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Comments on "The burden of avoidable disease from air pollution: implications for prevention"

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Samet and Buran in their paper published in your *Journal* recently [1] compare the burden of disease associated with air pollution to that of tobacco smoking. They suggest that, potentially, health gains due to elimination of smoking should be greater than those due to reduction of the exposure to air pollution. They also warn against an "artificial contest between tobacco control and air quality management". I do agree with this warning and would like to emphasize several issues in support of investment in clean air policies as an important public health issue.

There are several aspects of the health burden estimates comparison in [1] which deserve a comment. The first relates to the estimated magnitude of the health burden attributable to air pollution. The numbers quoted by Samet and Buran come from the Global Burden of Disease (GBD) study and its results for 2017 [2]. One may notice, that this ambitious project publishes the results of the comparative risk assessment every year since 2010. The improvement of methods and input data results in changes of the estimates produced in subsequent releases of this, and other, analyses [3]. The estimates of the burden of disease due to air pollution differ also between the assessments made by GBD project, WHO [4], EEA [5] or other authors [6] for Poland. Here the corresponding estimates of the annual number of deaths attributed to air pollution are, respectively (in thousands): 23, 27, 44 and 58. Big differences between these results may be confusing if details of the analysis are not communicated or understood. They depend on the health outcomes considered, concentration-response functions used, counterfactual level of exposure providing a point of reference for the assessments as well as the data on population exposure.

While GBD and WHO analyses are based on the relation of few, strictly defined health outcomes (e.g. ischemic heart disease, cerebrovascular disease, lung cancer and lower respiratory infections) to the exposure, the EEA analysis considers deaths from all causes, and Liliveld *et al.*: all non-communicable diseases and respiratory infections. Possible under-reporting of the specific causes of death in the Polish mortality data (with unproportionate number of IHD or stroke deaths registered as other diseases, such as atherosclerosis) might be the reason of under-estimation of the effects by GBD and WHO assessments based on strictly selected causes of death [7, 8]. Widening of the range of the disease categories associated with the exposure, as for example done in the most recent edition of GBD study including neonatal deaths, has clear impact on the estimates [9, 10]. For Poland, the GBD estimates for 2017 increased from 23 to 30 thousand deaths associated with air pollution when the new approach (using also new concentration-response functions) was applied [11].

The concentration-response functions applied by various projects are different, reflecting rapidly changing epidemiological evidence and methodology [12]. The differences (both their magnitude and direction) in estimates obtained with application of various functions depends on a given population exposure levels. Globally, application of GEMM model resulted in 40% increase in burden estimate as compared to the estimate based on IER functions for the same exposure data and health outcomes [13]. The simplest, log-linear, form of the function with relative risk of 1.06 per 10 μg/m^3 increase in annual mean PM2.5, used by EEA, is based on the studies available until 2012 [14]. Most recent metaanalysis indicates that relative risk is 1.08 [15], so one may expect 33% increase of burden estimates if this new risk coefficient is used for Poland in EEA analysis.

Counterfactual level of exposure used in air pollution burden of disease assessments (for PM2.5 ranging from 0 to 8.8 μg/m^3 in various projects) is considered

in [1] as a difficult (or even impossible) to be achieved target. Indeed, there are various, including natural, independent of human activity, sources of air pollution. Therefore a better support for policies is consideration of less ambitious, but more realistic, scenarios for exposure reduction and their benefits for health. For example, reduction of PM2.5 exposure to the WHO air quality guidelines level (10 μg/m^3) would result in 48% reduction of the current burden of disease associated with air pollution globally [3]. This reduction would reach 60% in Africa but be only 17-18% in less polluted regions, such as Europe or North America. Further burden reduction would require additional improvements in air quality, especially in already clean regions. For determination of the most effective policies, information on contribution of various sources to air pollution is necessary. For Polish cities, the exposure to PM2.5 could be cut by ca. 30% if emissions from solid fuel combustion in households could be eliminated [16]. Health benefits of such pollution reduction in specific populations can be estimated with widely available software tools, such as AirQ+ or BenMAP [17].

Though, in Poland, the prevalence of tobacco smoking declined in the period 1996-2014, it stabilized in the more recent years [8]. With ca. 28% men and 16% women smoking cigarettes in Poland, the GBD counterfactual of zero prevalence looks similarly non-achievable (or difficult to be achieved) in foreseeable future as that of reducing air pollution to levels observed in the cleanest regions in the world. Therefore, consideration of less ambitious, though more feasible, exposure targets could be a more efficient support also to tobacco policies.

Further reduction of the smoking prevalence would reduce the occurrence of cardiovascular and respiratory diseases, affected also by air pollution. With smaller background prevalence, burden of air pollution would be smaller. Therefore, instead of looking for (spurious) contest between tobacco control and air quality management, we should emphasize their synergy and benefits for public health. We should also not forget that the primary beneficiaries of the effective tobacco control are adults who smoke or consider tobacco use. On the other hand, reduction of air pollution benefits all population, most of which are non-smokers, and including wide range of vulnerable groups such as children, pregnant women, people in advanced age or in poor health. Also the smokers.

DISCLOSURE

The author reports no conflict of interest.

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