select "Lottery Data" *Excel* files available for purchase
B. Debt	
1. Total debt outstanding	Census of Governments (http://www.census.gov/govs/www). From webpage select year of interest; select vol. 1, no. 3 or 4, "Finances of County or Municipal and Township Governments" or downloadable spreadsheet or comma-separated-value files
2. Policy/Legislation	
A. Obstacles to unionization	See Employment Dimension, Workforce Characteristics
B. Living wage/minimum wage ordinances	
1. Living wage laws enacted	ACRON Living Wage Resource Center (http://www.acron.org). From webpage select "Living Wage"; select "List of Cities and Counties Where Living Wage Ordinances Have Been Passed"

2. Minimum wage rate	U.S. Department of Labor (http://www.dol.gov/esa/minwage/america.htm). Interactive map providing details of state minimum wage rates
3. Services	
A. Privatization	
1. Number of state programs and services privatized	Reason Public Policy Institute Privatization Center (http://www.privatization.org). From webpage select "Privatization Database"; select "Statistics and Trends." Results of surveys on number of programs and services privatized by state
B. Local services/safety net resources	
1. Percent of households reporting poor levels of city or county services, and reporting poor levels of police protection in their neighborhood	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII
2. Expenditures on public welfare, health, and hospitals, police and fire protection, parks and recreation, sewerage and sold waste management	Census of Governments (http://www.census.gov/govs/www). From webpage select year of interest; select Vol. 4, No. 3 or 4, "Finances of County or Municipal and Township Governments" or downloadable spreadsheet or comma-separated-value files
4. Municipal Fragmentation (Number of Subunit Governments within a Metro Area)	
1. Number of local governments	Census of Governments (http://www.census.gov/govs/www). From webpage select year of interest; select Vol. 1, No. 1, "Government Organization" or downloadable spreadsheet or comma-separated-value files
2. Metropolitan power diffusion index	Mitchell-Weaver, C., D. Miller, and R. Deal. 2000. "Multilevel Governance and Metropolitan Regionalism in the USA." *Urban Studies 37(5–6): 851–76.*

Table 10: Selected Data Sources Relevant to the Public Health Dimension

INDICATORS	*DATA SOURCE*
1. Programs	
A–J: Screening; Nutrition; Family Planning; Chronic Disease Control; Home Visiting; Outreach; School-Based Clinics/Education; Substance Abuse Prevention; Domestic Violence Program; Mental Health Services	Local Health Department Infrastructure Study (http://www.sscnet.ucla.edu/issr/da/index/techinfo/i31851.htm). This survey addressed the paucity of current data on the U.S. public health infrastructure. Respondent's state identification only obtainable through agreeing to terms and conditions of a Restricted Data Use Agreement; data available through the Inter-University Consortium for Political and Social Research; *STATA* file
K. Immunization	
1. Percent of 19–35 mo. olds completely immunized by race/ethnicity	National Immunization Program (http://www.cdc.gov/nip/coverage/default.htm). From webpage select "National Immunization Survey (NIS)"; select "NIS Data Tables"; downloadable tables in *Excel* or html for states and select counties
2. Regulation/Enforcement	
A–C. Sanitation; Health/food inspection; Health violations	Local Health Department Infrastructure Study as above
3. Funding	
A. Budget allocations	
1. Local health department expenditures	Local Health Department Infrastructure Study as above
2. Governmental expenditures on health	Census of Governments (http://www.census.gov/govs/www). From webpage select year of interest; select Vol. 4, No. 3 or 4, "Finances of County or Municipal and Township Governments" or downloadable spreadsheet or comma-separated-value files
B. Private sector provision of public health services	
1. Percent of total local health department budget from private sources	Local Health Department Infrastructure Study as above

Table 11: Selected Data Sources Relevant to the Psychosocial Dimension

INDICATORS	*DATA SOURCE*
1. Political	
A. Contributions to parties, candidates	See Political Dimension, Civic Participation
B. Women in elected office	See Political Dimension, Political Structure
C. Registered voters	See Political Dimension, Civic Participation
2. Volunteer Organizations	
A. Types/functions	
1. Number of churches, total and by denomination	*Religious Congregations and Membership in the United States 2000: An Enumeration by Region, State and County Based on Data Reported for 149 Religious Bodies.* (http://www.glenmary.org/grc/default.htm). Data available for purchase in CD-ROM and hard copy
B. Number of members	
1. Number of church members and church adherents, total and by denomination	Religious Congregations and Membership in the United States as above
2. Number and size of membership organizations, including churches, political and civic organizations	See Political Dimension, Power Groups
3. Union Participation	See Employment Dimension, Workforce Characteristics
4. Charitable Giving	
1. Average charitable contribution per itemized income tax return; number of public charitable organizations by type of charity; monetary public support for public charitable organizations by type of charity	National Center for Charitable Statistics (http://www.nccsdataweb.urban.org/NCCS/Public). Data from the Internal Revenue Service and other sources; dataweb in development that will allow data viewing, extraction, and download
5. Jails	
A. Expenditures	
1. State and local justice system expenditures	*Sourcebook of Criminal Justice Statistics* (http://www.albany.edu/sourcebook). Data available online and in CD-ROM and print format

continued

Table 11: *Continued*

INDICATORS	*DATA SOURCE*
2. Corrections expenditures	Census of Governments (http://www.census.gov/govs/www). From webpage select year of interest; select Vol. 4, No. 3 or 4, "Finances of County or Municipal and Township Governments" or downloadable spreadsheet or comma-separated-value files
B. Incarceration rates	
1. Average daily population in local jails; state prison incarceration rates	Bureau of Justice Statistics, Prison and Jail Inmates at Midyear (http://www.ojp.usdoj.gov/bjs/pubalp2.htm). Pdf, ASCII, and spreadsheet files available for download
2. Confined jail inmates by race, as a percent of total race specific population	Can be calculated from the Bureau of Justice Statistics as above and census data
C. Crime	
1. Number serious crimes known to police	U.S. Counties (http://www.census.gov/statab/www/county.html). Data available on CD-ROM; online data for single counties downloadable as text or comma-separated-value file
6. Lawsuits	
A. Civil lawsuits	
1. Number of tort trials	Bureau of Justice Statistics: Tort Trials and Verdicts in Large Counties (http://www.ojp.usdoj.gov/bjs/pubalp2.htm). Pdf, ASCII, and spreadsheet files available for download
7. Protective Services	
A. Government services	
1. Police protection expenditures	Census of Governments (http://www.census.gov/govs/www). From webpage select year of interest; select Vol. 4, No 3 or 4, "Finances of County or Municipal and Township Governments" or downloadable spreadsheet or comma-separated-value files
2. Percent of households reporting poor levels of police protection in their neighborhood	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII

Table 12: Selected Data Sources Relevant to the Behavioral Dimension

INDICATORS	*DATA SOURCE*
1. Tobacco Use	
A. Smoking rates	
1. Rate of ever smoking; number of cigarettes smoked per day; current smoking rates among adults	Behavioral Risk Factor Surveillance Survey (http://www.cdc.gov/brfss). Data for states available in Rich Text Format and *SAS* format; estimates for metropolitan areas under development by CDC
2. Current smoking rates among children in grades 6–8, 9–12	National Tobacco Control Program State Exchange (http://www.cdc.gov/tobacco/ntcp_exchange/index.htm). Webpage has links to state information
B. Cessation programs	
1. Directory of local smoking cessation programs	Quitnet National Directory (http://www.quitnet.com/library/programs/)
C. Smoking prevention	
1. Tobacco control funding	National Tobacco Control Program State Exchange as above
D. Workplace/public space smoking restriction laws	
1. Workplace smoking policies	Behavioral Risk Factor Surveillance Survey as above
2. Smoking restrictions: government and private workplaces, restaurants, child day care, bars, malls, grocery stores, enclosed arenas, public transportation, hospitals, prisons, hotels, and motels	National Tobacco Control Program State Exchange as above
E. Cost/accessibility of cigarettes	
1. Cigarette tax	See Economic Dimension, Redistribution (Taxes)
2. Average local price of cigarettes	See Economic Dimension, Cost of Living
2. Physical Activity	
A. Physical activity levels	
1. Type, frequency, and duration of physical activity	Behavioral Risk Factor Surveillance Survey as above
B. Physical education requirements in schools	See Education Dimension, School Characteristics
C. Public and private recreational facilities	

continued

Table 12: *Continued*

INDICATORS	*DATA SOURCE*
1. Expenditures on natural resources, parks, and recreation	Census of Governments (http://www.census.gov/govs/www). From webpage select year of interest; select Vol. 4, No. 3 or 4, "Finances of County or Municipal and Township Governments" or downloadable spreadsheet or comma-separated-value files. See Education Dimension, Community Climate
D. Television viewing patterns	
3. Diet/Obesity	
A. Fresh fruit and vegetable consumption	
1. Food intake history	Behavioral Risk Factor Surveillance Survey as above
B. High-fat, high-sugar food consumption	
1. Food intake history	Behavioral Risk Factor Surveillance Survey as above
C. Food quality/availability	
1. Number of supermarkets, convenience stores	Economic Census (http://www.census.gov). Data for specific types of retail trade establishments available online and on CD-ROM
2. Percent of food sales that are supermarket sales	Progressive Grocer's Market Scope (http://www.progressivegrocer.com)
3. Percent of households reporting unsatisfactory shopping in their neighborhood	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII
D. Number of fast food establishments	
1. Number of fast food restaurants	Economic Census as above
E. School nutrition	
1. Regulation of subcontracting to vendors	Commercial Activities in Schools GAO Report (http://www.gao.gov/archive/2000/he00156.pdf)
2. Nutrition education	See Education Dimension, School Characteristics
4. Alcohol and Illicit Drug Use	
A. Number of beer, wine and liquor stores	Economic Census as above

B. Drug and alcohol treatment services	
1. Number of hospitals with outpatient alcohol/drug abuse services; number of alcohol/chemical dependency treatment beds	Area Resource File (http://www.arfsys.com). Data available for purchase on CD-ROM, magnetic tape, and cartridge
2. Number of alcohol/chemical dependency treatment programs	Substance Abuse and Mental Health Services Administration Facility locator (http://www.findtreatment.samhsa.gov/facilitylocatordoc.htm)
C. Syringe laws/exchange programs	
1. Law allowing sterile syringe exchange	Hard Truth about AIDS: Sterile Syringe Exchange Programs (http://www.hardtruth.qti.net/sterile_syringe_exchange_program.htm)
5. Violence	
A. Guns	
1. Availability	
A. Presence of firearms in home/vehicle	Behavioral Risk Factor Surveillance Survey as above
B. Number of gun stores	Economic Census as above
B. Exposure to violence	
1. Rates of violent crime	FBI Uniform Crime Reports (http://www.fbi.gov/ucr/ucr.htm). From webpage select "Crime in the United States"; select year of interest; select "Index of Crime" for metropolitan statistical areas; data downloadable in *Excel* and pdf format
2. Perception of neighborhood safety	Behavioral Risk Factor Surveillance Survey as above
3. Percent of households perceiving neighborhood crime as a problem or bothersome	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII
C. Police protection	See Psychosocial Dimension, Protective Services

Table 13: Selected Data Sources Relevant to the Transportation Dimension

INDICATORS	*DATA SOURCE*
1. Safety	
A. Seat belts/child restraints	
1. Prevalence of seat belt and child safety seat use	Behavioral Risk Factor Surveillance Survey (http://www. cdc.gov/brfss). Data for states available in Rich Text Format and *SAS* format; estimates for metropolitan areas under development by CDC
B. Helmets	
1. Prevalence of child bicycle helmet use	Behavioral Risk Factor Surveillance Survey as above
C. Age curfews/graduated driver's license program	
1. Driver's license requirements for young drivers	Insurance Institute for Highway Safety/Highway Loss Data Institute (http://www.hwysafety-org/). From webpage select "Flow States Measure Up"
D. Driving while intoxicated laws/enforcement	
1. Rating of driving while intoxicated laws and law enforcement	MADD (http://www.madd.org/home). From webpage select "States and Resources"; select "Laws"; select "Rating the States"
E. Speed restriction/enforcement	
1. Speed limit on urban interstates	Insurance Institute for Highway Safety/Highway Loss Data Institute (http://www.hwysafety.org/). From webpage select "How States Measure Up"
2. Peak period freeway and principal artery speed	Texas Transportation Institute (http://www.mobility.tamu.edu/). Annual Urban Mobility Report includes speed and congestion information
2. Infrastructure	
A. Roads	
1. Quantity	
A. Miles of interstate, other freeways and expressways other principal arteries, minor arterial, collector, and local roads, and total roadway miles	Federal Highway Administration (http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubs.htm). From webpage select "Highway Statistics" for desired year; select "Roadway Extent, Characteristics, and Performance." Pdf and *Excel* files
2. Quality	

A. Percent of households reporting major repairs needed to streets in their neighborhood	American Housing survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average 12 areas included each year. Downloadable data in *SAS* and ASCII
3. Traffic patterns	
A. Spatial location of jobs	
1. Mean travel time to work, workers 16+; average daily commute distance	Census Bureau (http://www.census.gov)
B. Traffic volume	
1. Total vehicle miles of local road travel daily, total and by type of road; travel time index (measure of congestion at peak times); percent lane miles with congestion	Texas Transportation Institute as above
2. Percent of households reporting street noise or traffic as a problem or bothersome	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every 4 years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII
3. Annual traffic growth rates	Highway and Motorway Fact Book (http://www.publicpurpose. com/ut-ushyg.htm)
C. Car pooling	
1. Percent of workers 16+years carpooling to work	Census Bureau (http://www.census.gov)
4. Vehicles	
A. Numbers of vehicles	
1. Vehicles available per household	Census Bureau (http://www.census.gov)
B. Types of vehicles	
1. Numbers of automobiles, buses, trucks, and trailers registered	Federal Highway Administration (http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubs.htm). From webpage select "Highway Statistics" for desired year; select "Motor Vehicles." Pdf and *Excel* files
5. Public Transportation	
A. Availability/density/efficiency	
1. Percent of households reporting unsatisfactory or no public transportation in their neighborhood	American Housing Survey (http://www.census.gov/hhes/www/ahs.htm). Data for each of 47 selected metropolitan areas are collected about every four years, with an average of 12 areas included each year. Downloadable data in *SAS* and ASCII

continued

Table 13: *Continued*

INDICATORS	*DATA SOURCE*
B. Types of public transportation available	
1. Percent of 16+ using various means of transportation to work	Census Bureau (http://www.census.gov)
C. Cohesiveness/integration	
1. Percent of trips taken by car, transit, on foot, and by bicycle	*Driven to Spend: The Impact of Sprawl on Household Expenses* (http://www.transact.org). From webpage select "Library"; select "STPP Reports"
6. Economic Issues	
A. Expenditures	
1. Highway expenditures	Census of Governments (http://www.census.gov/govs/www). From website select desired year; select Vol. 4, No. 3, 4. "Finances of County or Municipal and Township Governments" or downloadable state and local government finance data
2. Percent of total household expenditures for transportation; household spending on public transportation	*Driven to Spend: The Impact of Sprawl on Household Expenses* as above
3. Consumer expenditures on transportation	See Economic Dimension, Cost of Living
B. Spending on local roads vs. alternate transportation	
1. Funding for state grants-in-aid for mass transit; funding for highway	Federal Highway Administration (http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubs.htm). From webpage select "Highway Statistics" for desired year; select "Highway Finance." Pdf and *Excel* files
C. Percent of transit revenue from fares	
1. Percent of total operating funds that are fare revenues	National Transit Database (http://www.fta.dot.gov/ntl/database.html). Pdf and HTML tables
D. Insurance rates	
1. Average expenditure for auto insurance	See Economic Dimension, Cost of Living
E. Commuter taxes	
1. Transit and vanpool tax exemption benefits	See Economic Dimension, Exploitation, Commuter Taxes

Institutions Examination Council, the American Chamber of Commerce Researchers Association, and the Economic Policy Institute. Further information about accessing these and other data sources listed in Tables 2–13 is available from the authors.

Having provided details of potential characteristics of communities that may affect health and the process through which they were generated, we will conclude this paper by describing three general principles that we think can help guide the development of future research and advocacy on the importance of community contextual characteristics for health.

How Might Community Contextual Characteristics Affect Health Disparities? Three Guiding Principles to Consider

A key question underlying much of the literature on contextual characteristics and health is whether local variations in outcomes are attributable to the composition of the population in an area, or whether aspects of the areas themselves influence health status. While authors of several earlier studies concluded that area effects were not significant once individual factors had been taken into account (Duncan, Jones, and Moon 1993; Sloggett and Joshi 1994), reviews of more recent literature incorporating more complex multilevel modeling have concluded that there is fairly consistent evidence for the presence of so-called "area effects" for a range of health outcomes (Pickett and Pearl 2001; Macintyre, Ellaway, and Cummins 2002).

We propose three related guiding principles that we think are useful for understanding how aspects of contextual characteristics can affect health and disparities in health.

Community Contextual Characteristics and the Specificity of Health Outcomes

The first principle involves the conceptualization of "health." It is obvious that health is multidimensional and cannot be captured in a single outcome. In considering how community contextual characteristics may affect health, we are concerned with a broad range of health outcomes, such as heart disease, diabetes, stroke, cancer, suicide, and asthma. In addition, we are concerned with mental health, aspects of physical, social, emotional, and cognitive functioning, and health-related behaviors such as exercise, diet, and medication and health care utilization. This list is not intended to be exhaustive or exclusive. Rather, it serves to illustrate our first principle.

Greater understanding of how community contextual characteristics may affect health will require thinking about mechanisms linking contextual characteristics to specific health outcomes. The contextual characteristics associated with falls among the elderly are not necessarily the same characteristics implicated in respiratory disease in children, or in suicide. Likewise, the uneven or broken pavements implicated in falls among the elderly do not cause respiratory disease, even though we may be forced to pragmatically use a count of uneven or broken pavements as a surrogate for the causal exposures for respiratory disease. Indeed, tallies of dilapidated buildings or broken windows have been used as surrogate measures of contextual environment linked to certain health outcomes (Cohen et al. 2000). Nevertheless, it is important to be clear that these may not be the causal exposures relevant to different types of health outcomes.

The point is that unless we attempt to study rather specific health outcomes, it will be difficult to know which contextual characteristics are important for which health outcomes. A study by Merlo and colleagues (in press) is an example of showing how a specific aspect of contextual environment—levels of social participation and the communication networks it fostered—is plausibly related to use of hormone replacement therapy, but is not related to anti-hypertensive medication use, in spite of the fact that these are very similar outcomes.

This specific outcome/mechanism approach is, in our opinion, one way forward and needs to be applied more rigorously across a range of potential health outcomes relevant to contextual influences on health disparities. We do not wish to appear overly reductionist and would hold open the possibility that many contextual characteristics are likely to be empirically implicated in a range of health outcomes (e.g., poverty). Moreover, we should also be aware of the potential for clusters of exposures to interact in producing disease, so that it is the spatial aggregation of a series of negative contextual forces that act synergistically to magnify the total exposure load or increase susceptibility to certain outcomes (Diderichsen, Evans, and Whitehead 2001). However, the general principle of moving toward a search for greater conceptual and mechanistic specificity (both social and biological) of contextual influences on health is important.

Contextual Characteristics and the Natural History of Different Health Outcomes

The second and related principle to consider is the "natural history" of different types of health outcomes. This means thinking about which stage in

the natural history of the outcome is of concern. For instance, it is possible that contextual characteristics may play little simultaneous role in the pathogenesis of stroke, but currently existing contextual conditions may be very important in the quality of life and access to resources of people who have survived stroke and are living with some functional limitations. For many health outcomes, especially chronic disease outcomes, there is a natural history that may involve early exposure to certain risk factors such as a high fat diet or cigarette smoking, metabolic or hemostatic changes, and the appearance of subclinical manifestations that increase susceptibility, such as asymptomatic atherosclerosis or elevated blood pressure. At a later stage there may be triggering mechanisms that lead to a clinically defined event (such as a heart attack), and assuming survival, the consequences of the disease where afflicted individuals learn to live on a day-to-day basis with any physical, social, behavioral, and psychological limitations imposed by their condition. It seems likely that different aspects of community contextual characteristics could affect these processes differently (Morenoff and Lynch 2002).

Our point here is to suggest that there is no single pathway to health and therefore there is not a unique set of contextual characteristics that will be universally important for all health outcomes or at all stages of the outcomes. The two principles described so far are important in guiding the next phase of research on health-related contextual effects and this recognition is motivated by the overwhelming body of knowledge that suggests that there are indeed different pathways to different types and stages of health outcomes.

Contextual Characteristics and the Lifecourse

The third principle involves the consideration of lifecourse processes (Kuh and Ben-Shlomo 1997). If research on contextual health effects is to fulfill its promise for better understanding health and disparities in health, then it can be misleading to look for "explanations" based solely on contemporaneous contextual exposures. As we have discussed above, chronic diseases have latency periods—that implies that exposures from across the lifecourse may be important in the pathogenesis and progression of these diseases (Davey Smith and Lynch in press; Barker 1998; Davey Smith et al. 1997, 1998, 2000; Davey Smith, Harding, and Rosato 2000; Hertzman et al. 2001; Leon 1998).

This does not mean that there are not important proximal contextual characteristics related to the triggering of events. However, we should conceptualize how measured exposures to contextual characteristics match up with the temporal logic of the stage of the outcome. This means we should start

thinking about the potential effects of community contextual characteristics through a lifecourse perspective. It is possible that exposure to current environmental conditions per se has little to do with the current distribution of disparities in the incidence of chronic disease outcomes like rates of heart disease or cancer. Rather, they may more strongly reflect both contextual characteristics and individual influences from earlier in the lifecourse. This recognition means that both individual and contextual exposures over the lifecourse are of interest in better understanding contemporary levels and disparities in population health outcomes such as heart disease, cancer, chronic lung disease, and diabetes. Thus, it is important to remember that exposures in early life can have both direct and indirect long-term effects on health. Biological and social exposures co-evolve over the lifecourse so that contextual exposures at one point may be literally "embodied" to the extent they become an "individual characteristic" later in the lifecourse. (Kuh et al. in press; Aboderin et al. 2002; Davey Smith et al. 2000; Davey Smith, Harding, and Rosato 2000; Harding 2001; Ben-Shlomo and Kuh 2002; Leon 2000).

CONCLUSION

In this paper, we have documented a project designed to elucidate those aspects of community contextual characteristics that are plausibly linked to health. We hope the information presented here is useful to public health researchers and advocates in terms of broadening the conceptualization of potential contextual influences on health and understanding the health-promoting and health-endangering characteristics within which decisions about the provision of health care services are made. In addition to this very practical contribution, we have also attempted to provide some thoughts on how the research agenda on contextual health effects might move most profitably forward. We believe that it is important to adopt a lifecourse approach to more fully understand the effects of contextual characteristics on health and health disparities.

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REFERENCES

Aboderin, I., A. Kalache, Y. Ben-Shlomo, J. W. Lynch, C. S. Yajnik, D. Kuh, and D. Yach. 2001. *Life Course Perspectives on Coronary Heart Disease, Stroke and Diabetes: Key Issues and Implications for Policy and Research.* Geneva: World Health Organization.

Acevedo-Garcia, D. 2000. "Residential Segregation and the Epidemiology of Infectious Diseases." *Social Science and Medicine* 51 (8): 1143–61.

——— 2001. "Zip Code-Level Risk Factors for Tuberculosis: Neighborhood Environment and Residential Segregation in New Jersey, 1985–1992." *American Journal of Public Health* 91 (5): 734–41.

Agran, P. F., D. G. Winn, C. L. Anderson, and C. P. Del Valle. 1998. "Family, Social, and Cultural Factors in Pedestrian Injuries among Hispanic Children." *Injury Prevention* 4 (3): 188–93.

Agran, P. F., D. G. Winn, C. L. Anderson, C. Tran, and C. P. Del Valle. 1996. "The Role of the Physical and Traffic Environment in Child Pedestrian Injuries." *Pediatrics* 98 (6, part 2): 1096–103.

American Lung Association. 2001. "Urban Air Pollution and Health Inequalities: A Workshop Report." *Environmental Health Perspectives* 109 (3, supplement): 357–74.

Anderson, R. T., P. Sorlie, E. Backlund, N. Johnson, and G. A. Kaplan. 1997. "Mortality Effects of Community Socioeconomic Status." *Epidemiology* 8 (1): 42–7.

Andrulis, D. P. 1998. "Access to Care is the Centerpiece in the Elimination of Socioeconomic Disparities in Health." *Annals of Internal Medicine* 129 (5): 412–6.

Aneshensel, C. S., and C. A. Sucoff. 1996. "The Neighborhood Context of Adolescent Mental Health." *Journal of Health and Social Behavior* 37 (4): 293–310.

Armstrong, D. L., E. Barnett, M. Casper, and S. Wing. 1998. "Community Occupational Structure, Medical and Economic Resources, and Coronary Mortality among US Blacks and Whites, 1980–1988." *Annals of Epidemiology* 8 (3): 184–91.

Baker, D. W., M. F. Shapiro, and C. L. Schur. 2000. "Health Insurance and Access to Care for Symptomatic Conditions." *Archives of Internal Medicine* 160 (9): 1269–74.

Barker, D. J. 1998. *Mothers, Babies and Health in Later Life.* Edinburgh: Churchill Livingstone.

Barker, D. J., D. Coggon, C. Osmond, and C. Wickham. 1990. "Poor Housing in Childhood and High Rates of Stomach Cancer in England and Wales." *British Journal of Cancer* 61 (4): 575–8.

Barr, R. G., A. V. Diez-Roux, C. A. Knirsch, and A. Pablos-Mendez. 2001. "Neighborhood Poverty and the Resurgence of Tuberculosis in New York City, 1984–1992." *American Journal of Public Health* 91 (9): 1487–93.

Barrow, S. M., D. B. Herman, P. Cordova, and E. L. Struening. 1999. "Mortality among Homeless Shelter Residents in New York City." *American Journal of Public Health* 89 (4): 529–34.

Beauchamp, D. 1997. "Public Health, Privatization, and Market Populism: A Time for Reflection." *Quality Mananagment in Health Care* 5 (2): 73–9.

Ben-Shlomo, Y., and D. Kuh. 2002. "A Life Course Approach to Chronic Disease Epidemiology: Conceptual Models, Empirical Challenges and Interdisciplinary Perspectives." *International Journal of Epidemiology* 31 (2): 285–93.

Blakely, T. A., B. P. Kennedy, and I. Kawachi. 2001. "Socioeconomic Inequality in Voting Participation and Self-Rated Health." *American Journal of Public Health* 91 (1): 99–104.

Blindauer, K. M., R. J. Jackson, and M. McGeehin. 1999. "Environmental Pesticide Illness and Injury: The Need for a National Surveillance System." *Journal of Environmental Health* 61 (10): 9–13.

Bosma, H., H. D. van de Mheen, G. J. J. M. Borsboom, and J. P. Mackenbach. 2001. "Neighborhood Socioeconomic Status and All-Cause Mortality." *American Journal of Epidemiology* 153 (4): 363–71.

Bratton, K. A., and K. L. Haynie. 1999. "Agenda Setting and Legislative Success in State Legislatures: The Effects of Gender and Race." *Journal of Politics* 61 (3): 658–79.

Brown, P. 1995. "Race, Class, and Environmental Health: A Review and Systematization of the Literature." *Environmental Research* 69 (1): 15–30.

Carstairs, V., and R. Morris. 1989. "Deprivation: Explaining Differences in Mortality between Scotland and England and Wales." *British Medical Journal* 299 (6704): 886–9.

Casper, M. L., E. Barnett, J. A. Halverson, G. A. Elmes, V. E. Braham, Z. A. Majeed, A. S. Bloom, and S. Stanley. 1999. *Women and Heart Disease: An Atlas of Racial and Ethnic Disparities in Mortality.* Atlanta: Centers for Disease Control and Prevention.

Cassel, J. 1976. "The Contribution of the Social Environment to Host Resistance." *American Journal of Epidemiology* 104 (2): 107–23.

Cheng, Y., I. Kawachi, E. H. Caokley, J. Schwartz, and G. Colditz. 2000. "Association between Psychosocial Work Characteristics and Health Functioning in American Women: Prospective Study." *British Medical Journal* 320 (7247): 1432–6.

Cohen, D., S. Spear, R. Scribner, P. Kissinger, K. Mason, and J. Wildgen. 2000. "'Broken Windows' and the Risk of Gonorrhea." *American Journal of Public Health* 90 (2): 230–6.

Coleman, J. S. 1988. "Social Capital in the Creation of Human Capital." *American Journal of Sociology* 94 (3): S95–120.

Collins, J. W., and R. J. David. 1997. "Urban Violence and African-American Pregnancy Outcome: An Ecological Study." *Ethnicity and Disease* 7 (3): 184–90.

Collins, C. A., and D. R. Williams. 1999. "Segregation and Mortality: The Deadly Effects of Racism?" *Sociological Forum* 14 (3): 495–523.

Cubbin, C., F. B. LeClere, and G. S. Smith. 2000. "Socioeconomic Status and Injury Mortality: Individual and Neighborhood Determinants." *Journal of Epidemiology and Community Health* 54 (7): 517–24.

Davey Smith, G., and D. Dorling. 1996. "'I'm All Right, John': Voting Patterns and Mortality in England and Wales, 1981–92." *British Medical Journal* 313 (7072): 1573–7.

Davey Smith, G., S. Harding, and M. Rosato. 2000. "Relation between Infants' Birth Weight and Mothers' Mortality: Prospective Observational Study." *British Medical Journal* 320 (7238): 839–40.

Davey Smith, G., C. Hart, D. Blane, C. Gillis, and V. Hawthorne. 1997. "Lifetime Socioeconomic Position and Mortality: Prospective Observational Study." *British Medical Journal* 314 (7080): 547–52.

Davey Smith, G., C. Hart, D. Blane, and D. Hole. 1998. "Adverse Socioeconomic Conditions in Childhood and Cause Specific Adult Mortality: Prospective Observational Study." *British Medical Journal* 316 (7145): 1631–5.

Davey Smith, G., C. Hart, M. Upton, D. Hole, C. Gillis, G. Watt, and V. Hawthorne. 2000. "Height and Risk of Death among Men and Women: Etiological Implications of Associations with Cardio-respiratory Disease and Cancer Mortality." *Journal of Epidemiology and Community Health* 54 (2): 97–103.

Davey Smith, G., and J. W. Lynch. In press. "Socioeconomic Differentials." In *Lifecourse Approach to Chronic Disease Epidemiology*, vol. 2., edited by D. Kuh and Y. A. Ben-Shlomo. Oxford: Oxford University Press.

Dedman, D. J., D. Gunnell, G. Davey Smith, and S. Frankel. 2001. "Childhood Housing Conditions and Later Mortality in the Boyd Orr Cohort." *Journal of Epidemiology and Community Health* 55 (1): 10–5.

de Jonge, J., H. Bosma, R. Peter, and J. Siegrist. 2000. "Job Strain, Effort-Reward Imbalance and Employee Well-Being: A Large-Scale Cross-Sectional Study." *Social Science and Medicine* 50 (9): 1317–27.

Diderichsen, F., T. Evans, and M. Whitehead. 2001. "The Social Basis of Disparities in Health." In *Challenging Inequalities in Health: From Ethics to Action*, edited by T. Evans, M. Whitehead, F. Diderichsen, A. Bhuiya, and M. Wirth, pp. 13–23. Oxford: Oxford University Press.

Diehr, P., T. Koepsell, A. Cheadle, B. M. Psaty, E. Wagner, and S. Curry. 1993. "Do Communities Differ in Health Behaviors?" *Journal of Clinical Epidemiology* 46 (10): 1141–9.

Diez-Roux, A. V. 1998. "Bringing Context Back into Epidemiology: Variables and Fallacies in Multilevel Analysis." *American Journal of Public Health* 88 (2): 216–22.

Diez-Roux, A. V., S. S. Merkin, D. Arnett, L. Chambless, M. Massing, F. J. Nieto, P. Sorlie, M. Szklo, H. A. Tyroler, and R. L. Watson. 2001. "Neighborhood of Residence and Incidence of Coronary Heart Disease." *New England Journal of Medicine* 345 (2): 99–106.

Diez-Roux, A. V., F. J. Nieto, L. Caulfield, H. A. Tyroler, R. L. Watson, and M. Szklo. 1999. "Neighbourhood Differences in Diet: The Atherosclerosis Risk in Communities (ARIC) Study." *Journal of Epidemiology and Community Health* 53 (1): 55–63.

Diez-Roux, A. V., F. J. Nieto, C. Muntaner, H. A. Tyroler, G. W. Comstock, E. Shahar, L. S. Cooper, R. L. Watson, and M. Szklo. 1997. "Neighborhood Environments and Coronary Heart Disease: A Multilevel Analysis." *American Journal of Epidemiology* 146 (1): 48–63.

Duncan, C., K. Jones, and G. Moon. 1993. "Do Places Matter? A Multi-Level Analysis of Regional Variations in Health-Related Behaviour in Britain." *Social Science and Medicine* 37 (6): 725–33.

———. 1999. "Smoking and Deprivation: Are There Neighbourhood Effects?" *Social Science and Medicine* 48 (4): 497–505.

Durkin, M. S., L. L. Davidson, L. Kuhn, P. O'Connor, and B. Barlow. 1994. "Low-Income Neighborhoods and the Risk of Severe Pediatric Injury: A Small-Area Analysis in Northern Manhattan." *American Journal of Public Health* 84 (4): 587–92.

Ellaway, A., A. Anderson, and S. Macintyre. 1997. "Does Area of Residence Affect Body Size and Shape?" *International Journal of Obesity and Related Metabolic Disorders* 21 (4): 304–8.

Ellaway, A., and S. Macintyre. 1996. "Does Where You Live Predict Health Related Behaviors?" *Health Bulletin* 54 (6): 443–6.

———. 1998. "Does Housing Tenure Predict Health in the UK Because It Exposes People to Different Levels of Housing Related Hazards in the Home or Its Surroundings?" *Health and Place* 4 (2): 141–50.

———. 2000. "Mums on Prozac, Kids on Inhalers: The Need for Research on the Potential for Improving Health through Housing Interventions." *Health Bulletin* 58 (4): 336–9.

Ferguson, T. 1995. *Golden Rule: The Investment Theory of Party Competition and the Logic of Money-Driven Political Systems.* Chicago: University of Chicago Press.

Filakti, H., and J. Fox. 1995. "Differences in Mortality by Housing Tenure and by Car Access from the OPCS Longitudinal Study." *Population Trends* 81 (Autumn): 27–30.

Fingerhut, L. A., and M. Warner. 1997. "Injury Chartbook." In *Health, United States, 1996–97.* Hyattsville, MD: National Center for Health Statistics.

Flores, G., M. Abreu, M. A. Olivar, and B. Kustner. 1998. "Access Barriers to Health Care for Latino Children." *Archives of Pediatric and Adolescent Medicine* 152 (1): 1119–25.

French, S. A., M. Story, and R. W. Jeffery. 2001. "Environmental Influences on Eating and Physical Activity." *Annual Review of Public Health* 22: 309–35.

Frenk, J. 1998. "Medical Care and Health Improvement: The Critical Link." *Annals of Internal Medicine* 129 (5): 419–20.

Gielen, A. C., M. E. Wilson, R. R. Faden, L. Wissow, and J. D. Harvilchuck. 1995. "In-Home Injury Prevention Practices for Infants and Toddlers: The Role of Parental Beliefs, Barriers, and Housing Quality." *Health Education Quarterly* 22 (1): 85–95.

Goldman, L. R., M. W. Shannon, and The American Academy of Pediatrics Committee on Environmental Health. 2001. "Technical Report: Mercury in the Environment: Implications for Pediatricians." *Pediatrics* 108 (1): 197–205.

Gorman, B. K. 1999. "Racial and Ethnic Variation in Low Birthweight in the United States: Individual and Contextual Determinants." *Health and Place* 5 (3): 195–207.

Greenough, G., M. McGeehin, S. M. Bernard, J. Trtanj, J. Riad, and D. Engelberg. 2001. "The Potential Impacts of Climate Variability and Change on Health Impacts of Extreme Weather Events in the United States." *Environmental Health Perspectives* 109 (2, supplement): 191–8.

Griffith, J., R. Duncan, W. Riggan, and A. Pellom. 1989. "Cancer Mortality in U.S. Counties with Hazardous Waste Sites and Ground Water Pollution." *Archives of Environmental Health* 44 (2): 69–74.

Grossman, D. C., H. J. Neckerman, T. D. Koepsell, P. Y. Liu, K. N. Asher, K. Beland, K. Frey, and F. P. Rivara. 1997. "Effectiveness of a Violence Prevention Curriculum among Children in Elementary School: A Randomized Controlled Trial." *Journal of the American Medical Association* 77 (20): 1605–11.

Guest, A. M., G. Almgren, and J. M. Hussey. 1998. "The Ecology of Race and Socioeconomic Distress: Infant and Working-Age Mortality in Chicago." *Demography* 35 (1): 23–34.

Harding, J. E. 2001. "The Nutritional Basis of the Fetal Origins of Adult Disease." *International Journal of Epidemiology* 30 (1): 15–23.

Hart, C., R. Ecob, and G. Davey Smith. 1997. "People, Places and Coronary Heart Disease Risk Factors: A Multilevel Analysis of the Scottish Heart Health Study Archive." *Social Science and Medicine* 45 (6): 893–902.

Hertzman, C., C. Power, S. Matthews, and O. Manor. 2001. "Using an Interactive Framework of Society and Lifecourse to Explain Self-Rated Health in Early Adulthood." *Social Science and Medicine* 53 (12): 1575–85.

Hill, K. Q., and J. E. Leighley. 1992. "The Policy Consequences of Class Bias in State Electorates." *American Journal of Political Science* 36 (2): 351–65.

Hirsch, B. T., and D. A. Macpherson. 2001. *Union Membership and Earnings Data Book: Compilations from the Current Population Survey.* Washington DC: Bureau of National Affairs.

Holzer, H. 1991. "The Spatial Mismatch Hypothesis: What Has the Evidence Shown?" *Urban Studies* 28 (1): 105–22.

House, J. S., C. Robbins, and H. Metzner. 1982. "The Association of Social Relations and Activities with Mortality. Prospective Evidence from the Tecumseh Community Health Study." *American Journal of Epidemiology* 116 (1): 123–40.

House, J. S., K. R. Landis, and D. Umberson. 1988. "Social Relationships and Health." *Science* 241 (4865): 540–5.

Hwang, S. W. 2001. "Homelessness and Health." *Canadian Medical Association Journal* 164 (2): 229–33.

Institute of Medicine. 1988. *The Future of Public Health.* Washington, DC: National Academy Press.

Institute of Medicine. 1993. *Access to Health Care in America.* Washington, DC: National Academy Press.

Jackson, S. A., R. T. Anderson, R. J. Johnson, and P. D. Sorlie. 2000. "The Relation of Residential Segregation to All-Cause Mortality: A Study in Black and White." *American Journal of Public Health* 90 (4): 615–7.

Johnson, B. L. 1999. "A Review of the Effects of Hazardous Waste on Reproductive Health." *American Journal of Obstetrics and Gynecology* 181 (1): 12–6.

Kaplan, G. A., and J. W. Lynch. 1997. "Whither Studies on the Socioeconomic Foundations of Population Health?" *American Journal of Public Health* 87 (9): 1409–11.

———. 2001. "Is Economic Policy Health Policy?" *American Journal of Public Health* 91 (3): 1–3.

Kaplan, G. A., E. R. Pamuk, J. W. Lynch, R. D. Cohen, and J. L. Balfour. 1996. "Inequality in Income and Mortality in the United States: Analysis of Mortality and Potential Pathways." *British Medical Journal* 312 (7137): 999–1003.

Kaplan, M. S., and O. Geling. 1999. "Sociodemographic and Geographic Patterns of Firearm Suicide in the United States, 1989–1993." *Health and Place* 5 (2): 179–85.

Kawachi, I. 1999. "Social Capital and Community Effects on Population and Individual Health." *Annals of the New York Academy of Sciences* 896: 120–30.

Kawachi, I., B. P. Kennedy, and R. Glass. 1999. "Social Capital and Self-Rated Health: A Contextual Analysis." *American Journal of Public Health* 89 (8): 1187–93.

Kawachi, I., B. P. Kennedy, K. Lochner, and D. Prothrow-Stith. 1997. "Social Capital, Income Inequality, and Mortality." *American Journal of Public Health* 87 (9): 1491–8.

Kawachi, I., B. P. Kennedy, and R. G. Wilkinson. 1999. "Crime: Social Disorganization and Relative Deprivation." *Social Science and Medicine* 48 (6): 719–31.

Kennedy, B. P., I. Kawachi, R. Glass, and D. Prothrow-Stith. 1998. "Income Distribution, Socioeconomic Status, and Self-Rated Health in the United States: Multilevel Analysis." *British Medical Journal* 317 (7163): 917–21.

Ketola, E., R. Sipila, and M. Makela. 2000. "Effectiveness of Individual Lifestyle Interventions in Reducing Cardiovascular Disease and Risk Factors." *Annals of Medicine* 32 (4): 239–51.

Kleinschmidt, I., M. Hills, and P. Elliott. 1995. "Smoking Behavior Can Be Predicted by Neighbourhood Deprivation Measures." *Journal of Epidemiology and Community Health* 49 (2, supplement): S72–7.

Krieger, N., J. T. Chen, P. D. Waterman, M. J. Soobader, S. V. Subramanian, and R. Carson. 2002. "Geocoding and Monitoring of U.S. Socioeconomic Inequalities in Mortality and Cancer Incidence: Does the Choice of Area-Based Measure and Geographic Level Matter? The Public Health Disparities Geocoding Project." *American Journal of Epidemiology* 156 (5): 471–82.

———. 2003. "Choosing Area-Based Socioeconomic Measures to Monitor Social Inequalities in Low Birth Weight and Childhood Lead Poisoning: The Public Health Disparities Geocoding Project." *Journal of Epidemiology and Community Health* 57 (3): 186–99.

Krieger, N., D. L. Rowley, A. A. Herman, B. Avery, and M. T. Phillips. 1993. "Racism, Sexism, and Social Class: Implications for Studies of Health, Disease, and Well-Being." *American Journal of Preventive Medicine* 9 (2, supplement): 82–122.

Krieger, N., and S. Sidney. 1997. "Prevalence and Health Implications of Anti-Gay Discrimination: A Study of Black and White Women and Men in the CARDIA Cohort." *International Journal of Health Services* 27 (1): 157–76.

Kuh, D. L., and Y. Ben-Shlomo. 1997. *A Life Course Approach to Chronic Disease Epidemiology: Tracing the Origins of Ill-Health from Early to Adult Life.* Oxford: Oxford University Press.

Kuh, D., Y. Ben-Shlomo, J. Lynch, and J. Hallqvist. In press. "A Glossary for Lifecourse Epidemiology." *Journal of Epidemiology and Community Health.*

Landrigan, P. J., L. Claudio, S. B. Markowitz, G. S. Berkowitz, B. L. Brenner, H. Romero, J. G. Wetmur, T. D. Matte, A. C. Gore, J. H. Godbold, and M. S. Wolff. 1999. "Pesticides and Inner-City Children: Exposures, Risks, and Prevention." *Environmental Health Perspectives* 107 (suppl 3): 431–7.

Langer, N. 1999. "Culturally Competent Professionals in Therapeutic Alliances Enhance Patient Compliance." *Journal of Health Care for the Poor and Underserved* 10 (1): 19–26.

LeClere, F. B., R. G. Rogers, and K. D. Peters. 1998. "Neighborhood Social Context and Racial Differences in Women's Heart Disease Mortality." *Journal of Health and Social Behavior* 39 (2): 91–107.

Leon, D. A. 1998. "Fetal Growth and Adult Disease." *European Journal of Clinical Nutrition* 52 (1, supplement): S72–8.

———. 2000. "Common Threads: Underlying Components of Inequalities in Mortality between and within Countries." In *Poverty, Inequality and Health: An International Perspective*, edited by D. A. Leon and G. Walt. Oxford: Oxford University Press.

Lynch, J. W., and G. Davey Smith. 2003. "Rates and States: An Essay Review of the Health of Nations." *International Journal of Epidemiology* (in press).

Lynch, J. W., G. Davey Smith, G. A. Kaplan, and J. S. House. 2000. "Income Inequality and Mortality: Importance to Health of Individual Income, Psychosocial Environment, or Material Conditions." *British Medical Journal* 320 (7243): 1200–4.

Lynch, J. W., P. Due, C. Muntaner, and G. Davey Smith. 2000b. "Social Capital: Is It a Good Strategy for Public Health?" *Journal of Epidemiology and Community Health* 54 (6): 404–8.

Lynch, J. W., and G. A. Kaplan. 2000. "Socioeconomic Position." In *Social Epidemiology*, edited by L. F. Berkman and I. Kawachi, pp. 13–35. New York: Oxford University Press.

Lynch, J. W., G. A. Kaplan, E. R. Pamuk, R. D. Cohen, K. E. Heck, J. L. Balfour, and I. H. Yen. 1998. "Income Inequality and Mortality in Metropolitan Areas of the United States." *American Journal of Public Health* 88 (7): 1074–80.

Lynch, J. W., G. A. Kaplan, and J. T. Salonen. 1997. "Why Do Poor People Behave Poorly? Variations in Adult Health Behavior and Psychosocial Characteristics, by Stage of the Socioeconomic Lifecourse." *Social Science and Medicine* 44 (6): 809–20.

McGinnis, M. J., and W. H. Foege. 1993. "Actual Causes of Death in the United States." *Journal of the American Medical Association* 270 (18): 2207–12.

Macintyre, S., A. Ellaway, and S. Cummins. 2002. "Place Effects on Health: How Can We Conceptualise, Operationalise and Measure Them?" *Social Science and Medicine* 55 (1): 125–39.

Macintyre, S., A. Ellaway, G. Der, G. Ford, and K. Hunt. 1998. "Do Housing Tenure and Car Access Predict Health Because They Are Simply Markers of Income or Self Esteem?" *Journal of Epidemiology and Community Health* 52 (10): 657–64.

McKeown, T. 1979. *The Role of Medicine: Dream, Mirage, or Nemesis.* Princeton, NJ: Princeton University Press.

McQuiston, T. H., R. C. Zakocs, and D. Loomis. 1998. "The Case for Stronger OSHA Enforcement—Evidence From Evaluation Research." *American Journal of Public Health* 88 (7): 1022–4.

Malmstrom, M., J. Sundquist, and S.-E. Johansson. 1999. "Neighborhood Environment and Self-Reported Health Status: A Multi-Level Analysis." *American Journal of Public Health* 89 (8): 1181–6.

Matteson, D. W., J. A. Burr, and J. R. Marshall. 1998. "Infant Mortality: A Multi-Level Analysis of Individual and Community Risk Factors." *Social Science and Medicine* 47 (11): 1841–54.

Mendelsohn, A. L., B. P. Dreyer, A. H. Fierman, C. M. Rosen, L. A. Legano, H. A. Kruger, S. W. Lim, S. Barasch, L. Au, and C. D. Courtlandt. 1999. "Low-Level Lead Exposure and Cognitive Development in Early Childhood." *Journal of Developmental and Behavioral Pediatrics* 20 (6): 425–31.

Merlo, J., J. Lynch, P.-O. Östergren, M. Lindström, N. K. Rasmusen, and L. Råstam. In press. "Neighbourhood Levels of Social Participation Affect Use of Hormone Replacement and Anti-Hypertensive Medications: A Cross-Sectional Multilevel Analysis." *American Journal of Epidemiology.*

Mitchell, R., S. Gleave, M. Bartley, D. Wiggins, and H. Joshi. 2000. "Do Attitude and Area Influence Health? A Multilevel Approach to Health Inequalities." *Health and Place* 6 (2): 67–79.

Mitchell-Weaver, C., D. Miller, and R. Deal. 2000. "Municipal Governance and Metropolitan Regionalism in the USA." *Urban Studies* 37 (516): 851–76.

Morenoff, J., and J. W. Lynch. 2002. "What Makes a Place Healthy? Neighborhood Influences on Racial/Ethnic Disparities in Health over the Life Course." Paper presented at the National Academy of Science, Health Disparities and Aging Symposium, Washington DC.

Mouw, T. 2000. "Job Relocation and the Racial Gap in Unemployment in Detroit and Chicago, 1980 to 1990." *American Sociological Review* 65 (5): 730–53.

Nansel, T. R., M. Overpeck, R. S. Pilla, W. J. Ruan, B. Simons-Morton, and P. Scheidt. 2001. "Bullying Behaviors among U.S. Youth: Prevalence and Association with Psychosocial Adjustment." *Journal of the American Medical Association* 285 (16): 2094–100.

Navin, F., S. Zein, and E. Felipe. 2000. "Road Safety Engineering: An Effective Tool in the Fight against Whiplash Injuries." *Accident Analysis and Prevention* 32 (2): 271–5.

Nelson, D. E., B. L. Thompson, S. D. Bland, and R. Rubinson. 1999. "Trends in Perceived Cost as a Barrier to Medical Care, 1991–1996." *American Journal of Public Health* 89 (9): 1410–3.

Newacheck, P. W., J. J. Stoddard, D. C. Hughes, and M. Pearl. 1998. "Health Insurance and Access to Primary Care for Children." *New England Journal of Medicine* 338 (8): 513–9.

O'Campo, P., X. Xue, M.-C. Wang, and M. O. Caughy. 1997. "Neighborhood Risk Factors for Low Birthweight in Baltimore: A Multilevel Analysis." *American Journal of Public Health* 87 (7): 1113–8.

Packer, C. N., S. Stewart-Brown, and S. E. Fowle. 1994. "Damp Housing and Adult Health: Results from a Lifestyle Study in Worcester, England." *Journal of Epidemiology and Community Health* 48 (6): 555–9.

Passchier-Vermeer, W., and W. F. Passchier. 2000. "Noise Exposure and Public Health." *Environmental Health Perspectives* 108 (1, supplement): 123–31.

Patz, J. A., M. A. McGeehin, and S. M. Bernard. 2001. "The Potential Health Impacts of Climate Variability and Change for the United States." *Journal of Environmental Health* 64 (2): 20–8.

Pickett, K. E., and M. Pearl. 2001. "Multilevel Analyses of Neighbourhood Socioeconomic Context and Health Outcomes: A Critical Review." *Journal of Epidemiology and Community Health* 55 (2): 111–22.

Pincus, T., R. Esther, D. A. DeWalt, and L. F. Callahan. 1998. "Social Conditions and Self-Management Are More Powerful Determinants of Health Than Access to Care." *Annals of Internal Medicine* 129 (5): 406–11.

Platt, S., C. Martin, S. Hunt, and C. Lewis. 1989. "Damp Housing, Mould Growth and Symptomatic Health State." *British Medical Journal* 298 (6689): 1643–8.

Pope, C. A. III, D. V. Bates, and M. E. Raizenne. 1995. "Health Effects of Particulate Air Pollution: Time for Reassessment?" *Environmental Health Perspectives* 103 (5): 472–80.

Portes, A. 1998. "Social Capital: Its Origins and Applications to Modern Sociology." *Annual Review of Sociology* 24: 1–24.

Pugh, M. 1998. *Barriers to Work: The Spatial Divide between Jobs and Welfare Recipients in Metropolitan Areas.* Brookings Institution Center on Urban and Metropolitan Policy. Available at http://www.brookings.edu/es/urban/mismatch.pdf

Putnam, R., R. Leonardi, and R. Nanetti. 1993. *Making Democracy Work: Civic Traditions in Modern Italy.* Princeton, NJ: Princeton University Press.

Reading, R., I. H. Langford, R. Haynes, and A. Lovett. 1999. "Accidents to Preschool Children: Comparing Family and Neighbourhood Risk Factors." *Social Science and Medicine* 48 (3): 321–30.

Robert, S. A. 1999. "Socioeconomic Position and Health: The Independent Contribution of Community Socioeconomic Context." *Annual Review of Sociology* 25: 489–516.

Roberts, E. M. 1997. "Neighborhood Social Environments and the Distribution of Low Birthweight in Chicago." *American Journal of Public Health* 87 (4): 597–603.

Ross, B. H, and M. A. Levine. 1996. *Urban Politics: Power in Metropolitan America*, 5th ed. N. Itasca, IL: FE Peacock.

Ross, C. E. 2000. "Neighborhood Disadvantage and Adult Depression." *Journal of Health and Social Behavior* 41 (2): 177–87.

Ross, N. A., M. C. Wolfson, J. R. Dunn, J.-M. Berthelot, G. A. Kaplan, and J. W. Lynch. 2000. "Relation between Income Inequality and Mortality in Canada and the United States: Cross-Sectional Assessment Using Census Data and Vital Statistics." *British Medical Journal* 320 (7239): 898–902.

Rowley, D. L., C. J. Hogue, C. A. Blackmore, C. D. Ferre, K. Hatfield-Timajchy, P. Branch, and H. K. Atrash. 1993. "Preterm Delivery among African-American Women: A Research Strategy." *American Journal of Preventive Medicine* 9 (6, supplement): 1–6.

Saltzstein, A. L., Y. Ting, and G. H. Saltzstein. 2001. "Work-Family Balance and Job Satisfaction: The Impact of Family-Friendly Policies on Attitudes of Federal Government Employees." *Public Administration Review* 61 (4): 452–67.

Sampson, R. J., S. W. Raudenbush, and F. Earls. 1997. "Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy." *Science* 277 (5328): 918–24.

Schell, L. M. 1991. "Effects of Pollutants on Human Prenatal and Postnatal Growth: Noise, Lead, Polychlorobiphenyl Compounds, and Toxic Wastes." *American Journal of Physical Anthropology* (13, supplement): 157–88.

Schoenbach, V. J., B. H. Kaplan, L. Fredman, and D. G. Kleinbaum. 1986. "Social Ties and Mortality in Evans County, Georgia." *American Journal of Epidemiology* 123 (4): 577–91.

Sharpe, M. 1999. "An Unhealthy Road." *Journal of Environmental Monitoring* 1 (2): 23–5N.

Shaw, M., D. Gordon, D. Dorling, R. Mitchell, and G. Davey Smith. 2000. "Increasing Mortality Differentials by Residential Area Level of Poverty: Britain 1981–1997." *Social Science and Medicine* 51 (1): 151–3.

Sloggett, A., and H. Joshi. 1994. "Higher Mortality in Deprived Areas: Community or Personal Disadvantage?" *British Medical Journal* 309 (6967): 1470–4.

Snyder, P., J. Anliker, L. Cunningham-Sabo, L. B. Dixon, J. Altaha, A. Chamberlain, S. Davis, M. Evans, J. Hurley, and J. L. Weber. 1999. "The Pathways Study: A Model for Lowering the Fat in School Meals." *American Journal of Clinical Nutrition* 69 (4, supplement): 810–5S.

Stone, E. J., T. L. McKenzie, G. J. Welk, and M. L. Booth. 1998. "Effects of Physical Activity Interventions in Youth: Review and Synthesis." *American Journal of Preventive Medicine* 15 (4): 298–315.

Styne, D. M. 2001. "Childhood and Adolescent Obesity: Prevalence and Significance." *Pediatric Clinics of North America* 48 (4): 823–54.

Subramanian, S. V., I. Kawachi, and B. P. Kennedy. 2001. "Does the State You Live in Make a Difference? Multilevel Analysis of Self-Rated Health in the U.S." *Social Science and Medicine* 53 (1): 9–19.

Susser, M., W. Watson, and K. Hopper. 1985. *Sociology in Medicine.* New York: Oxford University Press.

Townsend, P., P. Phillimore, and A. Beattie. 1988. *Health and Deprivation: Inequality and the North.* London: Croom Helm.

Turnock, B. J., and A. S. Handler. 1997. "From Measuring to Improving Public Health Practice." *Annual Review of Public Health* 18: 261–82.

Twemlow, S. W., P. Fonagy, F. C. Sacco, M. L. Gies, R. Evans, and R. Ewbank. 2001. "Creating a Peaceful School Learning Environment: A Controlled Study of an Elementary School Intervention to Reduce Violence." *American Journal of Psychiatry* 158 (5): 808–10.

U.S. Department of Health and Human Services. 2000. *Healthy People 2010.* Washington, DC: U.S. Department of Health and Human Services.

U.S. Preventive Services Task Force. 1996. *Guide to Clinical Preventive Services*, 2d ed. Baltimore: Williams and Wilkins.

Waitzman, R. J., and K. R. Smith. 1998a. "Separate but Lethal: The Effects of Economic Segregation on Mortality in Metropolitan America." *Milbank Memorial Quarterly* 76 (3): 341–73.

———. 1998b. "Phantom of the Poverty Area: Poverty-Area Residence and Mortality in the United States." *American Journal of Public Health* 88 (6): 973–6.

Wasserman, C. R., G. M. Shaw, S. Selvin, J. B. Gould, and S. L. Syme. 1998. "Socioeconomic Status, Neighborhood Social Conditions, and Neural Tube Defects." *American Journal of Public Health* 88 (11): 1674–80.

Whitby, K. J. 1997. *The Color of Representation: Congressional Behavior and Black Interests.* Ann Arbor: University of Michigan Press.

Whitley, E., D. Gunnell, D. Dorling, and G. Davey Smith. 1999. "Ecological Study of Social Fragmentation, Poverty, and Suicide." *British Medical Journal* 319 (7216): 1034–7.

Williams, D. R. 1999. "Race, Socioeconomic Status, and Health: The Added Effects of Racism and Discrimination." *Annals of the New York Academy of Sciences* 896: 173–88.

Williams, D. R., and C. Collins. 2001. "Racial Residential Segregation: A Fundamental Cause of Racial Disparities in Health." *Public Health Reports* 116 (5): 404–16.

Wilson, P. S. 1994. "Established Risk Factors and Coronary Artery Disease: The Framingham Study." *American Journal of Hypertension* 7 (7, part 2): 7s–12s.

Woolcock, M. 2001. "The Place of Social Capital in Understanding Social and Economic Outcomes." *ISUMA: Canadian Journal of Policy Research* 2 (1): 11–7.

Yen, I. H., and G. A. Kaplan. 1998. "Poverty Area Residence and Changes in Physical Activity Level: Evidence from the Alameda County Study." *American Journal of Public Health* 88 (11): 1709–12.

———. 1999. "Poverty Area Residence and Changes in Depression and Perceived Health Status: Evidence from the Alameda County Study." *International Journal of Epidemiology* 28 (1): 90–4.

Yen, I. H., and S. L. Syme. 1999. "The Social Environment and Health: A Discussion of the Epidemiologic Literature." *Annual Review of Public Health* 20: 287–308.

Yen, I. H., D. R. Ragland, B. A. Greiner, and J. M. Fisher. 1999. "Workplace Discrimination and Alcohol Consumption: Findings from the San Francisco Muni Health and Safety Study." *Ethnicity and Disease* 9 (1): 70–80.

Zierler, S., N. Krieger, Y. Tang, W. Coady, E. Siegfried, A. DeMaria, and J. Auerbach. 2000. "Economic Deprivation and AIDS Incidence in Massachusetts." *American Journal of Public Health* 90 (7): 1064–73.