Special Report: Policy
Effectiveness of smoke-free policies

Second-hand smoke contains carcinogens, such as benzene, 1,3-butadiene, benzo[*a*]pyrene, and 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone.[1] Inhalation of second-hand smoke is now well documented as causing harm to health, including lung cancer and cardiovascular disease in adults, respiratory disease in adults and children, and sudden infant death syndrome.[2] Smoke-free policies include legislative and other measures to protect against harmful exposure to second-hand smoke and are an integral part of the World Health Organization Framework Convention for Tobacco Control (WHO-FCTC).[3]

From March 31 to April 5, 2008, a Working Group of 17 scientists from nine countries met at the International Agency for Research on Cancer (IARC), Lyon, France, to assess the evidence for the effectiveness of such policies. Members of the Working Group were selected on the basis of their expertise, geographical representation, availability, and absence of declared real or apparent conflicts of interest, on the basis of the completed WHO's declaration-of-interest form.

The Working Group started with a comprehensive assessment of the peer-reviewed published work and accessible governmental reports on the effects of such policies. This assessment included an outlining of different variations in these policies, a review of population attitudes to and compliance with such policies, and an analysis of the effectiveness of these policies in decreasing second-hand smoke exposure and modifying smoking behaviours. This assessment will be published as Volume 13 of the IARC Handbooks of Cancer Prevention series.[4]

As a result of this assessment, the Working Group proposed 11 potentially causal statements. When assessing the weight of evidence for these statements, the highest classification of "sufficient" suggests that the association was judged to be causal; a lesser classification of "strong" suggests that the association is consistent, but evidence of causality is limited. Although the IARC Handbook contains a full bibliography of over 900 references, only exemplar references are cited here to anchor the assessment of evidence for each statement.

Studies of the effects of smoke-free policies consistently show that exposure to second-hand smoke is decreased in high-exposure settings by 80–90% and can lead to widespread decreases in exposure of up to 40%.[5] The weight of evidence suggests that such policies do not increase exposure to second-hand smoke in homes. The greatest decreases in workplace second-hand smoke exposure occur in subpopulations that had the highest exposures prelegislation. A study with more than 10 years' follow-up has shown that early decreases in exposure are not reversed over time.[6] From this evidence, the Working Group concluded "there is sufficient evidence that implementation of smoke-free policies substantially decrease second-hand smoke exposure".

Studies of workers who are affected by workplace smoking restrictions[7] suggest that such policies are consistently associated with an individual decrease in cigarette use of 2–4 cigarettes a day. Whether or not this decrease is sufficient to lessen dependence and, therefore, increase the likelihood of quitting in the future is unknown, but some evidence exists that decreased use in the shorter term can lead to later increased cessation. This evidence led to the statement that "there is sufficient evidence that smoke-free workplaces decrease cigarette consumption in continuing smokers".

Population studies show a consistent pattern for a lower smoking prevalence and a higher smoking cessation in workplaces with smoke-free policies. Although these mostly cross-sectional studies cannot prove that workplace smoking restrictions decrease cigarette use, two such studies provided additional evidence for a causal effect; one assessing differences in smoking behaviour within industries with a similar workforce, and the other by convincingly ruling out other worker or worksite characteristics that could have produced the noted findings.[7,8] All studies show that partial restrictions are worse than smoke-free policies. The Working Group concluded "there is strong evidence that smoke-free workplaces decrease the prevalence of adult smoking".

The strength and scope of public and workplace smoking restrictions are associated with lower tobacco use in youths.[9] Smoke-free policies might have this effect by decreasing opportunities to develop a high level of nicotine addiction in people who are in the early stages of a dependence on smoking. This evidence led to the statement "there is strong evidence suggesting that smoke-free policies decrease tobacco use in youths".

Smoke-free policies have been shown to improve the health and productivity of employees and decrease business costs for insurance, cleaning, maintenance, and potential litigation. Implementing comprehensive smoke-free policies has not had a net negative economic effect on the restaurant and bar industry.[10] The conclusion was made that "there is sufficient evidence that smoke-free policies do not decrease the business activity of the restaurant and bar industry".

Most studies have shown rapid improvements in respiratory symptoms (eg, wheeze and cough) and sensory symptoms (eg, upper airway and eye irritation).[11] Workers in the hospitality industry have benefited. Thus, the statement has been made that "there is

sufficient evidence that the introduction of smoke-free policies decreases respiratory symptoms in workers".

Studies suggest that smoke-free workplace policies are followed by a 10–20% decrease in hospital admissions for acute coronary events in the first year after implementation. Most studies have not been able to identify the contribution of decreased second-hand smoke exposure in non-smokers from policy-related changes in smoking behaviour,[12] and publication bias cannot be ruled out. This evidence led to the conclusion that "there is strong evidence suggesting that the introduction of smoke-free legislation decreases heart disease morbidity".

The lead time for lung cancer to be diagnosed after exposure to a carcinogen can be 20 or more years. Most policies have been in effect for for less time than this. Furthermore, conclusive evidence for the effect of these policies on the incidence of lung cancer will be difficult to obtain, because most mandated population databases on cancer morbidity and mortality do not include smoking status, making it impossible to separate the effect on health events of changes in second-hand smoke exposure from changes in smoking behaviour. The Working Group concluded "in view of the long lag time between second-hand smoke exposure and the development of lung cancer, data are not yet available regarding the expected decline in lung cancer after implementation of smoke-free policies".

Exposure to second-hand smoke in homes with smokers is decreased with smoking restrictions, especially if the home is smoke-free.[13] The effect of a smoke-free home on children's exposure to second-hand smoke is substantially larger than any effect of interventions aimed at helping parents quit successfully. The statement was therefore made that "there is sufficient evidence that voluntary smoke-free home policies decrease children's second-hand smoke exposure".

Studies consistently report that smoke-free homes are associated with decreased tobacco use and increased successful quitting.[14] The effect of a smoke-free home is consistently stronger than the effect of a smoke-free workplace. Thus, the Working Group concluded "there is sufficient evidence that smoke-free home policies decrease adult smoking".

Cross-sectional studies consistently show that children of non-smoking parents who live in smoke-free homes are less likely to initiate smoking than if the home is not smoke-free.[15] Longitudinal studies are known to be underway, but are yet to be reported. The statement was therefore made that "there is strong evidence to suggest that smoke-free home policies decrease smoking in youths".

On the basis of the evidence reviewed, the Working Group recommended that governments enact and implement smoke-free policies that conform to the guidelines for Article 8 of the WHO-FCTC.[3] Implementation of such policies can have a broader population effect of increasing smoke-free environments. Not only do these policies achieve their aim of protecting the health of non-smokers by decreasing exposure to second-hand smoke, they also have many effects on smoking behaviour, which compound the expected health benefits. These health benefits will be greater if these policies are enacted as part of a comprehensive tobacco-control strategy that implements all of the provisions called for by the WHO-FCTC. Up to now, most of research has been done in high-resource countries. The Working Group also recommended the establishment of a multinational surveillance system to allow assessment of the effect of these policies in low-resource and medium-resource countries.

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