

# Improving household air quality: The neglected cultural dimension

Mirgissa Kaba<sup>1</sup>, Rebecca Wilkinson<sup>2</sup>, David IW Phillips<sup>3</sup>, Dan Levene<sup>4</sup>

Household air pollution is now recognized as the single largest environmental health risk factor worldwide contributing to the global burden of disease, with the World Health Organization (WHO) estimating that close to 4million people per year die prematurely as a result(1,2). This form of pollution is widespread in resource-poor countries mainly due to the use of biomass fuels, derived from crop residues, animal dung, wood or charcoal, as a source of household energy. It has been linked with an increased frequency of lower respiratory infection, cataract, ischemic stroke, hemorrhagic stroke, hypertension, ischemic heart disease and chronic obstructive pulmonary disease, as well as tracheal, bronchial and lung cancer (2). Vulnerable groups, such as the rural poor or women and children, appear to be disproportionately affected, the former as they are forced by economic circumstances to use more polluting fuel sources and the latter as a consequence of carrying out common domestic tasks such as cooking. The substantial disease burden and its propensity to affect vulnerable populations have led to its identification as a major target for intervention to improve global health and it is specifically mentioned in the current Sustainable Development Goals (Goal 3 –which recommends implementation of the WHO indoor air quality guidelines on household fuel combustion).

These concerns have led to a focus on the development of improved and more efficient cook stoves that have the potential to reduce pollutant emissions, together with the setting up of organizations to promote their use, such as the UN-hosted Global Alliance for Clean Cookstoves. However, despite encouraging evidence from observational studies, several recent randomized field trials show that the use of low emission stoves do not lead to improved clinical outcomes. For example, a Malawi-based trial of 10,750 children from 8,626 households found no difference in the primary outcome, the pneumonia incidence rate(3); and a controlled trial of ethanol stoves aimed at reducing blood pressure in pregnant Nigerian women only showed a modest change in diastolic blood pressure; systolic blood pressure did not differ(4). Similar findings were reported from randomized trials carried out elsewhere(5,6).

Acknowledging that these trials are not easy to carry out and have many shortcomings, the consistency of the results does suggest a need to re-evaluate the public health response to household air pollution in low- and middle-income countries. In particular, the findings raise the possibility that the primary focus on cook stoves may need to pay attention to the hitherto

neglected, sources of air pollution. One such potential source is smoke-based fumigation, used as a daily routine to clean the environment, cure diseases, or serve as a cleansing ritual at certain critical times in life, such as a puberty or right after delivery. The practice of fumigation is based on an ancient cultural belief, present in many parts of the world, including sub-Saharan Africa, that smoke has purifying, healing and beautifying properties. This was historically important in many ancient cultures and similar beliefs are known to have survived in Western Europe well into the 20th century (7). Certainly, in Ethiopia, these practices appear to be a widely prevalent and deeply accepted part of the culture. The practice is so little studied, with a paucity of biomedical or anthropological evidence, that we have recently initiated a multidisciplinary project to investigate the problem involving collaborating Ethiopian and UK groups.

Preliminary observations within Ethiopia show that the substances used to produce smoke are widely available from locally-sourced tree barks and herbs sold in large quantities in local markets. They are usually added to a traditional charcoal burner to release the various aromatic smokes. The choice of smoke is guided by an indigenous ethno-botanical pharmacopoeia, such that each substance is perceived as having a specific use in the household economy. The range of uses is extraordinarily wide. They go far beyond their function, shared with many other sub-Saharan African cultures(8), to suppress invertebrate pests such as mosquitos, other biting insects and termites. So, for example, purposely-produced smoke appears to be widely used to treat childhood illnesses, irrespective of whether the illness is perceived to have a conventional infectious cause or is due to the malign influence of evil spirits or the ‘evil eye’. The Ethiopian author, Mezlekia, gives an account of the use of smoke to discourage bad behavior during his childhood, a practice which, albeit occasionally, is still used(9). Domestic animals are often treated with smoke in the same way as for humans.

There is considerable region-to-region variation in these practices. Our investigations suggest that female fumigation is particularly common in parts of the Wollo province of north-east Ethiopia, while other sources report intense smoke exposure being used as a female puberty rite in parts of Tigray(10). Young girls undergo intense and prolonged fumigation from a mixture of steam and smoke generated from herbs sufficient to cause defoliation of the skin. However, it appears that smoke fumigation for beautification and/or

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<sup>1</sup>Addis Ababa University, Ethiopia

<sup>2</sup>Academic Unit of Primary Care and Population Sciences, UK

<sup>3</sup>MRC Life course Epidemiology Unit University of Southampton, UK

<sup>4</sup>School of Humanities, University of Southampton, UK

purification among women is becoming a more common practice in major cities of Ethiopia. While in rural areas women have a simple fire pit to fumigate themselves, in the cities more modern facilities have been designed for this purpose. Similar forms of female fumigation are attested in the Arabic-speaking world, where they are referred to as *dukhans*.

Clearly, purposely-producing smoke stands alone as a self-imposed form of air pollution and thus differs from involuntary exposures, such as from biomass cookstoves or vehicle pollution, which has dominated public health discourse in Africa. Despite the seemingly wide practice of the use of smoke in the household for a variety of purposes, little is known about the actual extent of its use, the reasons for its use, or, indeed, the health implications. Certainly, it is going to be difficult to evaluate the health effects, as the nature of the pollutants emitted will depend on the actual substances being burned, the method of combustion and the degree to which the spaces used for fumigation are ventilated. Yet surely this is an important area that needs to be explored, not least for the reason that continued adherence to these practices has the potential to undermine efforts to reduce communities' exposure to pollution from biomass combustion.

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