**Supplementary Table 13. Smoking Restrictions in Communities, Worksites, Schools, and Residences**

**Smoking Restrictions in Communities**

| Author, y | Design | Population | Duration | Intervention/Evaluation | Major Findings |
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| IOM Committee on Secondhand Smoke Exposure and Acute Coronary Events, 2009[401] | Review of quasi-experimental studies (pre-/postintervention) | Multiple studies that examined smoking bans and markers of air pollution and 11 studies in the United States, Canada, and Europe that examined smoking bans and acute coronary events | Follow-up durations of individual studies after the ban ranged from 0.2 to 3.0 y | Smoking bans in public places in communities: Study designs were generally quasi-experimental, comparing rates of relevant hospitalizations in time periods before vs after the ban, with varying durations from implementation of the ban to the assessment of post-ban end points. As additional ecological controls, several studies performed parallel assessments of the coronary rates in the same time periods in a nearby locality that had not instituted a smoking ban. | • Many studies have consistently demonstrated substantial reductions in markers of air pollution and particulate matter in places where smoking was banned.<br>• There was substantial evidence that these smoking bans were effective in reducing acute coronary events, with reductions ranging from ≈6% to 47%.<br>• In studies that evaluated coronary rates separately for smokers vs nonsmokers, reductions were demonstrated in both groups, consistent with benefits of reduced exposure to secondhand smoke among nonsmokers. |
| Meyers et al, 2009[413] | Systematic review and meta-analysis | 11 reports from 10 study locations that examined smoking bans in public places and risk of acute coronary events (the same studies as the IOM report, above) | As above | As above | • Pooling all studies, the relative reduction in acute coronary events was 17% (RR=0.83; 95% CI, 0.75-0.92).<br>• Largest RR reductions were seen among younger persons and nonsmokers.<br>• Benefits increased over time: the reduction in RR incrementally decreased 26% for each year of observation after implementation of the ban. |
| Herman and Walsh, 2011[415] | Quasi-experimental study (pre-/postintervention) | May 2007 statewide smoking ban in Arizona, which prohibited smoking in most enclosed public places and places of | January 2004 –May 2008 | Rate of hospital admissions was evaluated before and after the ban, both overall and stratified by county-specific presence or absence of preexisting smoking bans, to separate the effects of the ban vs temporal | • Comparing counties with no prior bans to those with prior bans, counties with no prior bans experienced significant reductions in hospital admissions for conditions |

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| | | employment | | trends. | directly affected by secondhand smoke, including acute MI (13%), angina (33%), stroke (14%), and asthma (22%).<br>• No significant differences were seen for control conditions such as appendicitis, kidney stones, acute cholecystitis, and ulcers. |
| Trachsel et al, 2010[416] | Quasi-experimental study (pre-/postintervention) | March 1, 2008, smoking ban in public buildings in the Swiss canton of Graubünden. | 2006-2009 | Rates of incident MI in the 2 y before and 2 y after the ban. Rates were evaluated both for the stable resident population and the large, transient tourist population to evaluate longer-term vs shorter-term effects. | • There was a 22% lower rate of incident acute MI in the year following the ban, compared with the prior 2 y.<br>• Rates of acute MI in both residents and nonresidents were lower, suggesting a short-term benefit of the smoking ban. |
| Naiman et al, 2010[417] | Quasi-experimental study (pre-/postintervention) | Smoking ban in restaurants and related settings in Toronto, Ontario, Canada | January 1996–March 2006 | The study evaluated hospital admission rates for multiple smoking-related conditions, including acute MI, angina, stroke, asthma, chronic obstructive pulmonary disease, and pneumonia/bronchitis, from January 1996, 3 y before initial implementation of the ban, to March 2006, 2 y after the last phase was implemented. The study also evaluated control cities and control end points. | • Rates of cardiovascular conditions decreased by 39%, and admissions for respiratory conditions decreased by 33%.<br>• No changes were observed in control cities or control end points.<br>• Reductions in disease end points occurred during the ban period related to implementation in restaurant settings. |
| Dove et al, 2010[418] | Quasi-experimental study (pre-/postintervention) | July 2004 comprehensive smoke-free workplace law in Massachusetts | 1999-2006 | The study evaluated rates of fatal MI before and after implementation of the ban, stratified by cities/towns with and without previous local smoking bans. | • MI mortality rates decreased by 9.2% after implementation of the law in cities and towns with no prior local smoking ban.<br>• A smaller, not statistically significant decrease occurred in localities that did have a prior ban.<br>• The effect of the statewide ban was larger after the first 12 mo (–18.6%; $P<0.001$) than in the first year. |
| **Smoking Restrictions in the Workplace** | | | | | |

| Author, y | Design | Population | Duration | Intervention/Evaluation | Major Findings |
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| Fichtenberg and Glantz, 2002[424] | Systematic review with random effects meta-analysis of quasi-experimental studies (pre-/postintervention) | N=22,122 from 8 prospective studies, 7 sequential cross-sectional studies, 6 retrospective studies, and 5 population surveys conducted in the United States, Canada, Australia, and Germany | Durations of individual study follow-up ranged from 1 to 24 mo | The included studies measured changes in smoking behavior that accompanied the implementation of smoke-free regulation in individual workplaces. Differences in consumption (per smoker and per employee) and prevalence before and after workplaces became smoke-free (in workplace studies) and between comparable samples with and without regulations (in population studies) were calculated. | • Implementation of totally smoke-free workplaces was associated with pooled reductions in absolute smoking prevalence of 3.8% (95% CI, 2.8%, 4.7%) and daily cigarette use among smokers of 3.1 cigarettes (95% CI, 2.4, 3.8)<br>• The combined effects of stopping smoking and lower consumption per continuing smoker equaled 1.3 (range 0.2-1.8) fewer cigarettes smoked per day per employee, a 29% (95% CI, 11%, 53%) relative reduction.<br>• Studies having either self-reported (N=3) or biochemical (N=3) measures of secondhand smoke all found significant reductions in environmental tobacco smoke exposure after policy implementation. |
| Bell et al, 2009[426] | Systematic review of cross-sectional (n=12), cohort (n=3), and quasi-experimental (n=1) studies | N=16 studies in workers in the United States (n=8), Australia (n=3), Ireland (n=3), Finland (n=1), and Scotland (n=1) | Included studies were published between 1990 and 2007. | Workplace smoking bans were the exposure of interest. In this review, the authors tried to study effect modification of the smoke-free policy on smoking indexes by certain key demographic variables. | • No differences were seen by age or sex in 2 studies finding a positive association between strong antismoking policies and quitting in the prior 6 mo (OR=1.51; 95% CI, 1.1, 1.7)[427] and a decrease in daily cigarette consumption (–5.2 cigarettes per day) after 5 mo and an increase of 1.7 cigarettes per day at 6 mo to 2 y after workplace smoking bans.[428]<br>• Farrelly et al[429] and Heloma and Jaakkola[430] showed that a complete smoking ban was associated with slightly larger reduced prevalence of smoking in men relative to women, whereas Kinne et al[431] showed that men, but not |

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| | | | | | women, whose workplace had smoking restrictions smoked fewer cigarettes on workdays and nonwork days.<br>• Farrelly et al[429] also showed that workers with a college degree showed a larger decline in smoking prevalence (28% reduction) than those without a high school education (13.7% reduction). Gritz et al[432] showed that white collar workers had higher quit rates than blue-collar workers in relation to smoking bans. |
| Hopkins et al, 2010[425] | Systematic review | Participants in 37 worksite studies of varying designs: prospective (n=8), retrospective (n=7), cross-sectional (n=13), and quasi-experimental (n=13), conducted in a variety of work settings in the United States (n=29), Canada (n=4), Australia (n=1), and Europe(n=2). | Included studies were published between 1980 and June 2005. | Adoption of a smoke-free policy was the exposure of interest. In 19 of the included studies, smoke-free policies were implemented either voluntarily or in response to a community-wide smoke-free law. In 18 of the studies individual workers provided information about the existing smoking policy at their workplace. Outcomes included prevalence of tobacco use, cessation of tobacco use, attempts to quit, and number of cigarettes smoked per day. | • In 22 studies that reported on prevalence, the median absolute change/difference in prevalence of tobacco use associated with smoke-free policy was a decrease of 3.4 percentage points (interquartile interval: −6.3 to −1.4). This difference was significant in 10 studies.<br>• In 6 studies that provided data to evaluate self-reported quit attempts, the median absolute change/difference was 4.1 percentage points higher (interquartile interval: −0.7 to +6.8).<br>• In 23 studies that assessed the impact of smoke-free policies on cessation, the median change/difference in tobacco quit rates was 6.4 percentage points higher (interquartile interval: 2.0-9.7). This result was significant in 8 studies.<br>• In 8 studies that provided multivariate-adjusted ORs for cessation comparing exposure to worksite smoke-free policy vs no smoke-free policy, OR ranged from 1.21 (95% CI, |

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| | | | | | 1.00, 1.45) to 1.92 (95% CI, 1.11, 3.32).<br>• In 18 studies that reported on number of cigarettes smoked per day, a smoke-free policy was associated with a median change/difference of 2.2 fewer cigarettes per day (interquartile interval: −1.7 to −3.3). |
| Mizoue et al, 2000[436] | Observational, cross-sectional | N=1040 employees of a municipal office in Japan | Not stated | A health survey using a self-administered questionnaire was conducted among a random sample of employees already subjected to 1 of 3 policies: a workroom ban, a work area ban with a smoking area inside the workroom, and time limits on smoking and prohibition of smoking during meetings (minimum restriction). Smoking behavior characteristics and desire to change smoking were compared among these policies, with adjustment for age. | • A 12% lower prevalence of smoking and a 17% higher proportion of ex-smokers were found in workplaces with a workroom ban than in those with minimum restrictions.<br>• Among current smokers the workroom ban was significantly associated with a lower consumption of cigarettes (mean difference from minimum restrictions, 4.1 cigarettes per day: $P<0.001$).<br>• The proportion of heavy smokers who consumed >25 cigarettes per day was 32% lower among smokers subject to a workroom ban compared with those working under minimum restrictions. |
| Farkas et al, 2000[439] | Observational, cross-sectional | N=17,185 teenagers, age 15-17 y, in the Current Population Surveys conducted by the US Census Bureau | 1992-1993 and 1995-1996 | Smoking behavior and household and workplace smoking restrictions were assessed using standardized questionnaires. These responses were designated as smoke-free, partial ban, and no smoking restrictions, respectively. | • Compared with those in workplaces with no smoking restrictions, adolescents who worked in smoke-free settings were less likely to be smokers (OR=0.68; 95% CI, 0.51, 0.90). |
| Siahpush et al, 2003[464] | Observational, cross-sectional | N=2526 current smokers and successful quitters age 14+ y in the 1998 Australian National Drug Strategy Household Survey | 1998 | Smoking behavior of participants was ascertained by a mixture of interviews and self-administered questionnaires. Participants also answered questions on the presence of a smoking ban at home, school, or the workplace. Associations were examined by multivariate logistic | • Workplace smoking bans were not significantly associated with odds of smoking cessation. |

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| | | | | regression analysis. | |
| Skeer et al, 2005[440] | Observational, cross-sectional | N=3650 Massachusetts adults who were employed primarily at a single worksite outside the home that was not mainly outdoors | January–June 2002 | Participants were obtained by random-digital dialing of Massachusetts households and asked about their smoking status, hours of exposure to tobacco smoke at work, and their worksite smoking policy. A multivariate logistic regression model was created to assess exposure to secondhand smoke in the workplace by workplace smoking policy, adjusting for potential confounding variables | • Employees who worked in places where smoking was permitted had 10.3 higher odds (95% CI, 6.7, 15.9) of being exposed to secondhand smoke, and those who worked in places with designated smoking areas had 2.9 higher odds of being exposed to secondhand smoke (95% CI, 2.4, 3.5), compared with employees in smoke-free worksites.<br>• Compared with smoke-free worksites, employees who worked in places with designated smoking areas were exposed to secondhand smoke 1.7 times longer (95% CI, 1.4, 2.2) and those who worked in places with no restrictions on smoking were exposed 6.34 times longer (95% CI, 4.37, 9.21). |
| Shelley et al, 2007[465] | Observational, cross-sectional | N=1472 Asians (1071 nonsmokers and 401 current smokers), age 18-74 y, living in 2 communities in New York City | November 2002–August 2003 | Smoking behavior, health status, and household and workplace smoking restrictions were assessed using standardized questionnaires. | • A smoking ban at work only was not associated with a higher likelihood of reporting good/excellent health (OR=1.13; 95% CI, 0.56, 2.31). |
| Osypuk et al, 2009[437] | Observational, cross-sectional | N=85,784 US indoor workers who participated in the 2001-2002 TUS of the CPS conducted by the US Census Bureau | 2001-2002 | Survey participants were asked about their individual smoking habits and smoking policies at their workplace. Workplace smoking was modeled as a dichotomous variable (smoke-free vs non–smoke-free) where non–smoke-free workplaces included sites with designated smoking areas and no smoking restrictions. The association between smoke-free workplaces and current smoking was compared among immigrants and those born in the United States after covariate adjustment. | • Employment in a workplace that was not smoke-free was associated with higher odds of current smoking among all survey participants, OR=1.34 (95% CI, 1.27, 1.41).<br>• Stratified analysis showed that US-born participants working in non–smoke-free workplaces were 1.36 times more likely to be current smokers (OR=1.36; 95% CI, 1.29, 1.44) compared with those working in smoke-free workplaces. The association was potentially |

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| | | | | | weaker among immigrants (OR=1.15; 95% CI, 0.97, 1.35). |
| Friedrich et al, 2009[438] | Observational, cross-sectional | N=1627 employees of larger companies (>20 employees) in the canton of Zurich, Switzerland | 2007 | Questionnaire data about the prevalence of tobacco prevention usage, tobacco prevention measures, and the stages of change with respect to introduction of tobacco prevention measures were obtained from human resources managers in included companies. Multivariable regression was used to evaluate the relation between worksite tobacco prevention measures and policies and relevant outcomes such as percentage of smokers in the workforce and environmental smoke-related problems. | • Greater restrictiveness in smoke-free policies was inversely associated with percentage of smokers in the workforce and with environmental tobacco smoke–related problems (environmental tobacco smoke exposure and complaints) after ordinal regression analysis<br>• Compared with companies that banned smoking indoors and outdoors, workers in companies with no policy were 3.77 times more likely and those in companies with designated smoking areas were 2.75 times more likely to report environmental tobacco smoke–related complaints.<br>• No statistical difference was found in environmental tobacco smoke–related complaints between companies with indoor smoking bans alone and those with both outdoor and indoor smoking bans. |
| Ma et al, 2010[441] | Observational, cross-sectional | N=2698 workers, age 18-69 y, in 6 counties in China | 2004 | Face-to-face interviews collected data on demographic characteristics, smoking behaviors, secondhand smoke exposure, and worksite smoking policy. Multivariate-adjusted models evaluated the relation between worksite smoking restriction policies and secondhand smoke exposure among nonsmokers, intention to quit among smokers, and cigarettes smoked. | • Nonsmokers in workplaces with an unrestricted smoking policy were 3.7 times more likely (OR=3.7; 95% CI, 1.3, 10.1) to be exposed to secondhand smoke compared with nonsmokers in smoke-free workplaces.<br>• Significant associations were not seen for intention to quit or cigarettes smoked. |
| Longo et al, 2001[435] | Quasi-experimental study, comparing current or former smokers in hospitals that | N=1033 current or former smokers in 26 randomly selected | Follow-up ranged from 6 mo to 9 y, depending on when | The Joint Commission on Accreditation of Healthcare Organizations mandated smoke-free | • At each of the time periods examined, the post-ban quit ratio for the hospital |

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| | implemented a smoke-free policy vs those in non–smoke-free control workplaces in the same communities | smoke-free hospitals in 21 states (intervention group) and 816 current or former smokers in workplaces without smoke-free policies who lived in the same communities (comparison group) | the smoking ban was implemented in each hospital (varying between hospitals from 1987 to 1994). | hospitals in the United States in 1993. Hospital and other community (control) employees were surveyed beginning in 1994 using a questionnaire and were resurveyed twice to assess their smoking status prospectively (until 1996). The main outcome measures were the proportions of smokers who quit after the ban (quit ratio) and the relapse rate. Between-group comparisons were conducted using the Cochran-Mantel-Haenszel statistic for general association, stratified Cox proportional hazards models, and other appropriate statistical tools. | employees was higher than that for the community employees.<br>• For employees whose workplace smoking bans were implemented at least 7 y before the survey, 25.6% of smokers quit post-ban, compared with 14.2% for employees in non–smoke-free workplaces ($P$=0.02).<br>• After adjusting for a variety of factors, time to quitting smoking was shorter for hospital employees ($P$<0.001), with an overall RR of quitting of 2.3.<br>• Relapse rates were similar in both groups. |
| Osinubi et al, 2004[442] | Quasi-experimental study (pre-/postintervention) | N=128 employees of the New Jersey Insurance Manufacturers Group enrolled in a tobacco-dependence treatment program | 1999-2000 | The insurance group extended its smoke-free indoor policy to a smoke-free indoor and outdoor policy. Data on smoking habits of 101 employees enrolled in a tobacco-dependence treatment program in the group with target quit dates set before implementation of the ban were compared with those of 27 workers enrolled after the ban was implemented. In-person follow-ups were conducted with participants at 2 wk after their target quit dates, and quit status was verified with exhaled carbon monoxide. Quit status at 6 mo was assessed by self-report or telephone interviews. | • Post-ban participants had higher quit rates than pre-ban participants (52.4% vs 43.0%) after 6 mo.<br>• Post-ban participants were 80% less likely to relapse than pre-ban participants.<br>• Nonquitters decreased their consumption by 6.6 cigarettes per day (39.1% decrease). |
| Bauer et al 2005[433] | Quasi-experimental study (pre-/postintervention) | N=1967 employed persons, age 25-64 y at baseline, enrolled in COMMIT in 20 US and Canadian cities | 8 y, 1993-2001 | Data on personal and demographic characteristics, tobacco use behaviors, and restrictiveness of worksite smoking policies were obtained from trial participants who worked primarily indoors using telephone interviews done in 1993 and 2001. Multivariate models were constructed to examine the role of changes in worksite smoking policies | • People who worked in environments that changed to or maintained smoke-free policies between 1993 and 2001 were 1.9 times more likely than people whose worksites did not do so to have stopped smoking (OR=1.92; 95% CI, 1.11, 3.32). |

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| | | | | over time (and other factors) in determining smoking behaviors. | • Continuing smokers in these environments decreased their average daily consumption by 2.57 cigarettes.<br>• People working in environments that had smoke-free policies in place in both 1993 and 2001 were 2.3 times more likely (OR=2.29; 95% CI, 1.08, 4.45) than people not working in such environments to quit by 2001, and continuing smokers reported a decline in average daily consumption of 3.85 cigarettes.<br>• No significant change was observed in the likelihood of quitting in people working in environments with designated smoking areas compared with those working in environments that allowed smoking, but workers in such environments consumed 2.22 significantly fewer cigarettes per day. |
| Wheeler et al, 2007[434] | Quasi-experimental study (pre-/postintervention) | N=1400 workers at the University of Arkansas for Medical Sciences University Hospital and Arkansas Children's Hospital | 2003-2005 | The hospitals implemented smoke-free campuses in 2003. Smoking behavior and exposure to secondhand smoke was assessed in 1400 of the approximately 9000 employees at random 3 mo before implementation of the ban and 10 mo after implementation, using sequential cross-sectional anonymous surveys. | • Prevalence of smoking among employees declined from 9.6% before to 2.6% after implementation of the ban ($P<0.05$).<br>• Significantly fewer employees reported that they had to walk through cigarette smoke on campus after the ban than before (18% vs 43%, $P<0.001$). |
| **Smoking Restrictions on School Campuses** | | | | | |
| **Author, y** | **Design** | **Population** | **Duration** | **Intervention/Evaluation** | **Major Findings** |
| Sellstrom et al, 2006[444] | Systematic review | 17 cross-sectional or longitudinal studies performed in high-income countries | Search conducted between August and October 2003; time range of articles not | The study aimed to evaluate the relation between the school environment and various child outcomes. Smoking behavior was 1 | • In the 3 studies that evaluated smoking as an outcome, smoking was more prevalent in schools without |

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| | | involving youth age <18 y and with hierarchically structured data | stated | outcome of interest. | antismoking policies.<br>• The odds of being a smoker in a school without an antismoking policy was 1.2 to 2.77 times higher than in a school with a smoking policy. |
| Siahpush et al, 2003[464] | Observational, cross-sectional | N=2526 current smokers and successful quitters age 14+ y in the 1998 Australian National Drug Strategy Household Survey | 1998 | Smoking behavior of participants was ascertained by a mixture of interviews and self-administered questionnaires. Participants also answered questions on the presence of a smoking ban at home, school, or the workplace. Associations were examined by multivariate logistic regression analysis. | • Campus smoking bans were not significantly associated with odds of cessation. |
| Borders et al, 2005[445] | Observational, cross-sectional | N=13,041 undergraduate students at 12 4-y colleges and universities in Texas | Not reported | A web-based survey covering past and current tobacco use was completed by students in participating schools. Campus smoking policies and regulations, including those on restriction of tobacco distribution, prohibition of sales, and restrictions on advertising were obtained from school administrators. Multivariate logistic regression evaluated the association between these school policies and probability of smoking. | • College-level policies such as prohibition of tobacco sales on campus, prohibition of smoking in residential halls, restricted tobacco distribution, smoking restricted to 6 m from entrances, and clearly identified nonsmoking areas were each not significantly associated with self-reported smoking. |
| Barnett et al, 2007[446] | Observational, cross-sectional | N=763 students age 13 y and 768 students age 16 y in 57 schools in Quebec, Canada | 1999 | Student smoking behaviors and other key individual variables were obtained from students by self-reported and parent-completed questionnaires. School-level data on smoking policies were obtained from school principals. Multilevel modeling evaluated relations between school policies and student smoking. | • School policies targeted at student smoking or indoor smoking by staff were not significantly associated with students' cigarette consumption.<br>• Female students age 13 y attending schools that allowed staff to smoke outdoors were 4.8 times more likely (OR=4.8; 95% CI, 1.1, 21.1) to be daily smokers than those attending schools where teachers were not permitted to smoke outdoors. |
| Piontek et al, 2008[447] | Observational, cross-sectional | N=2510 secondary school students age 10-15 y and N=843 | Not reported | Student smoking behavior and students' perception of their school's antismoking policy were assessed | • Absence of smoking bans for students was associated with higher odds of being a current |

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| | | students age 16-21 y enrolled in 40 schools in Bavaria, Germany | | using self-administered questionnaires. Logistic regression examined school context variables, including rules on smoking as predictors of current adolescent smoking. | smoker in the younger age group only (OR=1.62; 95% CI, 1.03-2.53).<br>• Among older students, the presence of teachers who smoked on school grounds was associated with a higher likelihood of smoking (OR=1.97; 95% CI, 1.18-3.29). |
| Boris et al, 2009[448] | Observational, cross-sectional | N=1041 teachers and N=4763 9th grade students in 20 schools in 5 districts in southern Louisiana | Spring 2000 | Cross-sectional data on smoking behaviors were collected from teachers. Participating students completed the Healthy Habits Survey, which included information on smoking behavior at the end of their 1st semester in high school (to determine if short-term exposure to differing school policy affected adolescent behavior). Logistic regression methods were used to assess the relation between school policy and student smoking prevalence. | • No significant difference was observed for teacher smoking (11% vs 13%, *P*=0.42) or student smoking (24.6% vs 25.2%, *P*=0.75) at schools with a no-use vs restricted-use policy. |
| Murnaghan et al, 2009[449] | Observational, sequential cross-sectional | N=1537 10th grade students enrolled in all 10 English-speaking schools in Prince Edward Island, Canada followed up over 3 waves of data collection | 1999-2001 | Repeated cross-sectional smoking behavior data were collected from a census sample of all 10 schools using the SHAPES tobacco module over 3 y. In year 1, none of the schools had policies banning smoking on school property or participated in provincially directed school-based smoking prevention programs. In year 2, 4 of the schools had introduced a policy banning smoking on school property and the other 6 schools had implemented provincially directed school-based smoking prevention programs. In year 3, all 10 schools had introduced a policy banning smoking on school property and implemented the provincially directed school-based smoking prevention programs. Logistic regression analysis examined the relation between school and | • The presence of a school tobacco ban was not significantly associated with reduced odds of smoking after multivariate adjustment. |

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| | | | | environmental factors and smoking in 12th grade students. | |
| Lovato et al, 2010[210] | Observational, cross-sectional | N=22,681 students in grades 10 and 11 in 77 schools in 5 Canadian provinces | 2003-2004 | Student smoking behaviors were assessed using the SHAPES questionnaire. Written school antismoking policies were examined and scored to quantify their "smoking policy intent," and interviews were conducted with school officials to ascertain the degree of policy enforcement. School properties were also observed and tobacco control bylaws obtained from each school's municipality. Data on community-level variables were obtained from the Canadian census data records. Multilevel generalized linear models evaluated the relation between key individual-, school-, or community-level variables and student smoking. | • Students attending schools with stronger policies prohibiting tobacco use were less likely to smoke (OR=0.92; 95% CI, 0.88-0.97). |
| Apel et al, 1997[450] | Quasi-experimental evaluation (pre-/postintervention) | N=915 female and N=308 male students at the School of Education, University of Koln, Germany | 1995 | The university announced a new policy limiting smoking to designated areas. Ashtrays were also placed at each designated area and removed from all other areas that had been declared smoke-free. Approximately every 10th student was interviewed with a questionnaire. The effect of the new policy was then assessed. | • Of the students interviewed, 36% were current smokers.<br>• Of smokers, 28% of male smokers and 30% of female smokers reported smoking less 1 mo after the policy was implemented. |
| Etter et al, 1999[451] | Quasi-experimental evaluation (pre-/postintervention) | N=1856 staff and students of the University of Geneva, Switzerland | September1995–July 1996 | A smoking restriction policy was implemented at the university in March 1996. Smoking was prohibited in 4 faculty buildings of the university except in limited areas with display of posters and distribution of leaflets about the no-smoking program. No intervention was implemented in some other faculty buildings, considered comparison buildings. Surveys were conducted 3-4 mo before and 3-4 mo after implementation of the policy. | • The proportion of smokers who made at least 1 attempt to quit in the 4 mo after implementation almost doubled in the intervention group before vs after implementation (2.0% to 3.8%, *P*=0.003) but remained unchanged in the comparison group (1.8%).<br>• The proportion of active smokers was lower, but not significantly so, in the intervention (24.8%) vs |

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| | | | | | comparison (27.2%) groups at 4 mo after the intervention.<br>• Among participants who were smokers both at baseline and at follow-up, the number of cigarettes smoked within university buildings did not change significantly in the intervention group (5.5 cigarettes per day at baseline vs 5.7 at follow-up; *P*=0.14) but decreased significantly in the comparison group (5.5 at baseline vs 5.0 at follow-up, *P*=0.035).<br>• There was no difference in self-reported exposure to environmental tobacco smoke between the 2 groups.<br>• More members of the intervention group (28%) reported less annoyance because of environmental tobacco smoke than the comparison group (14%) (*P*=0.001). |
| **Stronger Enforcement of Schools' Anti-Tobacco Policies** | | | | | |
| Wakefield et al, 2000[452] | Observational, cross-sectional | N=17,287 students, grades 9-12, age 14-17 y, obtained by a 3-stage sampling procedure of US counties | Spring 1996 | Smoking behavior and household and school smoking restrictions were assessed using standardized questionnaires. | • School smoking bans were associated with a greater likelihood of being in an earlier stage of smoking uptake (OR=0.89; 95% CI, 0.85, 0.99) and lower 30-d prevalence of smoking (OR=0.86; 95% CI, 0.77, 0.94) only when the ban was strongly enforced, as measured by instances when teenagers perceived that most or all students obeyed the rule. |
| Adams et al, 2009[453] | Observational, cross-sectional | N=16,561 students, grades 7-12, at 20 middle and high schools in northern and central Illinois and participating | 2007 | Data on students' personal and observed smoking habits were obtained by questionnaire. Phone interviews were conducted with school administrators and staff who | • Schools with a higher enforcement variable had less current tobacco use by minors (OR=0.83; 95% CI, 0.70- |

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| | | in the Youth Tobacco Access Project, a large 5-y intervention study of youth tobacco use funded by the National Cancer Institute | | were most knowledgeable about enforcement of the school tobacco policy. Comprehensiveness of school tobacco policies, including applicability, restrictions, and repercussions, was rated. Random effects regression with a 2-level hierarchical model examined school enforcement, observations of minors using tobacco on school grounds, and youth smoking status. | 0.99).<br>• Schools with higher enforcement of tobacco policies had fewer observations of tobacco use on school grounds. For each additional unit of enforcement, the odds that youth saw minors using tobacco on the school grounds decreased by ≈0.5.<br>• Comprehensiveness of school tobacco policies was not significantly related to current tobacco use by students. |
| Lipperman-Kreda et al, 2009[454] | Observational, cross-sectional | N=21,281 middle and high school students (primarily grades 8 and 11) in 255 schools who participated in the 2006 Oregon Health Teens Survey | 2006 | Students were asked about school tobacco policies and whether the policies were strictly enforced, as well as about their individual smoking behavior. The percentage of students who perceived the rule against tobacco use as strictly enforced was calculated in each school. By quartiles, schools with perceived low levels of strictly enforced antismoking policy were compared with schools with higher levels of perceived enforcement against student smoking. | • After covariate adjustment, students at schools with high enforcement had 0.62 times the odds of any cigarette smoking and 0.46 times the odds of daily cigarette smoking compared with students in schools with low enforcement of antismoking policy ($P<0.05$ each). |
| Sabiston et al, 2009[455] | Observational, cross-sectional | N=24,213 students, grades 10-11, from 81 schools in 5 Canadian provinces | 2003-2004 | Student smoking behaviors were assessed using the SHAPES questionnaire. Written policies were collected from schools, interviews with school administrators were conducted, and school properties were observed to assess multiple dimensions of the school tobacco policy. A multilevel logistic regression model assessed the relations between social smoking indicators, school policy characteristics, and student smoking behavior. | • Students were less likely to be smokers in schools with stronger prohibition (OR=0.83; 95% CI, 0.72, 0.95) compared with weaker prohibition.<br>• Students' perceptions of school tobacco context were associated with a greater likelihood of smoking (OR=1.26; 95% CI, 1.20, 1.33). |
| Evans-Whipp et al, 2010[456] | Observational, cross-sectional | N=3466 students, grades 6, 8 and 10, from 285 schools in the International Youth | 2003 | Students completed questionnaires about their personal smoking behaviors and smoking behaviors occurring on school property. | • Peer smoking on school grounds was lower in schools with a strict enforcement of policy (OR=0.45; 95% CI, |

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| | | Development Study in Washington state, the United States, and Victoria, Australia | | Selected school staff from each school completed surveys, and the comprehensiveness of each school's smoking policy was rated. Random effects logistic regression evaluated the relation of specific school policy components with smoking outcomes. | 0.25-0.82; $P$=0.009).<br>• There was no clear evidence that a comprehensive smoking ban, harsh penalties, remedial penalties, harm minimization policy, or abstinence policy had any significant relation to smoking outcomes. |
| Lovato et al, 2007[457] | Observational, cross-sectional | N=22,318 students in grades 10 and 11 in 81 randomly sampled schools in 5 districts in Canada | Not reported | Student smoking behaviors were assessed using the SHAPES tobacco module, and a senior school administrator with extensive knowledge of each school's tobacco policy was also recruited to complete a questionnaire about the implementation of the school smoking policy. Written tobacco policies were also collected from each school and each corresponding school district board. Multiple linear regression was conducted to examine policy implementation and students' perception of policy enforcement as predictors of school smoking prevalence and smoking behaviors occurring on and off school property. | • Students' perceptions of policy enforcement were correlated with school smoking prevalence ($R^2$=0.36) and location of tobacco use ($R^2$=0.23-0.63).<br>• Policy intention and implementation subscales did not significantly correlate with school smoking prevalence but were moderately correlated with tobacco use on school property ($R^2$=0.21-0.27). |
| Lovato et al, 2010[210] | Observational, cross-sectional | N=22,681 students in grades 10 and 11 in 77 schools in 5 Canadian provinces | 2003-2004 | Student smoking behaviors were assessed using the SHAPES questionnaire. Written school antismoking policies were examined and scored to quantify their "smoking policy intent," and interviews were conducted with school officials to ascertain the degree of policy enforcement. School properties were also observed and tobacco control bylaws obtained from each school's municipality. Data on community-level variables were obtained from the Canadian census data records. Multilevel generalized linear models evaluated the relation between key individual-, school-, or community-level variables and student smoking. | • Students in schools with stronger enforcement of antismoking policies were more likely to smoke (OR=1.20; 95% CI, 1.07, 1.35). |
| Lovato et al 2010[458] | Observational, cross-sectional | N=29,553 students in grades 5-9 who | 2004-2005 | Student smoking behaviors were assessed using the SHAPES | • Neither smoking policy intent variables nor strict |

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| | | participated in the Canadian Youth Smoking Survey | | questionnaire. Each school's written tobacco policy was examined, scored, and coded, with higher scores representing stronger policies. Enforcement of school policies was assessed by interviewing school staff most knowledgeable about the anti-smoking policy. Negative binomial regression analysis models examined the relation between school policy characteristics and school smoking prevalence. Multilevel logistic regression evaluated the relations between school-level variables and individual smoking status. | enforcement of anti-tobacco policies were significant predictors of individual smoking status. |
| **Residence-Based Restrictions on Smoking** | | | | | |
| **Author, y** | **Design** | **Population** | **Duration** | **Intervention/Evaluation** | **Major Findings** |
| Mills et al, 2009[459] | Systematic review of cross-sectional (n=16) and longitudinal (n=7) studies | Adults in the United States (n=20 studies), Canada (n=2 studies), Australia (n=2 studies), and United Kingdom (n=1 study) | Studies published between January 1990 and November 2008 | Home smoking restrictions were assessed using a variety of different questions in the included studies. Complete or partial home smoking bans were evaluated and typically compared with no restrictions. Outcome measures included smoking prevalence, smoking cessation, daily cigarette consumption by smokers, and relapse after smoking cessation. | • Of 2 studies that evaluated smoking prevalence, 2 found significantly lower prevalence of smokers in persons living in homes with smoking restrictions compared with homes without smoking restrictions.<br>• Of 14 studies that assessed daily cigarette consumption, 13 found significantly lower daily cigarette consumption in smokers living in homes with smoking restrictions compared with homes without restrictions. One study found null results. The 3 longitudinal studies that reported significantly lower consumption showed a reduction in daily cigarette use of ≈2 cigarettes per day.<br>• Of 13 studies that assessed quitting, 12 showed that smokers living in homes with smoking restrictions were more likely to quit compared with those living in homes |

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| | | | | | with no smoking restrictions. One study reported null results. Point estimates for OR of abstinence ranged from 1.32 to 3.89 in the various studies.<br>• All 5 studies that reported relapse showed that smokers living in smoke-free homes were less likely to relapse after quitting, compared with those living in homes without smoking restrictions. In a longitudinal study, Hyland et al found that those living in a smoke-free home at baseline were less likely to be smoking 4 y later compared with those who allowed smoking in their homes (OR=0.6; 95% CI, 0.4, 0.8). |
| Emory et al, 2010[460] | Systematic review of longitudinal (n=2) and cross-sectional studies (n=16) | Children age <18 y in the United States (n=16 studies), Ukraine (n=1 study), Finland (n=1 study), and Australia (n=1 study) | • Variable individual study duration<br>• Studies published between January 1990 and January 2010 were included. | • In 7 of the included studies, smoking restrictions at home were separated into 3 categories: complete, partial, and no smoking restrictions.<br>• Among the studies, 11 used a dichotomous exposure, in which completely smoke-free homes were compared with all others.<br>• Outcomes examined in the various studies were heterogeneous and included smoking initiation, status or transitions on the smoking uptake continuum, current smoking defined as smoking in the past 30 d, cigarette consumption among current smokers, intent to smoke, and smoking cessation among youth-ever smokers.<br>• Included studies adjusted for relevant covariates. | • Both longitudinal studies showed positive association between home smoking restriction and at least 1 index of improved smoking behavior among adolescents.<br>• One of these longitudinal studies (Klein et al) showed that adolescents with a home smoking ban were 12% less likely to have smoked in the past month (OR= 0.88; 95% CI, 0.80, 0.96) compared with those without home smoking bans.<br>• In the other longitudinal study (Albers et al), having a smoke free home was not significantly related to progression to established smoking. Not having a smoke-free home was associated with transition from nonsmoking to experimentation for children who lived with nonsmokers (OR=1.89; 95% CI, 1.30, 2.74) |

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| | | | | | but not for children who lived with smokers.<br>• Of the 17 cross-sectional studies, 14 showed at least some marginal positive association between home smoking restriction and adolescent smoking behavior. For example, Rissell et al 2008 found that students with clear rules about not smoking were 33% less likely to be current smokers (OR= 0.67; 95% CI, 0.49, 0.90) than those without clear rules. Rainio et al (2008) showed that odds of being cigarette experimenters (as opposed to never-users) were 2-fold higher in children with no home smoking restrictions vs those in smoke-free homes. |
| Kabir et al, 2010[461] | Systematic review of cross-sectional studies (n=8), longitudinal (n=1), quasi-experimental (n=1), and randomized trial (n=1) | Children age 0-17 y (mean age 12-14 y) in studies in the United States (n=5 studies), Europe (n=5 studies), Australia (n=1 study), and Latin America, Asia, or the Middle East (n=1 study) | Studies published between January 2000 and April 2010 | The study assessed the relation of voluntary home smoking restrictions with secondhand smoke exposure in children. Studies used either self-reported or biochemical measures (urinary cotinine, hair cotinine: creatinine ratio) to assess secondhand smoke exposure. | • Children living in homes with smoking bans had significantly lower odds of secondhand smoke exposure compared with those living in homes with no smoking bans.<br>• Children living in homes with smoking restrictions had significantly less biochemical concentration of secondhand smoke (>50% less) than those living in homes with no smoking restrictions. |
| Pizacani et al, 2004[462] | Observational, prospective | N=1133 adult smokers identified from a 1997 telephone survey in Oregon, including 583 assessed during follow-up | 1997-1999, median duration of follow-up 21.3 mo | A standardized questionnaire on tobacco attitudes and practices was administered by telephone, including level of household smoking restrictions, eg, full home ban, partial home ban, and no home smoking ban. Of the 1133 smokers identified at baseline, 583 were interviewed at follow-up to assess quitting activities, quit attempts, time until relapse, and smoking cessation. | • A full ban at baseline was associated with higher odds of a subsequent quit attempt (OR=2.0; 95% CI, 1.0, 3.9).<br>• Among respondents in the preparation stage at baseline (intention to quit in the next month with a quit attempt in the previous year), a full ban was associated with higher odds of being in cessation for at least 7 d during follow-up |

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| | | | | | (OR=4.4; 95% CI, 1.1, 18.7) and a lower relapse rate (HR=0.5; 95% CI, 0.2, 0.9).<br>• These associations were not seen among smokers in precontemplation (no intention to quit) or contemplation (intention to quit within the next 6 mo) stages. |
| Farkas et al, 2000[439] | Observational, cross-sectional | N=17,185 adolescents, age 15-17 y, in the CPS conducted by the US Census Bureau | 1992-1993, and 1995-1996 | Smoking behavior and household and workplace smoking restrictions were assessed using standardized questionnaires. These responses were designated as smoke-free, partial ban, and no smoking restrictions, respectively. | • Compared with those in households with no smoking restrictions, adolescents who lived in smoke-free households were less likely to be smokers (OR=0.74; 95% CI, 0.62, 0.88).<br>• Among ever-smokers, adolescents were more likely to be former smokers if they lived in smoke-free homes (OR=1.80; 95% CI, 1.23, 2.65). |
| Wakefield et al, 2000[452] | Observational, cross-sectional | N=17,287 students, grades 9-12, age 14-17 y, obtained by a 3-stage sampling procedure of US counties | Spring 1996 | Smoking behavior and household and school smoking restrictions were assessed using standardized questionnaires. | • Restrictions on smoking at home were associated with a greater likelihood of being in an earlier stage of smoking uptake ($P<0.05$) and a lower 30-d prevalence of smoking (OR=0.79; 95% CI, 0.67, 0.91). |
| Wechsler et al, 2001[463] | Observational, cross-sectional | N=14,138 students enrolled in 119 US colleges and participating in the Harvard School of Public Health Alcohol Survey | Spring 1999 | Smoking behavior and household and school smoking restrictions were assessed using standardized questionnaires. Multiple logistic regression was used to model association of current cigarette use in the past 30 d with types of housing after adjusting for smoking history and other variables. | • Current smoking was lower among residents of smoke-free housing compared with residents of unrestricted housing (21.0% vs 30.6%, $P<0.0001$). |
| Siahpush et al, 2003[464] | Observational, cross-sectional | N=2526 current smokers and successful quitters age 14+ y in the 1998 Australian National Drug Strategy Household Survey | 1998 | Smoking behavior of participants was ascertained by a mixture of interviews and self-administered questionnaires. Participants also answered questions on the presence of a smoking ban in their homes, schools, or workplaces. | • The odds of having quit smoking were 4.5 times greater for respondents who lived in households where smoking was not permitted than for those in households with no smoking restrictions |

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| | | | | Associations were examined by multivariate logistic regression analysis. | (OR 4.5; 95% CI, 3.1, 6.6). |
| Shelley et al, 2007[465] | Observational, cross-sectional | N=1472 Asians (1071 nonsmokers and 401 current smokers), age 18-74 y, living in 2 communities in New York City | November 2002–August 2003 | Smoking behavior, health status, and household and workplace smoking restrictions were assessed using standardized questionnaires. | • Among nonsmokers, compared with no smoking restrictions, respondents who had a total smoking ban at home only were more likely to report excellent/good health (OR=1.90; $P<0.05$); as were respondents who had a total smoking ban both at home and work (OR=2.61; $P<0.01$). |
| Schultz et al, 2010[466] | Observational, cross-sectional | N=29,243 students, grades 5-9, age 11-15 y, from randomly sampled public and private schools in 10 provinces in Canada and participating in the Canadian Youth Smoking Survey | 2004-2005 | Participants completed questionnaires on smoking behavior and home smoking restrictions, including total ban, some restrictions, and no restrictions. Susceptibility to smoking was categorized into levels of smoking experience and intention: nonsusceptible nonsmoker, susceptible nonsmoker, and experimenter/smoker. | • Respondents living in homes with no smoking bans were more likely (OR=1.70; 95% CI, 1.31, 2.21) to be smokers or experimenters compared with those living in homes with smoking bans<br>• For nonsmokers, the odds of being susceptible to smoking increased with absence of a total household smoking ban. |
| Myung et al, 2010[467] | Observational, cross-sectional | N=2545 Asian male smokers age >18 y living in California | 2003-2004 | Data on smoking status, intention to quit smoking, and household smoking restrictions were obtained from the California Korean American Tobacco Use Survey. Multivariate adjusted logistic regression model was used to study the association between household smoking restriction and intention to quit. | • Having an intention to quit smoking in those living in homes with complete or partial smoking restrictions was 2.5 times higher than for those with no restriction on smoking in their homes (OR=2.54; 95% CI, 1.22, 2.58). |
| Ayers et al, 2010[468] | Observational, cross-sectional | N=500 adult Koreans living in Seoul, Korea and N=2830 persons of Korean ancestry living in California | 2002 | Telephone interviews were conducted with randomly selected persons to obtain information about the kind of smoking restriction that exists in their home, estimate the number of cigarettes they and their "most exposed" child were exposed to, and obtain information about other important covariates.<br>Logistic regression models were constructed to evaluate the association between home smoking restrictions and secondhand smoke | • Smoking restrictions were inversely associated with home secondhand smoke exposure.<br>• The predicted probability of any secondhand smoke exposure in Koreans without any home smoking restriction was 0.5 (95% CI, 0.45, 0.56) compared with 0.1 (95% CI, 0.17, 0.33) in Koreans with complete home smoking ban.<br>• The predicted probability of |

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| | | | | exposure and predicted probabilities were reported. | any secondhand smoke exposure in persons of Korean ancestry living in California without any home smoking restriction was 0.62 (95% CI, 0.52, 0.70) compared with 0.03 (95% CI, 0.02, 0.04) in those with a complete home smoking ban. |
| Fu et al, 2010[469] | Observational, cross-sectional | N=291 American Indians obtained from a cohort of smokers participating in the Minnesota Health Care Programs' nicotine replacement treatment program | 2005-2006 | Administrative records obtained at baseline and follow-up survey data obtained after 8 mo of nicotine replacement therapy were used to obtain data on smoking behavior, type of smoking ban at home, and other demographics. Multivariate analysis assessed the relation between presence of complete home smoking ban and 7-d point prevalence abstinence. | • Complete smoking ban was associated with a greater likelihood of smoking abstinence in the past week, compared with no ban and partial ban (OR=3.57; 95% CI, 1.52, 8.40). |

IOM indicates Institute of Medicine; RR, relative risk; CI, confidence interval; MI, myocardial infarction; OR, odds ratio; TUS, Tobacco Use Supplement; HR, hazard ratio; CPS, current population surveys; COMMIT, Community Intervention Trial for Smoking Cessation; and SHAPES, School Health Action, Planning and Evaluation System.

Note: Reference numbers (eg, Meyers et al, 2009[413]) appearing in this supplementary table correspond with those listed in the reference section of the statement. For the purposes of this supplementary table, these meta-analyses or systematic reviews (see "Author, y" column) are considered the primary citation. Additional studies mentioned in the primary citation may be included in the "Intervention/Exposure" and "Findings" columns. The additional studies can be accessed through the primary citation.