ASAP EAST AFRICA

Briefing Note: Characterisation of air pollution in commercial canteen settings, Kigali, Rwanda

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June 2020

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ASAP brings together leading UK and East African researchers in air pollution, urban planning, economic geography, public health, social sciences and development studies to provide a framework for improved air quality management in three East African cities: Addis Ababa (Ethiopia), Kampala (Uganda) and Nairobi (Kenya).

This timely and responsive programme of activity will enhance local decision-making abilities to improve urban air quality, reduce the effects of air pollution upon human health, and allow for sustainable development to proceed without further deterioration in air quality.

Central to the project's aims are strengthening research capabilities and technological expertise in East Africa, with local stakeholders and experts involved in the conception, implementation, and uptake of the programme and its outcomes.

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Summary

- Cooking using biomass fuels (wood, dung, charcoal and crop residue)[1]causes acute and chronic health events, in the domestic and occupational setting; but there is a lack of knowledge and regulation regarding occupational exposure to Carbon monoxide (CO).
- CO concentrations were recorded in the University of Rwanda, Nyarugenge Campus staff and student canteens where wood and charcoal fuels are used.
- Measured CO levels exceeded the World Health Organisation Indoor Air Quality guidelines (Evidenced based HAP concentration limits).
- Elevated CO levels has been associated with cardiovascular health events and adverse pregnancy outcomes[2,3].
- There are clear policy implications for effective interventions at organisational (structural, fuel transition) and individual levels.

Methods

- Setting: Two wood and charcoal burning canteens (staff and student) in the Nyarugenge Campus, University of Rwanda College of Science and Technology (UR-CST)
- Recording of CO concentrations over 48-hours using portable monitors (Lascar EasyLog EL-USB-CO)
- Kitchen staff have an average 11-hour shifts preparing meals for 550 staff and students each day.

Key findings

- CO concentration increased with cooking activity
- Greatest peak 1-minute value concentration of 255.5 ppm, observed within the student kitchen
- The 8-hour WHO-IAQ guidelines (8.7 ppm) were exceeded in:
  a) The staff kitchen between 06:00-14:00 (40.7 ppm) and 14:00-22:00 (37.9 ppm)
  b) The student kitchen between 06:00-14:00 (34.7 ppm) and 14:00-22:00 (9.2 ppm)

Policy implications

Given the significant proportion of time spent during the 11-hour shift patterns in this environment with high levels of CO, it is clear there is a need for:

- Further investigation of personal exposure and health impacts among biomass canteen staff.
- Effective intervention strategies which protect this group and may operate at a range of levels:

Organisational (Fuel transition):

- Transitioning to cleaner fuel sources; however this will require changes in kitchen infrastructure (such as LPG supply and storage areas) and assessment of the health and economic costs.

Organisational (structure):

- A harm reduction approach (improved ventilation, altered stove position or other retrofitting measures, ensuring the wood is dry) will have a marked impact upon indoor air quality[4].
- The positioning and layout of the canteen serving area may be reviewed to reduce exposure during mealtime periods; but effectiveness at reducing CO exposure would have to be reviewed.

Individual (staff):

- Actions such as staff training to share best practice, reducing proximity to the exposure source during peak exposure periods and reviewing timing of breaks between cooking sessions.

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Acknowledgements

We are grateful to Dr Ignace Gatare, Principal of the University of Rwanda College of Science and Technology and all canteen and catering staff for their assistance with this study. In addition, to Pacifique Abimana, Patrick R Tumwizere and Clement Uwanyirigira, for their help in field observations.

Suggested citation

Woolley. K.E., Bartington. S.E., Pope. F.D., Thomas. G.N., Avis. W., Kabera. T. (2020). *Briefing Note: Characterisation of air pollution in commercial canteen settings, Kigali, Rwanda.* Birmingham, UK: University of Birmingham.