The Massive Global Toll of Secondhand Smoke

Oberg M, Maritta JS, Woodward A, et al. Worldwide burden of disease from exposure to second-hand smoke: A retrospective analysis of data from 192 countries. Lancet 2010 Nov 25. [Epub ahead of print]

Study Overview

Objective. To estimate the worldwide exposure to second-hand smoke and its burden of disease in children and adult nonsmokers.

Design. Comparative risk assessment method.

Setting and participants. The investigators calculated exposure to second-hand smoke for every country among men and women aged 15 and older and among children (younger than 14 years). They defined exposure to second-hand smoke for children as having one or both parents who smoke, or being exposed to tobacco smoke or to a person who smokes indoors. The adult definitions of exposure were based on having a spouse who smokes or exposure to tobacco smoke at work. Child estimates of second-hand smoke exposure were obtained from the Global Youth Tobacco Survey, a school-based survey of children aged 13 to 15 years in more than 120 countries. Data for both children and adults were also obtained from 19 national and multinational surveys found in a search of the literature between 1980 and 2007. Second-hand smoke exposure was modeled for countries without survey data using linear, power, and logarithmic regressions based on regional data for male smoking rates, female smoking rates, proportion of population living in urban areas, and the per capita gross national income.

Main outcome measures. The investigators calculated the burden of disease from second-hand smoke as deaths and disability-adjusted life-years (DALYs) for children and adult nonsmokers. These estimates were based on disease-specific relative risk estimates and region-specific estimates of the proportion of people exposed to second-hand smoke, using data from 192 countries during 2004. They assumed that the contribution of a risk factor to disease is based on the population-attributable fraction, which they calculated using the proportion of people exposed to the secondhand smoke and the relative risk of diseases related to its exposure. The exposed population fraction and relative risks were specified for each age-group and sex for the following outcomes: ischemic heart disease, lower respiratory infections, acute otitis media, asthma, and lung cancer. The investigators estimated the attributable burden of disease, in deaths or DALYs, for every outcome by multiplication of the population-attributable fraction due to secondhand smoke by the total burden attributable to that disease in nonsmokers. Estimates were calculated for 192 countries, which were grouped into 14 regions for comparability with previous worldwide assessments of health risk factors. This study was done for 2004, the most recent year for which comprehensive disease data were available for analysis by age, sex, country, and disease.

Main results. Globally, 40% of children, 35% of female nonsmokers, and 33% of male nonsmokers were exposed to secondhand smoke in 2004. In certain regions of Southeast

Asia, the Western Pacific, and Europe, over 60% of children and 50% of adults were exposed to secondhand smoke. The authors estimated that exposure to secondhand smoke caused at least 603,000 deaths among nonsmokers in 2004. This included 379,000 deaths from ischemic heart disease, 165,000 deaths from lower respiratory infections, 63,900 deaths from asthma, and 21,400 deaths from lung cancer. Nearly half of these deaths (47% or 281,000) occurred among women, and 166,000 deaths (28%) occurred among children younger than 5 years of age. An overall total of 10.9 million DALYs were lost because of diseases caused by exposure to secondhand smoke. Over 61% of DALYS lost were among children, mainly due to respiratory infections (5,939,000) and asthma (651,000). The adult DALYs lost were mostly from ischemic heart disease (2,836,000) and asthma (1,246,000).

Conclusion. The global burden of disease due to secondhand smoke is large and disproportionately affects children and women.

Commentary

Smoking is one the largest causes of preventable disease and premature death worldwide. In 2004, an estimated 5.1 million premature deaths due to smoking occurred globally [1]. The results of this analysis suggest that the true total deaths for 2004 should be upwards of 5.7 million. The global harm caused by secondhand smoke inequitably falls upon children and women. Children suffer the lion's share of the burden, as they are most vulnerable to family members' indoor smoking and least able to avoid it. The huge burden of disease due to lower respiratory tract infections among children again highlights the deadly and so far underrecognized connection between tobacco use and common infectious diseases in the developing world, including tuberculosis, pneumonia, and HIV [2]. Secondhand smoke's toll on women is likely a function of their lower smoking rates compared with men as well as higher degrees of exposure at home and work compared with men.

A few limitations should be noted. This modeling analysis is prone to bias due to exposure data limitations, especially for poorer regions of the developing world. Furthermore, the exact effect sizes used to complete the analysis are open to variability due to incomplete information for each age- and sex-group included in the analysis. The authors undertook various sensitivity analyses to account for the possibility of estimation errors, which they present in the appendix to this article. The picture that emerges is that while the data are not perfect and thus exact estimates are impossible to calculate, the overall magnitude of the effects remains large and relatively stable.

Applications for Clinical Practice

Secondhand smoke is clearly a major cause of disease and disability worldwide, accounting for up 1% of annual global mortality and disproportionately affecting women and children. This exposure is eminently preventable through evidence-based policies such as clean indoor air laws that protect people from secondhand smoke. These laws are associated with short-term 20% drops in ischemic heart disease mortality within 1 year and are not associated with any large economic burden [3]. The Framework Convention on Tobacco Control (FCTC) is the world's first major public health treaty, now encompassing 172 nations. It includes provisions to legally bind all ratifying nations to protect their population from exposure to secondhand smoke [4]. Since 2003, over 60 countries who are signatories to FCTC have initiated campaigns for smoke-free laws and more than 17 countries have a national law requiring all workplaces and public places to be smoke-free [4]. Nonetheless the vast majority of the globe remains without protection from secondhand smoke due to inadequate political implementation of these evidence-based policies, often spurred by tobacco industry opposition. Beyond FCTC, health providers must be vigilant in their efforts to promote smokefree homes, in particular to protect young children. In order to prevent continued and needless harm, health providers must also lead the political charge to implement these lifesaving policies, particularly in poor countries suffering from dual burdens of communicable and noncommunicable diseases.

—Review by Asaf Bitton, MD, MPH

References

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