EDITOR'S CHOICE

Health warning messages on tobacco products: a review

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Received 29 April 2010
Accepted 8 March 2011
Published Online First
23 May 2011

ABSTRACT

Objective To review evidence on the impact of health warning messages on tobacco packages.

Data sources Articles were identified through electronic databases of published articles, as well as relevant 'grey' literature using the following keywords: health warning, health message, health communication, label and labelling in conjunction with at least one of the following terms: smoking, tobacco, cigarette, product, package and pack. *Study selection and data extraction*: Relevant articles available prior to January 2011 were screened for six methodological criteria. A total of 94 original original articles met inclusion criteria, including 72 quantitative studies, 16 qualitative studies, 5 studies with both qualitative and qualitative components, and 1 review paper: Canada (n=35), USA (n=29) Australia (n=16), UK (n=13), The Netherlands (n=3), France (n=3), New Zealand (n=3), Mexico (n=3), Brazil (n=2), Belgium (n=1), other European countries (n=10), Norway (n=1), Malaysia (n=1) and China (n=1).

Results The evidence indicates that the impact of health warnings depends upon their size and design: whereas obscure text-only warnings appear to have little impact, prominent health warnings on the face of packages serve as a prominent source of health information for smokers and non-smokers, can increase health knowledge and perceptions of risk and can promote smoking cessation. The evidence also indicates that comprehensive warnings are effective among youth and may help to prevent smoking initiation. Pictorial health warnings that elicit strong emotional reactions are significantly more effective.

Conclusions Health warnings on packages are among the most direct and prominent means of communicating with smokers. Larger warnings with pictures are significantly more effective than smaller, text-only messages.

INTRODUCTION

Tobacco use is responsible for one in ten global deaths and is the second major cause of mortality in the world.[1] In 2009, more than 5 million people died from tobacco use, more than tuberculosis, HIV/AIDS and malaria combined.[2] The health burden from tobacco reflects the wide range of smoking-related diseases: causal links have been identified for 10 types of cancer as well as 18 other diseases.[3] Remarkably, the list of known health risks continues to grow, with cancers of the stomach and acute myeloid leukaemia among those most recently identified.

Health warnings on tobacco packages have emerged as an important medium for communicating the health risks of tobacco use to consumers. Tobacco packages provide high reach and frequency of exposure—pack-a-day smokers are potentially exposed to the warnings over 7000 times per year—as well as an opportunity to communicate with smokers during the act of smoking.[4 5] Tobacco packs also serve as portable advertisements with high levels of exposure among non-smokers: unlike many other consumer products, cigarette packs are displayed each time the product is used and are often left in public view between uses.[6] Tobacco packages are also prominent in retail outlets, where product displays are common and typically increase in prominence as other forms of tobacco marketing are restricted.[7]

International guidelines for cigarette health warnings have been established under Article 11 of the WHO's Framework Convention on Tobacco Control (FCTC)—the first international treaty devoted to public health.[8] The FCTC requires rotating health warnings that cover at least 30% of the front and back of cigarette packages. Beyond these minimum requirements, the FCTC states that warnings 'should' cover 50% or more of a package's principal surfaces, and 'may' include pictures. 'Elaborated guidelines' include additional information to help guide implementation with more detailed recommendations, including general design, position and the content of warnings.[9] To date, more than 165 countries have ratified the treaty.

At present, cigarette packages in the vast majority of countries carry a health warning; however, the position, size and general strength of these warnings vary considerably across jurisdictions.[10 11] In 2001, Canada became the first country in the world to implement pictorial warnings and set new precedents in terms of the size of warnings, which covered 50% of the principal display areas (see figure 1). More than 30 countries have since adopted the FCTC recommendation for pictorial warnings that cover at least half of the package.[11] New precedents continue to be set in terms of the size of warnings; in Uruguay, for example, health warnings cover 80% of the front and back of packages.

Scientific literature on the impact of tobacco health warnings has grown in parallel with changes in regulatory practice. The current paper seeks to review evidence on the effectiveness of health warnings on tobacco packages. More specifically, the study sought to review evidence on the following: (1) differences between text versus pictorial warnings, (2) impact on youth and adults, (3) impact of message content and themes and (4) impact on cessation behaviour, including any potential adverse outcomes.

METHODS

Published articles were identified through electronic searches of MEDLINE (Medical Literature Analysis

Canada 2001

Brazil 2002/ 04 /09

Singapore 2004/ 06

Thailand 2005/07/10

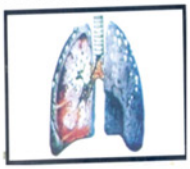
Venezuela 2005/09

Australia 2006

Belgium 2006

Chile 2006/07/08/09/10

Jordan 2006



Panama 2006/09

Uruguay 2006/08/09/10

Hong Kong 2007

Brunei 2008

Egypt 2008/10

New Zealand 2008

Romania 2008

UK 2008

Djibouti 2009

India 2009/11

Iran 2009

Malaysia 2009

Mauritius 2009

Peru 2009

Taiwan 2009

Colombia 2010

Latvia 2010

Mexico 2010

Mongolia 2010

Pakistan 2010

Switzerland 2010

Turkey 2010

France 2011

Malta 2011

Spain 2011*

Norway 2011*

Philippines 2011*

Urkraine 2012*

*Proposed implementation date at time of publication.

Figure 1 Pictorial health warnings and implementation dates.

and Retrieval System Online) and Web of Science databases. Electronic searches were also conducted to identify relevant 'grey literature', including unpublished research commissioned by governments. Additional searches using the reference lists of relevant articles were also conducted. The following keywords were used to identify relevant articles: health warning, health message, health communication, label and labelling in conjunction with at least one of the following terms: smoking, tobacco, cigarette, product, package and pack. The review was limited to articles that reported original research findings and were available for review by December 2010. Studies examining health warnings on advertisements (rather than packages) were excluded, as were studies on other aspects of packaging and labelling regulations, including labelling of ingredient and 'constituent' information as well as restrictions on deceptive marketing practices. Due to the diversity of research methods in this domain, we did not restrict studies to a particular design; however, each of the articles were reviewed for the following methodological criteria: (1) clearly stated objective/research question, (2) clear description of sample/study population, (3) consistent data collection method, (4) key measures appear to be valid, (5) main outcomes are defined and measurable and (6) analysis and summary of findings are clear and appropriate. Each article was reviewed by two independent reviewers. A total of 103 papers presenting empirical data were identified that met the general eligibility criteria. Following review of the full-text articles, seven were excluded on the basis of insufficient methodological information.The 94 original articles included in the review consisted of 72 quantitative studies, 16 qualitative studies, 5 studies with both qualitative and qualitative components, and 1 review paper. A summary of each study is available in online supplementary table 1. Research articles came from the following jurisdictions: Canada (n=35), USA (n=29) Australia (n=16), UK (n=13), The Netherlands (n=3), France (n=3), New Zealand (n=3), Mexico (n=3), Brazil (n=2), Belgium (n=1), other European countries (n=10), Norway (n=1), Malaysia (n=1) and China (n=1). Note that several articles included data collected in multiple countries: these articles were counted as a single study but recorded in multiple jurisdictions.

RESULTS

General awareness and prominence of health warnings

Smokers report high levels of awareness for health warnings on tobacco packages.[12–25] Data collected from a series of cohort studies found that more smokers reported getting information about the risks of smoking from cigarette packages than from any other source except television in a majority of countries.[26] For example, in countries with large pictorial warnings, such as Thailand, Australia and Uruguay, more than 85% of smokers cited packages as a source of health information.[26] A notable exception is the low levels of salience for more obscure warnings that appear on the side of packages, such as the health warnings implemented in the USA in 1984.[27 28] The findings suggest that small text warnings are associated with low levels of awareness and poor recall.[29]

Health warnings have also been found to be a prominent source of health information for non-smokers and the general public.[14–17 21 24] For example, 86% of non-smokers in Canada agreed in a national survey that the warnings on cigarette packs provide them with important health information.[15] Non-smokers also report high levels of recall for specific health messages on packs.[17] For example, more than a third of adult non-smokers in Australia could recall at least one specific pictorial warning on cigarette packs in a 2008 survey.[24] In the UK, a national survey of youth conducted in 2008 found that approximately 60% of non-smokers could recall a specific warning displayed on the front of UK packs.[16]

The salience of health warnings depends upon the size and position of the warning message. Youth and adults are more likely to recall larger warnings, rate larger warnings as having greater impact, and often equate the size of the warning with the magnitude of the risk.[18 19 24 30–34] For example, a recent experimental research study conducted in Canada found that increasing the size of pictorial warnings from the current size of 50% of the principal display area to 75%, 90% and 100% enhanced their impact among adult smokers, youth smokers, as well as 'vulnerable' youth non-smokers.[19 20] A recent study conducted in Australia, where pictorial warnings cover 90% of the front and 30% of the back of packs, also found that the effectiveness of warnings could be improved by increasing the size of the warnings further.[24]

Features that distinguish the warning messages from the package design have also been found to increase the impact of health warnings. Using a box or perimeter around the outside of the message has been found to increase the salience and recall of warnings,[30] while contrasting colours, such as black lettering on a white background, are the easiest to read and increase comprehension.[31 35]

Impact of text warning labels on health beliefs and attitudes

Several studies have shown that large text-based warnings are associated with increased perceptions of risk and health knowledge.[12] Cross-sectional surveys conducted in Canada during the 1990s found that the majority of smokers reported that package warning labels were an important source of health information and had increased their awareness of the risks of smoking.[15 18 21 36] An Australian study[22] found that, relative to non-smokers, smokers demonstrated an increase in their knowledge of the main constituents of tobacco smoke and identified significantly more disease groups following the introduction of new Australian warning labels in 1995.

Several studies have also evaluated the enhancement of text warnings in the European Union (EU). In 2003, EU warnings were required to be a minimum of 30% of the 'front' and 40% of the 'back' of packs. A series of 52 focus groups conducted in seven European countries in 2004 found that the enhanced text warnings in the EU were more noticeable than smaller warnings printed previously on packs, with a greater potential to help smokers to quit (figure 2)[37] A cohort study conducted in the UK before and after the enhanced warnings were implemented also found that the salience of the warnings increased dramatically among UK smokers, along with the frequency of thoughts regarding health effects and level of health knowledge.[27] These findings are consistent with a number of population-based surveys conducted after the implementation of the enhanced warnings in France,[38] Scotland and Ireland,[39] Spain[40] and Belgium.[41] Collectively, these studies indicate that smokers' awareness of the warnings increased following implementation of the new warnings and a considerable proportion of smokers reported measures consistent with increased perception of health risks as a result of more comprehensive text warnings.

Impact of pictorial warning labels on health beliefs and attitudes

A wide variety of research has demonstrated the effectiveness of using pictures and imagery in health communications.[42–50] These studies suggest that health warnings with pictures are significantly more likely to draw attention, result in greater

Figure 2 An example of EC/UK text-only warnings (2003).

information processing and improve memory for the health message.

Experimental research on cigarette warnings has also found that picture-based warnings are more likely to be rated as effective than text-only warnings on a range of outcomes, including as a deterrent for new smokers and a means to increase cessation among current smokers.[51–56] For example, a 2008 study conducted in China found that smokers were significantly more likely to rate pictorial warnings as more effective than text warnings for motivating smoking cessation and for preventing smoking among youth.[57]

Extensive focus group testing and market research commissioned by government health agencies also support the effectiveness of pictorial health warnings on packages.[30 41 53 58–67] This research consistently demonstrates that health warnings with pictures are rated by smokers and non-smokers as more effective than text-only warnings. For example, a set of 40 focus groups conducted in Canada approximately 5 years after the introduction of pictorial warnings concluded that: 'The picture was generally the first thing people looked at and related to. It determined the strength of the warning's emotional impact and noticeability. For many participants, the picture played the key role in understanding the message, and tended to override the meaning conveyed by the words in the headline.'(p 26)[67] A series of 24 focus groups conducted in Australia approximately 2 years after the introduction of the pictorial warnings came to similar conclusions: 'Throughout the group discussions the graphic health warnings were invariably considered to have greater impact than the previous text-only health warnings… The graphic images have seemingly increased or reinforced awareness of those consequences that were previously text only… as well as, communicated new information'(pp 12–16) (figure 3).[62]

Since 2001, when Canada became the first country to implement pictorial health warnings on cigarette packs, a series of population-based surveys have compared the effectiveness of text versus pictorial warnings. These findings are consistent with both experimental studies and government-commissioned research: pictorial warnings are more likely to be noticed and read by smokers, are associated with stronger beliefs about the health risks of smoking, as well as increased motivation to quit smoking.[23 26 27 51 52 55 58–62 67–74]

Picture warnings also appear to be effective among youth. Approximately 6 years after their introduction, more than 90% of Canadian youth agreed that picture warnings on Canadian packages had provided them with important information about the health effects of smoking cigarettes, are accurate, and made smoking seem less attractive.[21] Other national surveys of Canadian youth suggest similar levels of support and self-reported impact.[18] A recent longitudinal evaluation of pictorial warnings among Australian school children found that students were more likely to read, attend to, think about, and talk about health warnings after the pictorial warnings were implemented in 2006.[71] In addition, experimental and established smokers were more likely to think about quitting and to forgo smoking a cigarette, while intention to smoke was lower among those students who had talked about the warning labels and had forgone cigarettes.

Only three of the studies we identified failed to support the superiority of text over graphic warnings. An experimental study conducted with youth smokers in Germany compared the current EU text warnings with corresponding pictorial warnings, and failed to detect any significant differences between the conditions.[75] The second study examined the impact of briefly viewing a text versus pictorial warning on a website among 296 non-smoking secondary-school students from Canada and the USA. The study found that the picture warnings were more effective than the text-only warning at lowering intentions to

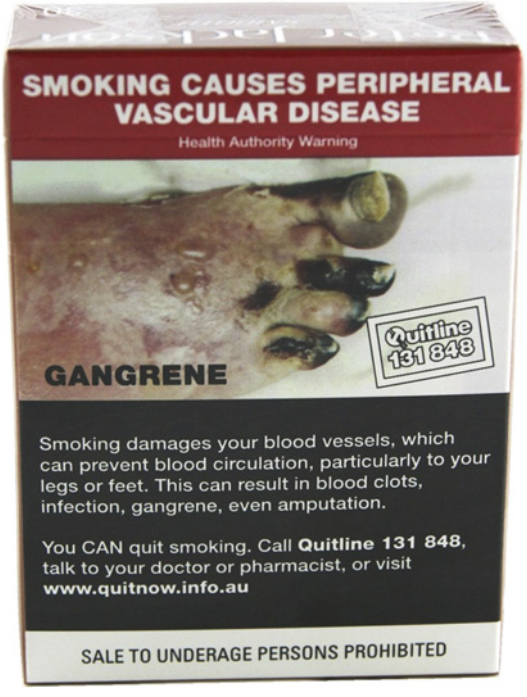


Figure 3 A sample pictorial health warning in Australia (2010).

smoke among the Canadian students, but less effective among US students.[76] The third study examined the speed with which participants responded to a text statement (some of which were accompanied by an image) as an outcome, and failed to note differences.[77] However, as the authors note, measures of reaction time may not be an appropriate measure of the impact of a warning, particularly considering that emotional responses may increase rather than decrease reaction time.

Health warnings and cessation behaviour

The extent to which health warnings lead to changes in smoking behaviour is difficult to ascertain within the context of population-based data.[78] However, significant proportions of adult and youth smokers report that large text and pictorial health warnings have reduced their consumption levels, increased their likelihood of quitting, increased their motivation to quit and increased the likelihood of remaining abstinent following a quit attempt.[15 18 21–27 68 69 79–82] For example, one-fifth of smokers in an EU-wide survey reported that health warnings have been effective in getting them to smoke less and in helping them try to quit.[17] In countries with pictorial health warnings, such as Canada and Australia, these numbers are higher: more than 40% of Canadian smokers report that the pictorial warnings have motivated them to quit smoking[68]; in Australia, 57% of smokers report that the labels have made them think about quitting and 34% say the warnings have helped them to try to quit.[24] Similar findings have been observed among youth. For example, in 2008, almost 80% of youth smokers in the UK agreed that the warnings had 'put me off smoking'.[16] Three longitudinal studies—two with adults and one with youth—found an association between reading and thinking about health warnings and subsequent cessation behaviour, including a cohort study conducted with nationally representative samples of smokers in Canada, Australia, the UK and the USA.[23 39 71]

Health warnings have also been associated with increased use of effective cessation services. Research conducted in the UK, The Netherlands, Australia and Brazil examined changes in the use of national telephone 'helplines' after the contact information was displayed within package health warnings. Each of these studies reported significant increases in call volumes following the introduction of new warnings.[25 65 83–86] For example, calls to the smoking cessation helpline in The Netherlands increased more than 3.5 times in the 12 months after the helpline number was printed on the back of one of 14 package warnings.[84] In the UK, call volume increased by as much as 4000 calls per month after the introduction of larger text warnings.[83]

Surveys among former smokers also suggest that health warnings promote long-term abstinence from smoking. In Australia, 62% of quitters reported in 2008 that the pictorial warnings had 'helped them to give up smoking,' while 75% reported the warnings 'had an effect on their behaviour'—a significant increase from the 25% who reported an effect from text warnings 8 years earlier.[24] In addition, approximately 30% of former smokers in the EU reported in 2008 that health warnings had helped prevent them from smoking again,[17] with similar proportions of former smokers in Canada reporting that pictorial health warnings helped them to remain abstinent.[87]

A single study has examined changes in prevalence due to health warnings. The study concluded that the implementation of pictorial warnings in Canada reduced daily consumption of cigarettes, but had no discernable impact on prevalence.[88] However, there are serious limitations to linking changes in national prevalence and health warnings in this way. First, the study examined prevalence rates in the 6 months following the implementation date of the regulation, which did not correspond to the date when health warnings began appearing on packages. Although warnings are expected to exert their impact over time, the pictorial warnings in Canada took many months to appear in retail outlets and appeared on relatively few packs during much of the follow-up period examined by the study. In fact, the prevalence of adult smoking in Canada has declined approximately 6% since the implementation of large pictorial warnings in 2001.[89] However, there is no way to attribute these declines to the new health warnings given that health warnings are typically introduced against a backdrop of other tobacco control measures, including changes in price/taxation, mass media campaigns and smoke-free legislation.

Health warnings and smoking initiation

A few studies have attempted to directly assess the impact of health warnings on smoking initiation among youth using prevalence rates. Although youth smoking rates have declined dramatically in countries such as Canada after the implementation of large pictorial health warnings,[89] there is no reliable way to attribute these changes specifically to the warnings rather than other tobacco control measures. However, population-based surveys indicate that significant proportions of youth non-smokers, including the most vulnerable youth populations in Canada,[14 19 21] the UK[16] and Australia[71] report that warnings have discouraged them from smoking. Between one-fifth and two-thirds of youth non-smokers indicated that the warnings had helped prevent them from taking up smoking in Canada[21] and Australia,[24] and approximately 90% of youth non-smokers in a national UK survey reported that the warnings 'put them off smoking.'[16] Longitudinal surveys in Australia also found that experimental and established smokers were more likely to think about quitting and forgo cigarettes after the implementation of large pictorial warnings, while the intention to smoke was lower among those students who had talked about the warning labels.[71] Finally, nationally representative surveys conducted in 2008 with over 26 000 respondents from 27 EU member states and Norway found that 3 out of 10 non-smokers in the EU reported that health warnings were effective in preventing them from smoking.[17] Levels were highest in Romania, where pictorial warnings were implemented shortly before the survey was conducted, with 6 in 10 non-smokers reporting that the warnings have helped to prevent them from smoking.[17]

Overall, while it is not possible to quantify the impact of health warnings on smoking prevalence, all of the evidence conducted to date suggests that comprehensive health warnings can promote cessation behaviour and discourage initiation, and that larger pictorial warnings are most effective in doing so.

Message theme and content of health warnings

Health warnings vary considerably in their content and 'executional' style. Qualitative research and pre-market focus group testing have evaluated the content of health warnings in several jurisdictions. The primary outcomes used to evaluate health warnings include their ability to attract attention, comprehension, credibility, novelty, personal identification, and emotional appeal.[16 42 59 63 67] Negative emotions, such as fear, may be particularly important in the effectiveness of large pictorial warnings given the importance of emotional arousal in message acceptance.[90 91] Negative emotional reactions to cigarette health warnings have been associated with increases in key outcomes such as intentions to quit, thinking about health risks or