

# Commentary: Abating climate change and lung cancer!

Nino Künzli<sup>1,2</sup>

<sup>1</sup>Swiss Tropical and Public Health Institute, Basel, Switzerland and <sup>2</sup>University of Basel, Basel, Switzerland

Correspondence to: Nino Künzli, Swiss TPH Socinstrasse 57, 4051 Basel, Switzerland. E-mail: nino.kuenzli@unibas.ch

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**Accepted** 9 February 2011

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The systematic review of Hosgood *et al.*<sup>1</sup> published in this issue of the *IJE*, provides strong and sobering evidence about the price several hundred million people, mostly in Asia, pay for cooking or heating with coal using unvented stoves: a 2- to 5-fold increased risk of developing lung cancer. The focus on geographic differences in the risks highlight that some areas in China are particularly strongly affected; be it due to different compositions of coal or habits and exposure patterns. The majority of the 25 studies come from China where the use of coal remains highly prevalent. Primary energy sources in China—the world's biggest emitter of CO<sub>2</sub>—are strongly dominated by coal (>70%).

Lung cancer is just the tip of the iceberg of the adverse effects of indoor coal (and biomass) combustion.<sup>2</sup> Lung cancer and chronic respiratory diseases, in particular chronic obstructive pulmonary disease (COPD), not only cluster among smokers, but also among those exposed to indoor air pollution due to coal or biomass combustion.<sup>3,4</sup> Due to its chronic long-term nature, the morbidity burden related to COPD largely exceeds that due to lung cancer although mortality rates are rather similar for both diseases.<sup>5</sup> The two diseases not only share pathological pathways, but COPD increases the risk of developing lung cancer four to five times.<sup>5</sup>

A previous cohort study from China showed that the lung cancer risk due to indoor coal combustion was even larger than the risk related to tobacco smoking:<sup>6</sup> women with a history of >40 years of cooking had a >3-fold lung cancer incidence compared with those cooking <20 years, while men with >40 years smoking history had a 50% higher lung cancer incidence compared with those with <20 years of smoking.

The question arises how to abate this entirely preventable burden of morbidity and mortality caused by indoor coal combustion. As shown in the above mentioned retrospective cohort study, stove improvement programmes in the rural Xuanwei region of China effectively cut lung cancer incidence by half.<sup>6</sup> The intervention in this cohort study consisted in the

change from smoky coal fires to stoves with chimneys. While this is promising, the approach falls short in embracing the problem in a more holistic manner. Two issues are of particular relevance.

First, chimneys simply transport the combustion-related pollution to the outdoor environment. While concentrations of health-relevant toxicants are certainly far more diluted outdoors than in poorly vented rooms, outdoor air pollution remains an environmental hazard shared among the entire population, day and night. Ambient air pollution contributes to a range of health problems including lung cancer.<sup>7</sup> In fact, the impact of the indoor coal combustion is even underestimated in the studies reviewed by Hosgood *et al.*,<sup>1</sup> as cancer rates due to coal-related outdoor pollution (from indoor origin) contribute to the 'background rates' of lung cancer, thus diluting the relative risks due to indoor combustion of coal. Depending on local conditions and topography, indoor combustion can indeed become the dominant cause of outdoor air pollution.<sup>2</sup> This is exemplified in the Mongolian capital Ulaan-Baatar, where poor-quality stoves and boilers fuelled by coal and wood have become the single most important cause of a permanent 'outdoor air quality crisis', with daily mean particulate matter concentrations regularly exceeding 1000 µg/m<sup>3</sup>.<sup>8</sup>

Secondly, coal ranks very high both in terms of equivalent CO<sub>2</sub> emissions (per energy content) and of air pollution-related health effects.<sup>9</sup> From a climate change perspective, coal combustion—indoors as well as in power plants or industries—remains a main problem and challenge.

Most attractive are policy decisions that promote win-win situations in both abating climate change and improving the environment (air quality in this case) to maximize the public-health benefits. As shown in a comparative risk assessment scenario conducted for India,<sup>10</sup> replacing 150 million combustion-based stoves with electric ones could avoid 12 500 disability-adjusted life years (DALYs) per million person-years while saving some 0.2 Mt of CO<sub>2</sub>

emissions per million population and year. The mere addition of chimneys to old stoves is not necessarily a simpler or cheaper intervention and certainly falls short of fully capitalizing on a climate change policy to improve public health. Smart climate change policies such as zero emission stove programmes will result in substantial and immediate as well as sustained public health benefits. In conclusion, dilution of pollution is not the solution!

**Conflict of interest:** None declared.

## References

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