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Impact of saline water sources on hypertension and cardiovascular disease risk in coastal Bangladesh

Adrian Butler (1), Mohammad Hoque (1), Eleanor Mathewson (1), Kazi Ahmed (2), Moshuir Rahman (2), Paolo Vineis (3), and Pauline Scheelbeek (3)

(1) Department of Civil and Environmental Engineering, Imperial College London, London, UK (a.butler@imperial.ac.uk), (2) Department of Geology, University of Dhaka, Bangladesh, (3) MRC-PHE Centre for Environment and Health, Department of Epidemiology and Biostatistics, Imperial College London, UK

Southern Bangladesh is periodically affected by tropical cyclone induced storm surges. Such events can result in the inundation of large areas of the coastal plain by sea water. Over time these episodic influxes of saline water have led to the build-up of a high of salinities (e.g. > 1,000 mg/l) in the shallow (up to ca. 150 m depth) groundwater. Owing to the highly saline groundwater, local communities have developed alternative surface water sources by constructing artificial drinking water ponds, which collect monsoonal rainwater. These have far greater storage than traditional rainwater harvesting systems, which typically use 40 litre storage containers that are quickly depleted during the dry season. Unfortunately, the ponds can also become salinised during storm surge events, the impacts of which can last for a number of years.

A combined hydrological and epidemiological research programme over the past two years has been undertaken to understand the potential health risks associated with these saline water sources, as excessive intake of sodium can lead to hypertension and an increased risk of cardiovascular disease (such as stroke and heart attack). An important aspect of the selected research sites was the variety of drinking water sources available. These included the presence of managed aquifer recharge sites where monsoonal rainwater is stored in near-surface (semi-)confined aquifers for abstraction during the dry season. This provided an opportunity for the effects of interventions with lower salinity sources to be assessed. Adjusting for confounding factors such as age, gender and diet, the results show a significant association between salinity and blood pressure. Furthermore, the results also showed such impacts are reversible.

In order to evaluate the costs and benefits of such interventions, a water salinity – dose impact model is being developed to assess the effectiveness of alternative drinking water sources, such as enhanced rainwater harvesting, localised solar distillation, as well as the long-term risks from traditional water sources due to climate change. Preliminary results from the model will be presented showing the relative impacts from these interventions. These highlight the need for an integrated approach to salinity management in such coastal deltas in order to improve the long-term health of local communities living in these areas.