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Quantifying disease burden among climate refugees using multidisciplinary approach: A case of Dhaka, Bangladesh

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ABSTRACT

The instability of climate and its human-induced change lead to relocation of affected people who become 'climate refugees'. Bangladesh, being one of the countries most vulnerable to climate change events, especially water-related climatic hazards (floods, droughts, cyclones, etc), is in the frontline of global warming-driven mass migrations. To study climate refugees in Dhaka, one of the largest, most densely populated and fastest-growing polluted megacities, we used a population-based integrated home visiting survey, interviews with mothers, home-based surveillance, and household environmental monitoring. Disability Adjusted Life Years (DALYs) lost due to diarrhea and asthma attacks among climate refugee and non-climate refugee children under 5 years of age were quantified. The results conclusively showed that, compared with the non-climate refugees community, climate refugees showed a substantial increase of diarrhea and asthma which lead to 18,697 and 1069-folds higher DALYs loss. Moreover, used as an input to an epidemiological analysis, DALYs lost due to diarrhea and asthma showed significant changes with Odds Ratio (OR) ranges of 4.6–9.5 and 3.4–5.8, respectively in the climate refugees community for some statistically selected predictors. It is con-

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cluded that household environmental exposure (water and indoor air quality) had significant adverse effects on children's health among climate refugees. This suggests that public health policies should be oriented not only towards reduction in environmental diseases, but also towards affecting elimination of exposure of children.

1. Introduction

An important part of health-needs assessment is the identification of high-risk areas for a disease. In urban slums, neglected people are a reservoir for a wide spectrum of diseases. Presently the majority of slum dwellers are some variety of environmental migrant, who experience difficulties living in slums without good sanitation systems, supply of safe drinking water, proper cooking and health care facilities. Climate change is responsible for relocation of the affected people, which makes them 'climate refugees'. Bangladesh is in the frontline of mass migrations as a result of global warming (Friedman, 2009) and is subjected to climate events, especially water related climatic hazards. Every year a huge number of displaced people (estimated at 300,000–400,000) move to the Dhaka, the hub of the country's economic zone, one of the largest, most densely populated, fastest-growing and polluted megacities in the world. Bangladesh has one of the highest urban population growth rates, with an annual rate of about 1.67%. Among the total urban population, more than 30–50% lives in informal settlements and slums. Dhaka is the most problematic city regarding water supply, sanitation, drainage and solid waste management. Slums in Dhaka are overcrowded, lacking access to clean drinking water and toilets, dominated by improperly ventilated housing, and surrounded by crime and desperation. The levels (Mollah and Aramaki, 2010) of urban service provisions are unsatisfactory in most of the slums. Diseases related to water, sanitation, and hygiene, as well as indoor air, disproportionately affect poorer members of the society. The reasons behind this phenomenon are complex and interconnected (Mollah et al., 2009).

Over three million children under the age of five die each year globally due to environment-related diseases, such as diarrheal and acute respiratory illness (Haines et al., 2006). Acute diarrheal diseases are a major cause of morbidity and mortality in developing countries, such as Bangladesh, where 1 in 10 children die before their fifth birthday (Bern et al., 1992; Petri et al., 2000). Indoor air pollution (IAP) due to burning biomass fuel ranks fourth in risk factors for death and disease in developing countries (WHO, 2010) with an estimated 1.6 million deaths annually, more than half of which are children under age five (Akachi et al., 2009). Asthma causes over 180,000 deaths every year, including 25,000 children's deaths (WHO, 2000), and was the second leading cause of death in Bangladesh in 2000 according to the Bangladesh Bureau of Statistics (Zaman et al., 2007). Furthermore, IAP is one of the main risk factors (Creel, 2002) increasing asthma attacks.

An epidemiologic study is an initial step towards controlling the disease (Ferreccio et al., 1991; Yamashiro et al., 1998) to improve health care provisions at the community level (Haining, 1996). This paper deals with two issues: (1) water supply as well as source which follows water collection, treatment and storage facilities and environmental sanitation & hygiene practices, and (2) indoor air contaminants which depend mainly on the type of fuel used, ventilation system and behavior. The paper will also address their influences on significant reduction of the DALYs lost by diarrhea and asthma. Understanding the relationship between community health and the environment is essential in combating the vulnerability of poor communities to disease (Mollah and Aramaki, 2010). This study aims to analyze and evaluate the health status or disease burden among climate refugees compared with non-climate refugees in the low-income areas of Dhaka.