'It Is Unbearable To Breath Here': Air Quality, Open Incineration, And Misinformation In Blantyre, Malawi

Elizabeth Tilley[a,*], Hope Chilunga[b], Jonathan Kwangulero, Lars Schöbitz[a], Saloni Vijay[a], Heiko Heilgendorff[c], Marc Kalina[a]

[a] *ETH Zurich, Department of Mechanical and Process Engineering, Global Health Engineering, Clausiusstrasse 37, Zurich, Switzerland, 8092*

[b] *Malawi University of Business and Applied Sciences, Department of Environmental Health, Blantyre, Malawi,*

[c] *University of KwaZulu-Natal, School of Mathematics, Statistics and Computer Science, Durban, South Africa,*

Abstract

Blantyre, Malawi's Queen Elizabeth Central Hospital (QECH), or Queen's, as it's known locally, is the country's largest public hospital. However, Queen's is not served by regular municipal waste collection. What municipal collection that is done is ad-hoc, sporadic, and based on the hospital's available financial resources. Rather, most hospital waste (infectious and non-infectious) is gathered by grounds staff and openly burned, in several constantly smouldering piles, sending up clouds of smoke. Speaking directly to an identified knowledge gap on air quality impacts linked to trash burning and the paucity of African urban dwellers' voices on air quality issues, this study employed a mixed-methods approach to both quantitatively measure the air quality around QECH, and to qualitatively investigate the perceived impacts amongst staff and caregivers. Low-cost sensors measuring particulate matter (PM) with particle sizes less than 10 µm (PM_{10}) and less than 2.5 µm ($PM_{2.5}$), expressed as the mass of PM per volume of air (µg PMx/m^3 air) were recorded every 5 minutes at 8 locations across the QECH for 2 months. Qualitative data collection consisted of 56 interviews with patients, caregivers and hospital staff (including janitorial and maintenance staff, nurses, doctors, and administrators). Our results show that safe air quality thresholds are consistently exceeded across space and time and that the most problematic air quality surrounds the shelter for caregivers and those receiving treatment for HIV/AIDs. Moreover, staff and visitors are severely impacted by the poor air quality within the space, but feel powerless to make changes or address complaints. Waste management interventions are desperately needed lest the patients who arrive at Queen's leave with more health issues than the ones with which they arrived.

Keywords: waste management, healthcare waste, trash burning, air quality, Malawi, urbanisation

*Corresponding author

Email addresses: tilleye@ethz.ch (Elizabeth Tilley), hchilunga@poly.ac.mw (Hope Chilunga), kwangulero@gmail.com