A Comparative Analysis of Septage Management in Five Cities in the Philippines

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1 INTRODUCTION

In the slums of the developing world, a lot of people lack access to water and sanitation services and thus expose them to high risks of acquiring diarrhea. The reduction of exposure to fecal bacteria plays a pivotal role in reducing the risks to infectious diarrhea. People's knowledge to this information could contribute to the improvement of water and sanitation. However, fecal bacteria exposure in slums has not yet been well studied and little has been done to utilize exposure information to reduce risks of infection. This study was conducted in a slum in Khulna, Bangladesh. The objectives were to (1) refine exposure analysis of existing studies; (2) document the perception of residents to exposure risk information; and (3) quantify the effectiveness of an introduced approach to risk reduction measures in slums.

2 METHODS

From September to December 2015, the concentration of E. coli in different types of samples (pond, soil, household stored water, drinking well, non-potable well, dishes and cups) collected in the study area was measured. Using the exposure analysis method described by Temple (2014), exposure risks from bathing using water sources and rain were estimated. Soil contact and ingestion through hands was included as a new route of exposure. Monte Carlo simulation was used to calculate the annual exposure for each route using the E. coli concentrations. In September 2014, hygiene improvement workshops were held and exposure risks were shown to residents in the study area. In the workshop, the residents were asked to suggest measures to reduce the risk of infection. Two to three weeks after the workshop, residents were again gathered to check if they followed the risk reduction measures that they suggested. The reduction of exposure due to the adoption of interventions was computed to validate their effectiveness.

3 RESULTS AND DISCUSSION

The annual exposures of men and women in the study area are 1.21×10^6 CFU / year and 6.79×10^5 CFU / year, respectively. The results were slightly lower than Kodera's (2014) results. For children, most of the soil exposure is derived from finger licking. The annual exposure of fingers of male children in this study was 3.60×10^4 CFU / year, while the annual exposure from soil ingestion was 2.01×10^4 CFU / year. Although. Similar with previous researches, exposure from bathing occupied a large portion of the overall exposure. The proposed interventions (in scenarios) were: 1) to change the bathing place in the pond (to an area with less contamination), 2) to bathe only using water from a well not used for drinking, 3) 30-second handwashing for children, and 4) combination of 2 and 3. Table 1 illustrates that the possible interventions reduced the amount of exposure.

Table 1. Risk reduction values of different scenario

	Boys		Girls	
	Median (CFU/year)	ERR* (%)	Median (CFU/year)	ERR (%)
Base scenario	1.2×10^6	-	6.8×10^5	-
Scenario 1	6.6×10^5	46	4.1×10^5	40
Scenario 2	3.5×10^5	73	2.9×10^5	58
Scenario 3	1.0×10^6	15	6.0×10^5	11
Scenario 4	2.6×10^5	79	2.3×10^5	66

*exposure reduction rate