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Unlocking the Door to Improved Sanitation: Exploring Factors Influencing Adoption of Improved Latrines in a Coastal Rural Area of Tanzania

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Abstract

Introduction

Access to safe sanitation is a recognised human right, yet many rural communities in Tanzania continue to experience low adoption of improved latrines. This study explored factors influencing adoption of improved latrines in rural coastal households of Tanzania.

Methods

A phenomenological qualitative study in Mkubiru village, Mtwara, explored factors influencing adoption of improved latrines. Purposive sampling recruited 38 adults and community leaders, including latrine owners and non-owners. Data were collected through 14 interviews and four focus groups in Kiswahili during July–August 2023. Thematic analysis combined deductive and inductive coding in Atlas.ti. Trustworthiness was enhanced through triangulation, reflexivity, audit trails, and thick description. The study obtained ethical approval and informed consent.

Results

Participants identified interrelated barriers and facilitators of improved-latrine adoption. Normalised open defecation was the leading barrier, compounded by sandy soils, high water tables, and rainfall that increased construction difficulty and costs. Competing household priorities, limited technical knowledge, and perceptions that improved latrines were for wealthier households further constrained adoption. Incremental construction, peer examples, local enforcement, health-worker engagement, and anticipated privacy, convenience, dignity, and safety promoted uptake.

Conclusion

Adoption of improved latrines in rural coastal communities is shaped by entrenched social norms, environmental constraints, and affordability challenges. Interventions should prioritise culturally sensitive strategies that address social norms and promote feasible latrine construction options suited to the coastal environment.

Keywords: *Sanitation, Open Defecation, Improved Latrines, Coastal Communities, Tanzania*

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INTRODUCTION

In 2010, the United Nations General Assembly recognized access to safe drinking water and sanitation as a fundamental human right; however, universal access remains elusive, particularly in low- and middle-income countries (LMICs) (United Nations Children's Fund (UNICEF) & World Health Organization (WHO), 2023). Globally, as of 2020, an estimated 2.5 billion people still lacked access to improved sanitation facilities, and approximately 1.1 billion people continue to practice open defecation, increasing the risk of diarrheal diseases and other sanitation-related health outcomes (WHO\UNICEF, 2021). Improved sanitation is a critical strategy for reducing open defecation and preventing waterborne diseases such as cholera and typhoid fever (Cronk & Bartram, 2018). Improved sanitation has been associated with significant social and health benefits, particularly for women and girls, including enhanced privacy, dignity, safety, and menstrual hygiene management (Kaur et al., 2018; Sara & Graham, 2014). Despite these benefits, improved sanitation remains constrained in many rural settings of LMICs.

While global open defecation rates have declined over the past two decades, progress has been uneven, with sub-Saharan Africa experiencing slower improvements compared to other regions (WHO\UNICEF, 2021). In Tanzania, nationally representative data from the 2022 Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS) indicate that approximately 55% of households have access to at least basic sanitation services, while about 10% of the population practice open defecation, with access generally lower in rural areas than in urban areas (National Bureau of Statistics; Office of the Chief Government Statistician Zanzibar, 2022; Belay et al, 2022). Additional national evidence from the 2020/21 National Panel Survey (NPS) suggests improving but still unequal sanitation coverage, with basic sanitation facilities more common in urban than rural settings (National Bureau of Statistics, 2022). These national survey findings highlight persistent rural-urban disparities in sanitation access and underscore the need for context-specific interventions.

Studies conducted in developing countries have identified multiple barriers to improved latrine adoption, including poverty, limited access to construction materials, low prioritization of sanitation, and deeply rooted socio-cultural beliefs (Alemu et al., 2018; Jenkins & Scott, 2007; Routray et al., 2015). Coastal regions face additional challenges due to environmental and climatic conditions, such as high-water tables, unstable sandy soils, and seasonal flooding, which complicate latrine construction and increase associated costs (Blackett et al., 2015; Djonoputro et al., 2010). These challenges are particularly relevant in rural coastal areas of Tanzania, including Mtwara Region, where open defecation remains common despite national sanitation initiatives (Adam et al, 2026). While existing research has examined sanitation access and latrine adoption in rural Tanzania, few studies have explored how environmental constraints interact with local cultural and social norms to influence latrine adoption in coastal rural context (Sara & Graham, 2014; Zakayo et al, 2024). Using an integrated behavioral-ecological lens, this study aimed to explore factors influencing household adoption of improved latrines in a rural coastal community in Mtwara Region, Tanzania. In particular, we investigated how contextual (environmental and infrastructural), psychosocial (social norms, awareness, and attitudes), and technological/financial factors interact to shape decisions about latrine construction and use.

METHODS

Study Design

A phenomenological qualitative study was conducted to examine lived experiences and perceptions influencing adoption of improved latrines in a rural coastal community. Phenomenology was appropriate for understanding how sanitation practices are interpreted and justified within shared social, cultural, and environmental contexts, particularly where empirical evidence remains limited.

Study Area

Mkubiru village in Mtwara was purposively selected due to documented sanitation challenges in the wider rural district. Previous research conducted by African Medical and Research Foundation (AMREF) and partners in Mtwara rural district showed that, despite sanitation promotion efforts, a substantial proportion of households lacked improved latrines and utilization remained suboptimal, reflecting ongoing gaps in sanitation coverage in the region (Kema et al., 2012). This aligned with our direct field observations of prevalent open defecation during preliminary visits and supported the village's selection as a study site.

Study Population

The study population comprised adult household members residing in Mkubiru village and key community leaders, including the village chairperson, village executive officer, and a religious leader. They were included because they had direct experience with latrine ownership and sanitation practices in the study area.

Sample Size and Sampling Technique

Purposive sampling was used to recruit participants with relevant experience of latrine ownership or non-ownership. Local leaders and community health workers helped identify eligible participants to ensure inclusion of individuals with diverse experiences, including both latrine owners and non-owners. The study included 38 participants: 14 in-depth interview participants and 24 participants across 4 focus group

discussions (6 participants per group). The study excluded individuals who were not permanent residents of the village or who could not provide informed consent. This sample size was determined based on data saturation and purposive inclusion of diverse voices.

Data Collection Procedures

We conducted IDIs and FGDs in Kiswahili using guides with discussion topics and probes covering cultural norms, environmental conditions, affordability, awareness, and attitudes toward improved latrines. The guides were developed based on the study objectives and a review of relevant literature. All IDIs and FGDs were conducted in person, except for three phone interviews with community leaders due to scheduling constraints. No participant took part in more than one data collection method. Data collection was conducted sequentially, allowing insights from early IDIs to inform probing in FGDs while maintaining flexibility in field scheduling. This sequential approach is consistent with qualitative methodological guidance for maximising complementarity between individual and group data (Guest et al., 2012; Creswell & Poth, 2018).

A team led by the principal investigator and two experienced research assistants, selected for their expertise, communication skills, and understanding of ethical issues, conducted data collection. The team contacted participants and invited them to participate, obtaining informed consent before data collection. The team collected participants' information on age, sex, gender, education level, marital status, occupation, and toilet ownership. To enhance reflexivity, the research team held regular debriefing discussions during data collection to reflect on interviewer positionality, refine probing techniques, and minimise potential interviewer bias. Data were collected between July 2023 and August 2023. IDIs lasted approximately 40 minutes, and FGDs lasted around 60 to 90 minutes.

Trustworthiness

The study ensured trustworthiness using the criteria outlined by Lincoln and Guba (Lincoln & Guba, 1985). Credibility was enhanced through data triangulation across IDIs and FGDs and the use of direct participant quotations. Dependability was supported by consistent use of interview guides and maintaining an audit trail documenting analytic decisions. Confirmability was strengthened through reflexive discussions among the research team during coding and theme development. The study provided a thick description of the context and participants to support transferability.

Data Analysis

Data were analysed using thematic analysis following Braun and Clarke (2006). Interviews were transcribed verbatim by trained research assistants, and transcripts were checked for accuracy. Given the study's focus on predefined dimensions (cultural/social norms, terrain, affordability, awareness, attitudes), we used a predominantly deductive coding approach: an initial codebook, derived from the research questions and relevant literature, was applied across the dataset, with new inductive codes added where participants raised unanticipated issues. We read transcripts repeatedly for familiarisation; collated related codes and iteratively reviewed them to generate candidate themes, which we refined through team discussion to ensure internal coherence and clear differentiation between themes. Atlas.ti version 9.0 supported coding and management.

Ethical considerations

The study received ethical approval from the Muhimbili University of Health and Allied Sciences Institutional Review Board (IRB reference number: DA.282/298/01.C/1734). The study also obtained permission from local authorities. We obtained written informed consent from all participants before data collection, and maintained confidentiality and anonymity throughout the study.

RESULTS

Description of study participants (IDIs)

Table 1 shows that the 14 IDI participants were predominantly aged 50 years and above (42.9%, n=6), male (64.3%, n=9), married (85.7%, n=12), and had primary-level education (92.9%, n=13). Most participants farmed (42.9%, n=6) or fished (35.7%, n=5). Ownership of improved latrines was low, with only 35.7% (n=5) reporting ownership of an improved latrine.

Table 1: Demographic Characteristics (n=14)

Characteristics	Category	Frequency	Percentage
Age group (years)	20–34	4	28.6
	35–49	4	28.6
	≥50	6	42.9
Sex	Male	9	64.3
	Female	5	35.7
Education level	None	1	7.1
	Primary	13	92.9
Marital status	Married	12	85.7
	Single	2	14.3
Occupation	Farmer	6	42.9
	Fisherman	5	35.7
	Tailor	1	7.1
	None	2	14.3
Own a latrine	Yes	5	35.7
	No	9	64.3

Description of study participants (FGDs)

Table 2 shows that the 24 FGD participants were predominantly aged 50 years and above (41.7%, n=10), married (87.5%, n=21), and economically active (83.3%, n=20). More than half had attained primary education (58.3%, n=14), while 25.0% (n=6) had no formal education. Participants aged 20–34 years accounted for 33.3% (n=8), indicating that the discussions included both younger and older community members.

Table 2: Demographic characteristics of participants (n=24)

Characteristics	Category	Frequency	Percentage
Age group (years)	20–34	8	33.3
	35–49	6	25.0
	≥50	10	41.7
Education level	None	6	25.0
	Primary	14	58.3
	Secondary	4	16.7
Marital status	Married	21	87.5
	Single	3	12.5
Currently working	Yes	20	83.3
	No	4	16.7

Factors influencing adoption of improved latrines

Five themes emerged from the analysis: cultural and social norms, coastal terrain, affordability, awareness, and attitudes and perceptions. For clarity of presentation, the findings are organised into factors that constrained (negative influences) and those that facilitated (positive influences) adoption of improved latrines, while remaining grounded in participants' descriptions.

Factors constraining adoption of improved latrines

Normalisation of open defecation as a social norm

Participants described open defecation as a long-standing and socially accepted practice that had been passed down across generations. Many reported that older generations commonly used beaches and farms for defecation, and that this continued to shape current sanitation behaviours. For example, one household participant explained:

"I also think the main reason (for lack of improved latrines in the community) could be customs, because our grandfathers were also using the beach as latrine." (IDI 7- Household member).

Participants further described how such practices are learned and reinforced within households and communities, particularly among children.

Environmental constraints related to coastal terrain

Participants reported that sandy soils, a high-water table, and seasonal rainfall posed challenges to latrine construction in the coastal setting. Participants frequently mentioned the high-water table as a barrier, as it required deeper pits and increased use of construction materials, particularly cement. Participants noted that these conditions increased overall construction costs, limiting the feasibility of building improved latrines. One participant stated:

"*If you find a normal dry land to build a latrine, you can use approximately 3 bags of cement … in our case there is sand and a lot of water since the water table is high…it is more expensive to build a latrine here. The cost can be around 6 bags of cement." (FGD 2, participant 3).*

Seasonal rainfall was also mentioned as affecting the feasibility of digging and the stability of latrine foundations, with some participants noting difficulties during the rainy season. One participant mentioned:

"*You are supposed to know what season is proper for latrine construction…during dry season the water table is lower so it is easier, because by then you can dig up to a depth of 10 meters, … the toilet is lifted a little higher so it is not affected by water level…unlike the rainy season… (IDI 7- Household member).*

Affordability constraints and competing household priorities

Financial constraints were frequently cited as a barrier to improved latrine adoption. Participants described prioritising basic household needs such as food, school fees, and healthcare over sanitation infrastructure. A community leader pointed out:

"*The challenge here is that most people in this village are fishermen, so whatever money they get from fishing they usually prioritize it for necessities like food. Building a latrine is not a priority*." (IDI 3- Community leader).

In addition to construction costs, participants reported challenges related to the cost of transporting materials and hiring skilled masons, particularly when such services were not locally available. Participants also reported reluctance to invest in latrine construction when living on rented land or in temporary housing structures.

Limited technical awareness

Several participants indicated limited knowledge of latrine designs suitable for coastal conditions. Poorly constructed latrines were reported to collapse, which discouraged further attempts to rebuild. As one FGD participant explained:

"*The biggest problem is on the awareness of how to build these latrines; … person might build a latrine this year and it breaks down, the same happens the following year … At the end of the day this person will say 'I will not build another one since I am only wasting money*'... (FGD 2 participant 3).

Attitudes, perceptions, and social stigma

Prevailing attitudes reflected skepticism about the feasibility of constructing latrines in sandy coastal soil, with improved latrines often perceived as symbols of wealth and therefore unattainable for many households. One FGD participant reported:

"There is this perception that for one to own an improved latrine, then the person must be very well off financially and they must have a lot of money to be able to do so." (FGD 1 participant 3).

Factors facilitating adoption of improved latrines

Incremental construction and prioritisation

Despite financial challenges, some households described adopting gradual approaches to latrine construction by purchasing materials over time. One community leader

explained:

"*There are other people in the village whose economic status is not very high, …They do this slowly by buying building materials in stages. When they get money this year they buy 2 bags of cement, next season they would buy bricks, then in the following year they would look for money to pay the masons and that way they will manage to build a latrine." (IDI 1- Community leader).*

Peer influence and demonstration

Participants reported that observing neighbours who had successfully built latrines motivated others to consider similar efforts. A household participant shared:

"When I was building a latrine there are some neighbors that thought what I did was a good thing, one of them decided to do the same." (IDI 6- Household member)

And another one said:

"I saw that my neighbor managed to do it, so that made me feel like it is possible. So, I started slowly and I managed to build a proper latrine that I can use with my family." (IDI 8- Household member).

Community-level actions and local enforcement:

Participants also described community-level initiatives to promote improved sanitation, including village meetings, enforcement of by-laws, and periodic visits by health officers or community health workers as ongoing efforts to encourage latrine adoption. A community leader explained:

"We created by-laws in the village, where when one defecates in areas where we have not agreed on, they will have to pay 10,000 shillings and they will be announced either at the village market or schools, which is basically shaming that person so they don't do it again." (IDI 1- Community leader).

Convenience and safety considerations:

Concerns related to personal safety, exposure, and respect, especially for women, were reported as important motivators for adoption. The difficulty of accessing the beach during unfavourable weather or health conditions was reported to further reinforce the perceived benefits of household latrines, as explained by two community leaders:

"*…example when one is sick, the distance from home to the beach is far. Or even if you are well but it is during the night, you want to go to sleep but feel the urge to ease yourself. It is very inconvenient…when a person thinks of such things then they do their best to build latrines." (IDI 2- Community leader 2).*

And the other one mentioned that:

"Personally, and for other people as well, I really would have wished to own a latrine. I really don't like seeing my wife going to the beach at 8.00pm in the night, it is not respectful and I am ashamed of that. It is also not very safe for her." (IDI 1- Community leader)

DISCUSSION

This study examined factors influencing adoption of improved latrines among households in a rural coastal community in Mtwara Region, Tanzania. The findings show that sanitation behaviours are shaped by interacting contextual, psychosocial, and technological factors, including cultural and social norms, coastal terrain, affordability, awareness, and attitudes toward improved sanitation. For clarity, these factors were presented as constraints and facilitators of latrine adoption, based on participants' accounts. This organisation aligns with behavioural and ecological perspectives, including the Integrated Behavioural Model for WASH (IBM-WASH), which conceptualises sanitation behaviours as the outcome of interacting influences across multiple levels. Overall, the findings highlight the complexity of latrine adoption in coastal settings where social norms intersect with environmental and resource constraints.

Cultural and social norms emerged as a central influence on sanitation practices. Participants consistently described the absence of a historical culture of latrine construction, attributing this to ancestral practices shaped by the coastal environment. Participants widely described open defecation along beaches as normal, socially accepted, and intergenerationally transmitted. Similar patterns have been documented in coastal and rural settings elsewhere, where long-standing sanitation practices persist despite increased awareness of health risks (Busienei et al., 2019; Lopez et al., 2019). The normalisation of beach defecation in this study underscores the difficulty of shifting sanitation behaviours in contexts where non- use of latrines is culturally embedded rather than socially sanctioned.

Environmental factors related to the coastal terrain further constrained latrine adoption. The high-water table and sandy, unstable soil significantly increased the technical difficulty and cost of constructing durable latrines, particularly during the rainy season. These findings align with studies from other coastal and high-water-table settings, which document similar construction challenges and heightened risks of pit collapse (Djonoputro et al., 2010; Eshun & Tichaawa, 2020). The perceived fragility of latrines constructed in such conditions discouraged households from investing in sanitation infrastructure, reinforcing reliance on open defecation.

These sandy-soil challenges may not be unique to the coastal area examined in this study but are likely prevalent in other coastal regions across Africa. Similar soil characteristics and challenges have been documented in various studies, including those conducted in Ghana and Ethiopia (Jenkins & Scott, 2007; Alemu et al., 2018). These findings underscore the strong influence of land and soil characteristics on latrine adoption and the need for tailored approaches to address these challenges. Coastal land challenges, including high water tables and unstable sandy soil, present formidable

barriers to improved latrine adoption. These challenges are not isolated to specific regions but have broader implications for latrine construction across coastal areas in Africa.

Affordability was another critical determinant of latrine ownership. Participants described low purchasing power, competing household priorities, and additional costs related to materials, transport, and skilled labour as major barriers. These findings are consistent with evidence from low-income settings in Cambodia, India, and Ethiopia, where the cost of latrine construction remains a key obstacle (Chase et al., 2015; Routray et al., 2015). However, this study also revealed that income alone did not fully explain adoption patterns. Some households with limited resources successfully constructed latrines through incremental approaches, purchasing materials over time and prioritising sanitation when funds became available. Similar coping strategies have been reported elsewhere and suggest that flexible, phased construction models can partially mitigate affordability barriers (Obeng, 2020; Laksham et al., 2017).

Awareness and knowledge shaped adoption decisions. While many participants recognised the health, environmental, and safety benefits of improved latrines, knowledge gaps persisted regarding latrine designs suitable for coastal environments. Repeated latrine failures reinforced scepticism and contributed to the perception that investing in sanitation was wasteful. These findings echo studies highlighting the importance of context-specific technical guidance in translating awareness into sustained adoption (Tamene & Afework, 2021; Sinha et al., 2017). These findings align with our study and underscore the need for targeted awareness and education to address knowledge gaps.

Attitudes and perceptions toward improved latrines reflected both resistance and aspiration. Improved latrines were often perceived as symbols of wealth, reinforcing the belief that ownership was unattainable for poorer households. At the same time, many participants expressed a strong desire to own latrines because of concerns about convenience, dignity, privacy, and safety, particularly for women. Similar tensions between aspiration and constraint have been reported in studies from India and sub-Saharan Africa, where open defecation remains normalised despite recognition of its drawbacks (Chakma et al., 2008; Biran et al., 2011; Banda et al., 2007). Social dynamics also shaped adoption, as reluctance to share latrines and fears of being perceived as "showing off" discouraged both use and peer-to-peer promotion, consistent with findings from Tanzania and Mozambique (Massa et al., 2017; Shiras et al., 2018).
Collectively, these findings highlight that improving latrine adoption in coastal Mtwara requires approaches that go beyond awareness creation. Interventions must engage with entrenched cultural norms, address environmental and technical constraints specific to coastal settings, reduce financial barriers through affordable and incremental construction options, and leverage social influence while minimising stigma. These findings also highlight the importance of engaging village leaders and existing local by-laws as practical entry points for promoting improved sanitation practices in rural coastal communities. Addressing these interconnected factors is essential for achieving sustained improvements in sanitation behaviour and public health outcomes.

IMPLICATION OF THE STUDY

This study indicates that improving sanitation in rural coastal Mtwara requires interventions that address social, environmental, technical, and financial barriers simultaneously. Programmes should challenge the normalisation of open defecation through culturally appropriate community engagement that involves village leaders, religious leaders, households, and community health workers. Because high water tables and sandy soils make conventional pits unstable and expensive, sanitation initiatives should promote technically appropriate, flood-resilient latrine designs and provide practical construction guidance. Flexible financing, phased construction, locally available materials, and trained local masons could reduce affordability barriers. Demonstration households and positive peer influence may further encourage adoption by showing that improved latrines are achievable, safe, and beneficial for dignity, privacy, and health.

CONCLUSION

In conclusion, this study found that cultural and social norms, the nature of coastal terrain, affordability, lack of awareness, and attitudes and perceptions all contribute to the low adoption of improved latrines in rural households of Mtwara. Understanding these complex factors is essential for developing effective strategies to promote latrine adoption and improve sanitation in the studied community.

STUDY LIMITATIONS

This study has several limitations to consider when interpreting the findings. First, although all interviews and focus group discussions were planned as in-person engagements, three interviews with community leaders were conducted by phone due to scheduling constraints. This may have limited the depth of probing and observation of non-verbal cues. To mitigate this, phone interviews followed the same interview guide as in-person interviews, and we used additional follow-up questions to clarify responses where necessary. Second, some eligible participants, particularly men engaged in fishing, were not available during daytime data collection periods due to livelihood demands. This may have underrepresented certain perspectives. To reduce this limitation, we conducted data collection at different times of day and used focus group discussions to capture a broader range of views.

Third, discussions of sanitation practices may have been influenced by social desirability, particularly given community norms and bylaws regulating open defecation. To mitigate this, interviews were conducted in private settings, participants were assured of confidentiality, and experienced research assistants were trained to use neutral, non-judgmental probing techniques. Finally, the study was

conducted in a single coastal village in Mtwara, and findings reflect the specific environmental, cultural, and socioeconomic context of this setting. While this limits direct transferability to other regions, the detailed contextual description provided allows readers to assess the relevance of the findings to similar coastal communities.

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CONFLICT OF INTERESTS

The authors declare no competing interests.

AUTHORS' CONTRIBUTIONS

IL conceptualised the study, collected data, analysed data, and wrote the manuscript. HS conceptualised the study, provided study oversight, revised critically for important intellectual content, and wrote the manuscript. All authors read and approved the final manuscript.

DATA AVAILABILITY

All study data and related materials are available from the corresponding author upon request.

LIST OF ABBREVIATIONS

AMREF - African Medical and Research Foundation
CLTS - Community-Led Total Sanitation
FGD -Focus Group Discussion
IDIs - In-Depth Interviews
IBM - Integrated Behavioural Model
WASH - Water, Sanitation and Hygiene
IRB - Institutional Review Board
LMICs - Low- and Middle-Income Countries
MUHAS - Muhimbili University of Health and Allied Sciences
NBS - National Bureau of Statistics
NPS - National Panel Survey
OCGS - Office of the Chief Government Statistician
SDGs - Sustainable Development Goals
TDHS-MIS - Tanzania Demographic and Health Survey and Malaria Indicator Survey
UNICEF - United Nations Children's Fund
WHO - World Health Organization

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