

Socio-Demographic and Sanitation Factors Associated with Diarrhea Prevalence in Peri-Urban Lusaka, Zambia

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Background: In Zambia, Sub-Saharan Africa, poor WASH accounts for 11.4% of all deaths; diarrheal disease outbreaks often originate from peri-urban settlements. Unfortunately, peri-urban sanitation poses a unique challenge due to the peri-urbans high density, unplanned stature, limited space, and limited funding for sanitation installment. Preliminary research in peri-urban Lusaka, Zambia uncovered a common co-use of chambers (i.e., disposable makeshift toilets) even when households owned toilets. Thus, with an aim to understand resident's needs, and inform peri-urban sanitation and public health policy, our study examined the socio-demographic and sanitation factors associated with diarrhea prevalence in peri-urban Lusaka, Zambia.

Methodology: Our study used multivariate stepwise logistic regression to assess the sociodemographic factors associated with diarrhea prevalence and use of three types of sanitation facilities (Figure 1), namely; improved toilets, unimproved toilets and chambers among peri-urban residents. Participants were 205 household heads and their WASH facilities in one peri-urban settlement of Lusaka. WASH facilities were assessed to determine their service level according to the UNICEF and WHO 2017 Joint Monitoring Programme sanitation ladder.

Results: Interestingly, both improved toilets and use of chambers indicated increased odds for diarrhea prevalence. Higher diarrhea prevalence was also found for toilets with more users. Chamber usage was found to be higher among female participants and users of unimproved toilet facilities. Moreover, when toilets were owned by residents, and hygiene was managed by an external party, e.g., landlord, odds of chamber use increased. Lastly, a significant association was found between having an improved toilet facility, access to improved drinking water and basic handwashing, highlighting the dynamics linking WASH access.

Discussion: Results highlight the nature of the current WHO/UNICEF sanitation ladder, and some integral gaps when placed within the peri-urban setting. The inability of outdoor toilets to fully offer privacy and safety to women and girls, and the lack of space for construction of one toilet per household in peri-urban settings were some of these concerns, limiting access and leading to use of chambers even when toilet facilities were present. Additional discussion noted the absence of a safely managed bracket for shared toilets on the sanitation ladder. These findings exposed a lack in user inclusion and toilet hygiene education which are needed for improved toilets to efficiently reduce fecal-oral contamination. This brought to foresight the toilets capacity as a contamination point by way of being an excretion and fecal disposal location, supporting the conclusion that without proper toilet hygiene practices, an improved toilet could increase fecal-oral contact, particularly in high density areas with many users. It also pointed out the need to formally highlight these high density area differences to swing governments and policy makers towards solutions tailored to addressing their unique challenges.

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Conclusion: To decrease pathogen transmission and improve peri-urban health outcomes, our study recommended a separate sanitation ladder for high density areas (Table 1) which considers improved private and shared facilities, toilet management and all-inclusive usage, cancelling the need for unimproved alternatives. It further called for financial plans supporting urban poor access to basic sanitation and increased education on toilet facility models, hygiene, management and risk to help with choice and proper facility use to maximize toilet use benefit.

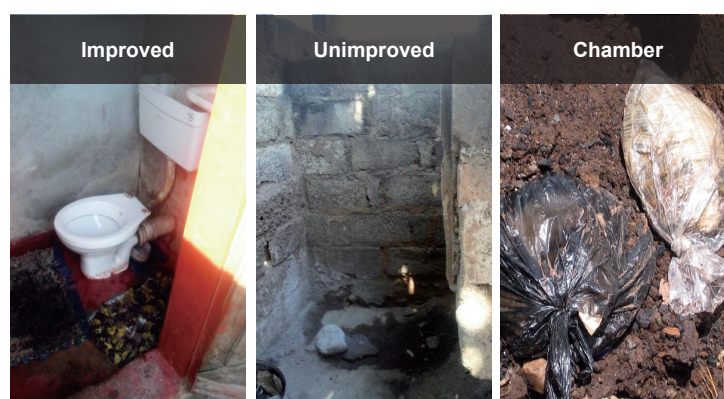


Figure 1. Sanitation types: Improved toilet, unimproved toilet, and chamber.

Table 1. Recommended high density sanitation ladder.

High Density Service Level	Definition
Safely Managed	Use of improved private or shared facilities, usable by all toilet users, at all times (no co-use of unimproved sanitation) with an available responsibility plan or rota and where excreta are safely disposed of in situ or transported and treated offsite
Basic	Use of improved private or shared facilities, usable by all toilet users, at all times (no co-use of unimproved sanitation) with an available responsibility plan or rota
Limited	Use of improved private or shared facilities
Unimproved (No Change)	Use of pit latrines without a slab or platform, hanging latrines or bucket latrines [Chambers come here]
Open Defecation (No Change)	Disposal of human faeces in fields, forests, bushes. Open bodies or water, beaches or other open spaces, or with solid waste [Depending on disposal, chambers come here]

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