

Science, Prudence, and Politics: The Case of Smoke-Free Indoor Spaces

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PURPOSE: We examine the process of how epidemiologic evidence regarding the harms of secondhand smoke (SHS) exposure has been translated into policy and distill lessons that could be applied to other public health areas.

METHODS: We detail the history of the growth of evidence and the development of prudent policies in this area and the parallel, organized efforts led by the tobacco industry to oppose them. We also describe how opposition to these policies helped shape the emerging research agenda.

RESULTS: Seven lessons emerged from our study. (i) Even after a policy goal has been achieved, the need for epidemiological evidence and inquiry remains. (ii) Dissemination and implementation research is necessary. (iii) The best and most necessary research questions do not always come from epidemiologists. (iv) There is a need for epidemiologists to work with other researchers across disciplines. (v) Epidemiologists must anticipate the opposition. (vi) Focused, well-organized advocacy is needed to translate even the strongest epidemiological evidence into policy change. (vii) Epidemiologists should be trained to engage and interact with public health advocates, practitioners, and policy makers.

CONCLUSIONS: Although this case study shows that policy can be driven by science, it also demonstrates that clear scientific evidence does not automatically lead to optimal policy.

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INTRODUCTION

This case study examines the important public health issue of secondhand smoke (SHS) exposure and the adoption of policies designed to protect populations from SHS's adverse health effects. The "lessons learned" from this case study relate to both the challenges of establishing whether an exposure is a threat to the public's health and then, after the scientific community reaches broad consensus on the

evidence, the successful translation of this knowledge into policies in the face of strong opposition from a well-funded stakeholder, the tobacco industry. We will briefly review the history of epidemiologic research in the area of health effects of SHS and the evolution and adoption of policies designed to eliminate SHS in public spaces. We detail the story of SHS policy adoption in New York state and discuss lessons learned that can be applied to other areas. This case study illustrates the "discovery to delivery" process (1) and identifies factors that can enhance the quality and speed with which epidemiologic evidence can be translated into national and community public health policy.

CONTEXT

Today, more than half of the population of the United States lives in a municipality or state that has a law requiring nearly all indoor public spaces to be completely smoke-free (2); before lawmakers in California required workplaces, bars, and restaurants to be smoke-free in 1998, few comprehensive smoke-free policies were in place. This sustained and relatively rapid progress toward eliminating smoking inside public places is one of the most important public health accomplishments of the last quarter century. Empirical research documenting the health effects of SHS played a critical role in the development and implementation of smoke-

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Selected Abbreviations and Acronyms

SHS = secondhand smoke
EPA = Environmental Protection Agency

free policies. However, although this case study tells the story of the successful spread of policies to prohibit smoking in public places, including restaurants and bars, it also illustrates that even the best scientific evidence is not a guarantee of rapid, consistent, or universal public health policy development. This case study also highlights the skill needed to mount and manage responses to attacks from those whose interests are threatened and the ability to harness the power of an orchestrated public health advocacy effort.

HISTORY OF EPIDEMIOLOGIC EVIDENCE ON THE DANGERS OF SHS

For most of the 20th century, smoking anywhere and at any time was commonplace in the United States; smoking bans were rare. But by the 1970s, the weight of scientific research was pointing to real dangers that were direct results of SHS exposure. The 1971 Surgeon General's Report, in relation to the risks of smoking and pregnancy, was the first Surgeon General's Report to propose a government ban on smoking in public places (3). However, the 1972 Surgeon General's Report was the first to explicitly identify involuntary smoking (i.e., SHS exposure) as a health risk (4). The landmark 1981 study by Hirayama and colleagues (5) demonstrated that non-smoking Japanese women married to men that smoked had greater rates of lung cancer compared with nonsmoking women married to nonsmoking men. By the mid-1980s, nearly 30 studies (6) had linked SHS exposure to increased risk for lower respiratory illnesses in infants and to increased respiratory symptoms and lower lung function in children.

Additional evidence continued to grow that further solidified the consensus that SHS was damaging to health. The 1986 Surgeon General's report concluded that SHS causes lung cancer in nonsmokers and is associated with a variety of respiratory conditions in children (6). In 1992 the U.S. Environmental Protection Agency (EPA) concluded that the widespread exposure to SHS in the United States presents a serious and substantial public health impact and classified SHS as a Group A carcinogen (7). The epidemiological evidence on SHS and lung cancer continued to grow; for the United States, the multi-site study published in 1994 by Fontham and others (8) was particularly notable because of its size and methodological rigor. Finally, the 2006 Surgeon General's report stated, "the debate is over" and "the science is clear" that SHS

causes lung cancer and heart disease in nonsmokers, among many other conditions (9).

THE WAVE OF POLICIES DESIGNED TO LIMIT SHS EXPOSURE

In 1975 Arizona, Connecticut, and Minnesota implemented the first policies in the United States that required portions of certain types of public spaces to be smoke free (10). However, it was not until a decade later, subsequent to the 1986 Surgeon General's Report, that the tide of local policies banning smoking really began to rise (6). Nearly 10 years after the first policies, in 1995, California became the first state to require all restaurants to be completely smoke free; the ban was expanded to bars in 1998. As of January 2010, 41% of the U.S. population lives in a community that requires all indoor workplaces (including restaurants and bars) to be completely smoke-free (Fig. 1) (2), and there are more than 3000 jurisdictions that have passed smoke-free workplace, restaurant, or bar legislation (11). A critically important fact in these policy debates is that the epidemiologic literature has consistently shown that SHS is associated with disease in nonsmokers. Thus, the primary argument for smoke-free legislation has been that workers should not be required to inhale a toxic substance as a condition of employment. This rationale has been compelling and successful, and without the scientific evidence of harm as a rationale, the rate of smoke-free policy adoption would likely have been slower.

OPPOSITION TO POLICY AND CONCERNS OUTSIDE OF HEALTH

Considerable effort has been mounted by the tobacco industry to challenge the scientific evidence, and in some cases these efforts have prevented or delayed comprehensive smoke-free policy implementation. As early as the 1981 Hirayama study, the tobacco industry took defensive action against scientific evidence on SHS, attempting to instill doubt in the assertion that SHS causes disease (12). This strategy mirrored that used earlier for active smoking and disease. The model of creating doubt and maintaining controversy, along with funding research to counter "positive" findings, can be traced to the early 1950s (13). The tobacco industry viewed the 1992 EPA decision that SHS was a human carcinogen as a particularly serious threat because they feared regulatory consequences via the Occupational Safety and Health Administration that would apply to workplaces across the country (9). Acting through public relations firms, these well-documented, organized campaigns, orchestrated by the tobacco industry, were designed to convince the public that the epidemiologic

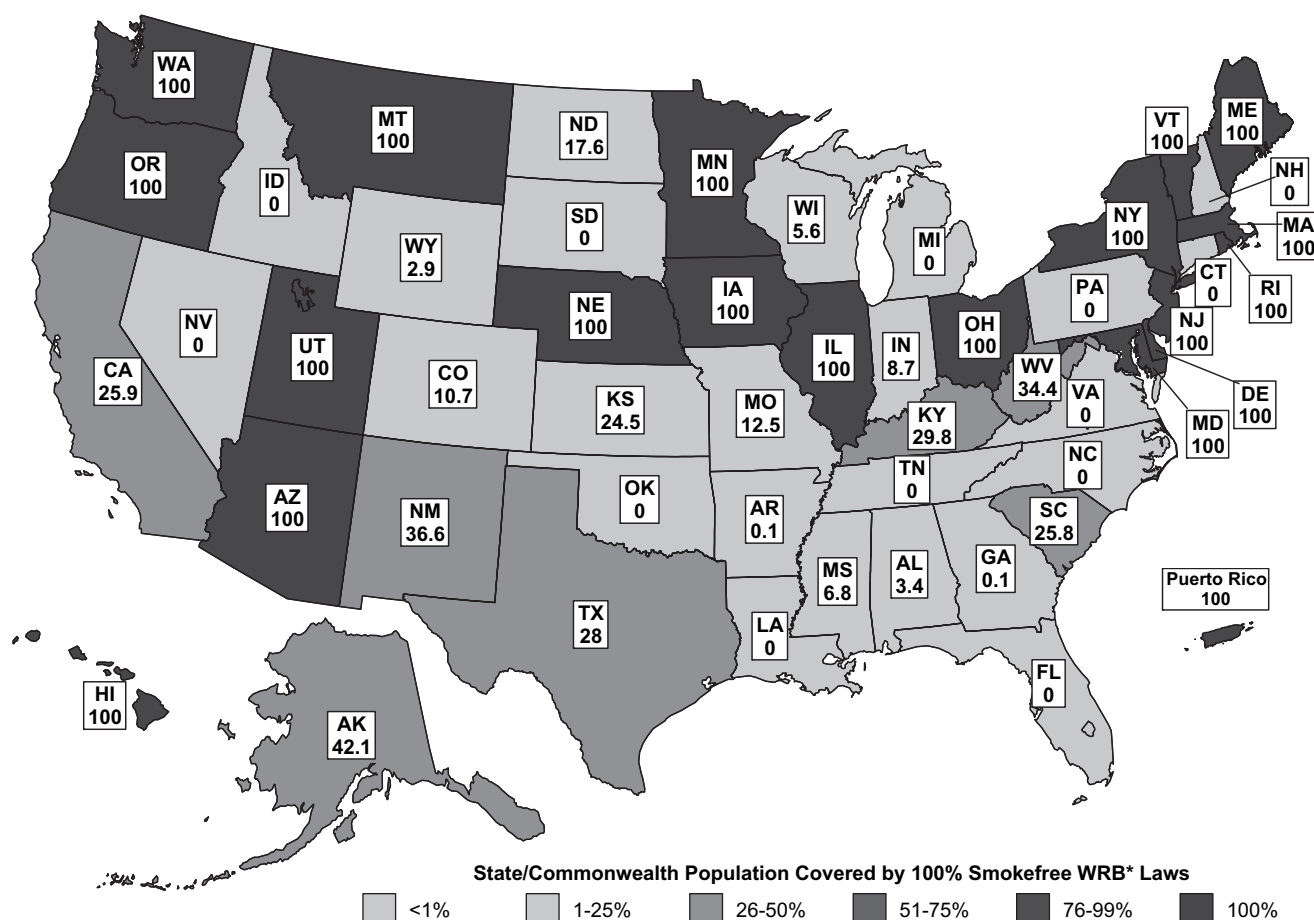


FIGURE 1. Percent of population covered by 100% smoke-free workplace laws in effect as of January 5, 2010. From the American Nonsmokers' Rights Foundation (<http://www.no-smoke.org>).

evidence was questionable (14–16). Evidence that was contrary to tobacco industry interests was labeled “junk science.” The industry recruited consultants who questioned emerging findings, and it began its own “sound science” program with the mission of discrediting the evidence presented in the EPA report (15).

Ironically, the fierce opposition to policies has sometimes worked to indirectly strengthen the evidence and help support policy implementation. When smoke-free policies first were introduced, opponents argued that the public did not support these policies, that assuring compliance with the laws would be difficult, that the policies would devastate the hospitality industry, and that suitable compromises such as improved heating, ventilating, and air conditioning systems were sufficient for protecting health (17).

Each of these points posed a testable hypothesis for empirical research studies, and epidemiologists used the scientific method to systematically examine the veracity of each of these claims. Surveys documented that the vast majority of the population prefers smoke-free indoor spaces and evaluations in many places showed that compliance

with smoke-free laws was extremely high with relatively mild and transient implementation issues (18–20).

Additionally, researchers found that business revenue was generally not negatively impacted by the presence of smoke-free policies in study after study across the nation (21). Finally, it was determined technological fixes such as better ventilation or filtration systems did not eliminate the health risks posed by SHS exposure in the workplace (22, 23). This program of research essentially rendered many of the industry arguments to smoke-free policy adoption as moot.

As the evidence-base for the adverse health effects of SHS exposure became established in the general public's mind, debate switched to the potential business and economic effects of implementing clean indoor air policies. In turn, health policy and economics scientists were able to establish that states and communities implementing SHS policies would not see any negative economic or business consequences (24). The only opposition argument that still carries sway in current policy debates, and one that is outside the realm of a testable epidemiologic study, is the philosophical argument about whether or the government has

the right to infringe on personal and business liberties for the sake of public health.

THE STATE OF EVIDENCE: HOW MUCH IS ENOUGH?

Assessments of potential for harm in epidemiology are accompanied by some degree of uncertainty. The question of when epidemiological evidence warrants moving forward and promoting a public health policy is determined by many factors, some of which lie outside of the recent common practice of epidemiology, although not of public health. With all interventions, policy or otherwise, the amount of epidemiologic evidence for causal effects that is needed to motivate action differs by purpose (25).

Gostin (26) offers a multiple-step model for evaluating how and when to move toward public health regulation. An important premise of this approach is that the level of risk needed to justify an intervention depends upon the potential burdens that the policy places on society. Extending this concept to the reality that epidemiologic evidence almost inevitably comes with some uncertainty, the SHS case study illustrates the need to weight potential benefit against the potential for unintentional harm to individuals or to society that could come from policies intended to protect the population from SHS exposure. In the case of SHS, the weight of evidence demonstrating the harm of exposure raised the need for prudent policies to reduce exposure and thus harm. The specific points of industry opposition to these policies showed a need for greater research on unintended consequences, such as the possibility of economic harm of bans to the hospitality industry. In fact, as previously mentioned, evaluation research showed that smoking bans can be implemented at no cost to the hospitality sector or to business in general, or even at a financial gain because there are savings on cleaning costs and upkeep for establishments (27, 28). Careful assessments, on the basis of epidemiologic investigational principles, generated the needed evidence, thus enabling smoother and more rapid enactment of the policies over time.

A CLOSER LOOK: THE STORY OF NEW YORK

In July, 2003 New York State became the third U.S. state to require indoor workplaces, including bars and restaurants, to prohibit smoking. This legislation culminated in a decade of local-level debates over the merits of the health argument that SHS caused disease in nonsmokers as well as other issues relevant to the implementation of such legislation.

In the early 1990s, New York State already had a law on the books that required indoor workplaces to be smoke free, but restaurants and bars were exempt. In 1994, a bill was

introduced in New York City to prohibit smoking in the dining areas of restaurants with 50 or more seats (29). After three spirited public hearings and a modification to the bill to exempt restaurants with 35 or fewer seats, the bill unanimously passed out of the health committee and was approved by the full city council with 82% voting in favor of the bill in December 2003. The Mayor signed it into law and it became effective April, 1995.

The three arguments made by proponents of a stronger smoke-free law were as follows: (i) SHS is a health hazard; (ii) the then current law was inadequate to protect workers and patrons from SHS; and (iii) the law would not have an adverse economic impact on restaurants. The answer to the question of how much evidence is enough came when the opponents' counter-arguments shifted to other issues: (i) the law would be bad for business; (ii) the law was unnecessary; (iii) the law was unfair; and (iv) the law would be impossible to enforce.

In the 1990s, the health argument was made by citing the 1992 EPA report summarizing the state of the science at the time along with more recent studies on lung cancer and other adverse health effects. Evidence on the adverse health impacts of SHS were the most central and important in justifying the need for expanding the existing legislation. The health evidence that SHS caused disease in nonsmokers was used to make the prudent case that, in fact, the law was necessary to protect the public's health. But prudence without conclusive evidence creates the space for politics and opposition. In the SHS case, the health evidence was used to address at least one opposing view, that of fairness, because, it was argued, that it was not fair for restaurant workers to risk their health to earn a living. But at the time the bill was being debated, there was just one published study on economic outcomes of smoke-free restaurant laws and it concluded there were no adverse effects (30), and there were no published studies on compliance issues with smoke-free laws. However, the testimonials demonstrated that the laws were largely supported by the majority of the population and were self enforcing with little additional resources used to gain high levels of compliance. Note that the opposition to this legislation was primarily on political and economic grounds—by this time the epidemiologic evidence was firmly established and not attacked directly.

Around the time that the 1995 smoke-free restaurant law took effect in New York City, and in response to similar science-based advocacy efforts, other major population centers in the state began adopting similar legislation leaving the state with a patchwork of legislation that still exempted some workplaces (i.e., bars). The 1995 New York City law provided the right opportunity to study the hypothesized impacts of the law. Studies showed that the people strongly supported the law (31), compliance with the law was high, most restaurateurs reported coming into

compliance with ease and little expense (18), and the hospitality and tourism industry flourished even after the law took effect (32–34). These findings helped to fuel efforts to strengthen legislation in local communities in New York that existed on the grounds of protecting all workers from SHS.

With this evidence in hand, and effectively communicated by informed advocates, the New York City Council voted to strengthen the city's smoke-free law to include all restaurants and bars in late 2002 with the legislation taking effect March 2003. Almost immediately afterwards, New York State passed similar legislation that provided smoke-free workplaces, bars, and restaurants throughout the state taking effect July 2003.

It is important to note that demonstrating that SHS poses a risk and that the proposed policy solution has greater benefits than burdens is only the first step in the policy change process. Since the 2003 New York ban went into effect, systematic follow-up studies have strengthened the evidence showing causal connections between this type of SHS policy and both risk reduction as well as health promotion. For instance, several studies showed that after the ban took effect, hospitality workers had significantly lower urinary cotinine (a marker for nicotine exposure) levels after the ban (35) and also reported fewer hours of total SHS exposure and less sensory (eye, nose, and throat) irritation (36) compared with before the ban. Hospital admission rates for acute myocardial infarction were reduced by 8% after the 2003 (37), replicating the results of similar studies conducted in other U.S. communities (38, 39). The evidence had now begun to narrow the space for politics and opposition. Furthermore, these follow-up evaluations have cited both when smoke-free policies have been challenged and when proposals have been put forward to extend them.

Although the cumulative epidemiological evidence on the dangers of SHS summarized in multiple reports supplied the essential evidence for smoke-free laws in policy debates across the country, simply having this evidence in hand was not sufficient to fuel policy change. Vocal advocates and well-crafted local, state, and national communication campaigns were essential to counteract well-financed opposition from the tobacco industry and some sectors of the business community, which were engaged as allies by the tobacco industry. It could be debated that passage of New York City's smoke-free air law in 1995 was a critical point for smoke-free air legislation in the United States because it demonstrated to public health advocates, tobacco control leaders, and policy makers across the country that the scientific evidence was solid enough to address and disarm. In addition, by 1995 there was a strong smoke-free air advocacy infrastructure in place, one that stretched from grassroots/local advocacy and coalitions, to national-level advocacy provided by organization that included the Campaign for

Tobacco Free Kids, Americans for Nonsmokers' Rights and the American Cancer Society. Although epidemiologists and other scientists were a part of this effort, they generally lack the experience and training needed to fully translate evidence into policy recommendations and to use it strategically in policy debates (40). Dissemination and implementation research is an important, but insufficiently represented area of training for future epidemiologists (41, 42).

IS THE GLASS NOW HALF FULL? OR HALF EMPTY?

We have seen in the case of SHS policy that strong scientific evidence can drive healthy public policy. We selected the case of smoke-free policy adoption as an example of public health policy being driven by rigorous epidemiological research. Certainly the weight of evidence that SHS harms health has been the key factor in activating policy, influencing so many jurisdictions in the United States to adopt 100% smoke-free regulations for their workplaces. But why, more than 20 years after the 1986 Surgeon General's Report, does more than half the U.S. population live in a community where smoking is not banned in all public spaces? Why is it taking so long to implement what the science is clearly telling us to do?

In general, dissemination and adoption of control strategies based in findings of clinical and epidemiologic studies and policy takes much longer than it should. One important reason for the slow pace of translation of discovery into delivery is that policy scientists are less connected to epidemiologists than could be the case, and this is as true in SHS research as in other areas of public health. An analysis of 40 years of SHS research found that the policy and intervention scientists only rarely directly cite the work that established the epidemiologic basis for SHS policy (43). Instead, they were much more likely to cite major summary reports such as the Surgeon General's reports or the NCI Cancer Monographs. However, it takes some time the evidence base to be summarized in these reports. So perhaps the pace of translating evidence into policy could be speeded up by reconnecting policy scientists to epidemiologists.

More generally, public health policy decisions involve multiple determining factors, of which research evidence is an important but neither necessary nor sufficient condition for taking action. Even the strongest epidemiological evidence will not trigger policy change on its own. Committed leadership and advocacy are essential, along with carefully constructed messages and media campaigns that address the concerns of critical audiences (e.g., the public, policymakers the business community). As Isaacs and Schroeder (44) point out, highly credible scientific

evidence can persuade policymakers to withstand attack by those whose interests are threatened, but significant policy or social change rarely, if ever, happens without focused, astute and courageous advocacy. And often, these on-the-ground advocates are more aware of the types of research questions that need to be answered solidly to provide to lawmakers the information that can cement their decisions (45). In the case of SHS policies, the tobacco industry has actively undermined the evidence that SHS causes disease and attempted to instill doubt in the minds of the public and policymakers. This tactic has served to diminish the relative strength of the health arguments while increasing the relative strength of the nonhealth arguments when protective policies are considered. The ultimate balance between health and nonhealth arguments in the decision-making process differs from community to community, from state to state, and from country to country and has evolved over time. Thus, SHS policy implementation has presented a challenge that requires small studies documenting the local benefits of smoke-free air laws in individual communities, along with skillful communications and advocacy efforts. The products of the smoke-free campaigns which include not just the policies and health benefits but also advocacy toolkits, partnerships, and a greater public awareness of the issue, have jointly led to a majority being covered by a 100% smoke-free workplace in 2010 (2). Thus, the balance has tipped, in our opinion when looking at progress in the effort to protect the public's health, the glass is more than half-full, rather than half-empty.

LESSONS LEARNED

1. *Even after a policy goal has been achieved, the need for epidemiological evidence and inquiry remains.* After a risk has been established and a policy strategy created, it is still necessary to evaluate the policy to learn whether it is associated with risk reduction and health promotion. In the case of SHS policy, documenting the decrease in cotinine levels and cardiovascular disease events in communities that have implemented bans has been an important part of the policy process. It is also important to do surveillance for any possible disparities in protection. In places that have comprehensive bans, continuing evaluation is important to assure that all are being protected, and provide data (on issues like public support for the ban and economic impact) in case the law is ever challenged.
2. *Community-based dissemination and implementation research is necessary.* Research questions relating to public opinion, economic impact, and even health effects had to be re-asked and studies repeated in local communities to meet the call for local data. Although not breaking new

scientific ground on health effects, these studies have provided invaluable evidence to help inform local smoke-free policies debates. The need for this type of research is so prevalent that the Centers for Disease Control and Prevention has developed a toolkit on conducting the five different types of studies that can be used to inform policy debates in the context of local community situations (46).

3. *The best and most necessary research questions do not always come from epidemiologists.* An ear towards the “users,” that is, community partners, advocates, the local business community and lawmakers, can and must inform research and guide research questions to the most policy-relevant facets of a topic. For instance, a city council member's reluctance to take a public health stand could be attributable to a variety of concerns related to potential health impact, economic impact, and/or public opinions. Knowing what questions are most relevant to lawmakers can be a guide to what research questions to ask. Further down the line, partnerships are useful for presenting a strong, consistent message on the evidence.

4. *There is a need for epidemiologists to work with other researchers across disciplines.* With SHS policy, the potential economic implications of the policies were key factors in smoke-free policy debates. Epidemiologists are typically not trained in economic analyses and so cross-disciplinary partnerships are key.

5. *Anticipate and address the opposition.* In this case study, there was a very organized, determined and well-funded coalition of groups that worked against the implementation of these policies. In the realm of SHS policy, the opposition's arguments have been quite predictable and always include the unfounded claims that smoke-free laws will not be supported, will cause economic hardship, and are not feasible. There are many public health arenas in which industry opponents may be formidable. By knowing the arguments and strategies that have surfaced in the past, communities looking towards smoke-free policies today can do ground-work, such as conducting studies according to the Centers for Disease Control and Prevention guidebook that yield evidence to address opposition arguments.

6. *Focused, well-organized advocacy is needed to translate even the strongest epidemiological evidence into policy change.* Simply having strong evidence was not sufficient to fuel policy change. Vocal advocates and well-crafted local, state, and national communication campaigns were essential to counteract well-financed opposition from the tobacco industry and business community.

7. *Train future epidemiologist to engage and interact with public health advocates, practitioners and with policy makers.* Few epidemiologists are trained or prepared manage the response to controversial science like research and SHS effects and policies. Getting involved in this kind of research can be

daunting for junior researchers. Remaining true to the science and facing unpleasant public encounters that they neither expect nor are typically trained to deal with through their academic programs, is quite challenging. If we want the findings of epidemiological research to be successfully translated into policy, we need to train students and junior investigators on how to engage and successfully communicate their work and its implications to relevant stakeholders. For instance, The Robert Wood Johnson Foundation's Substance Abuse Policy Research Program and the Center for Tobacco-Free Kids provides this kind of training for many researchers investigating smoke free air laws and policies.

CONCLUSIONS

The case of SHS offers a rich platform for considering the process of translating epidemiologic evidence to policy. Epidemiologists working on the forefront of translating other risk prevention areas, where the evidence is intuitively pointing to prudent policy options, can learn from both the barriers faced and successes achieved over the decades of work in the area of SHS policy. The history of SHS policy translation demonstrates that working locally and with those outside of the discipline of epidemiology is essential for achieving most public health policy goals and that science is not the only factor considered. Even with strong evidence in hand, the opposition to public health policies can be very effective at halting and even reversing progress and so, answering opposition must be a dynamic, iterative endeavor. Finally, continuous, ongoing, and local policy evaluations are important to spread effective and protective policy initiatives.

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