

WHAT MOTIVATES TOILET USE AMONG INDIGENOUS COMMUNITIES? FACTORS FOR PROMOTING HYGIENE BEHAVIOR AMONG BAKA HUNTER-GATHERERS IN CAMEROON

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ABSTRACT Despite the global effort, in low- and middle-income countries, people still lack access to safely managed water, sanitation and hygiene (WASH) facilities. In Cameroon, the WASH issues are impacting the nation at all levels, including urban slum, rural and indigenous communities that are often invisible, understudied and ostracized. To address this problem, local Non-Governmental Organizations have been playing a pivotal role in bridging the gap between government, academics and local communities. However, hygiene attitude and behavior are a complex system that stem from wide-ranging drivers from individual to sociocultural to technological factors. Through (1) the review of the case studies of inter-sectoral collaborations between NGOs, researchers and local communities (urban slum, agricultural village and indigenous community) and (2) authors' field study in indigenous communities, our findings show that (1) distance (contextual), (2) privacy and comfort (psychosocial), (3) safety and cleanliness (technology) and (4) ownership (contextual and technology) are fundamental for the use of sanitation facilities across different living conditions. Furthermore, (1) cultural norms and identity as a hunter-gatherer (psychosocial) and the exposure to modernization (technology) were important factors for promoting WASH behavioral change in the indigenous context.

KEYWORDS: Baka hunter-gatherers; Hygiene attitude and behavior; Rural villages; Sub-Saharan Africa; Urban slums; Water, sanitation and hygiene (WASH).

INTRODUCTION

Currently, about 2 billion people lack safe drinking water, 3.6 billion lack proper sanitation, and 494 million practice open defecation (WHO & UNICEF 2021a). Inadequate water access significantly impacts child health, causing deaths and disabilities (Mudadu et al. 2023; Prüss-Ustün et al. 2014; Wolf et al. 2023). Despite progress, equitable water, sanitation and hygiene (WASH) services remain challenging in low- and middle-income countries (LMICs), particularly underserved communities such as urban slums, rural areas and indigenous communities (Kuddus et al. 2020; Ramin 2009; Jiménez et al. 2014). In Sub-Saharan Africa (SSA)

where WASH issues are saliently prevalent, a global report (WHO & UNICEF 2021b) notes that while some progress has been made, challenges persist, with inadequate facilities impacting the physical, mental, and social well-being of various populations (Desye et al. 2022; Sclar et al. 2018; WHO & UNICEF 2024). Generally, indigenous populations are often overlooked in national and international reports due to inaccessibility, suggesting an urgent need to shed a light on their situation.

Indigenous communities are one of the most socially vulnerable populations that are often invisible, ostracized and understudied in WASH. In Cameroon, the Baka, Pygmy hunter-gatherers have been semi-sedentarized along the roadsides since 1950s (Hattori 2014). This transition from predominantly nomadic lifestyle in the forest to semi-sedentary villages has caused a significant change to their lifestyle including subsistence activities, diets, physical activity patterns and sanitation (Hagino et al. 2014; Yasuoka 2006). Regarding the context of sanitation, for example, our previous study has reported a high rate of diarrheal incidence in communities, suggesting the accountability of inappropriate hygiene attitude and behavior in the semi-sedentary villages that are relatively a closed and population dense living environment than forest (Konishi et al. 2022). Considering this situation, community-led WASH initiatives have been undertaken by external agents such as NGOs to address existing sanitation issues.

Local NGOs play a crucial role by understanding and advocating for local needs, supporting marginalized communities regarding WASH services, and collaborating with communities to enhance health, well-being, and quality of life (Yamauchi et al. 2023). Toilet use behavior has been argued to be attributable to various factors, ranging from individual to sociocultural to technology factors (CSDH 2008; Lopez et al. 2019; Nadimpalli et al. 2020; Yamauchi et al. 2022). Extensive research emphasizes the importance of consulting community members to understand their needs, values, and involving them in planning, decision-making, implementation and management to ensure the longevity and sustainability of community-based approaches (Nelson et al. 2021). Therefore, it is vital to investigate and consider how these factors vary across living settings.

This paper aimed to extract key factors for promoting hygiene behaviors (i.e., using toilets) among the Baka hunter-gatherers. As the first step, we reviewed previous case studies of transdisciplinary collaborations among the locals, NGOs and researchers in three different communities: (1) urban slum, (2) agricultural village and (3) indigenous community (Baka hunter-gatherers) in Cameroon to explore fundamental and context-specific factors for hygiene behavior (Study 1). Second, we conducted a study among Baka communities to further examine these factors in the context of indigenous sanitation (Study 2).

METHODS

Study 1. Review of fundamental and context-specific conditions for toilet use across diverse living settings

1. Participants and study sites

In Cameroon, we collaborated with local NGOs on WASH initiatives targeting indigenous communities (Lomie, East Province) targeting 3 different communities: urban slums, rural agricultural and hunter-gatherer villages (Messe et al. 2023; Yamauchi et al. 2023).

By reviewing the outcomes of our WASH collaborations with the local NGO, this study extracted (1) essential factors and (2) living condition-based factors for promoting hygiene behavior for these communities.

2. Background of each community-based NGO

1) TamTam Mobile

TamTam Mobile, headquartered in Yaoundé, the capital of Cameroon, was established in 1997 and officially registered in 2000 by the Mfoundi Prefecture. Their primary mission is to advance the United Nations' Sustainable Development Goals (SDGs) by focusing on communication, education, and community-based action research in Cameroon's slums and villages. Their initiatives encompass environmental protection, action research promotion, local capacity-building, and experience sharing. TamTam Mobile functions as a connector between local, national, and international organizations, fostering community-based approaches through daily activities that promote collaborative relationships among public authorities, communities, peri-urban areas, private individuals, research institutions, and non-governmental/profit organizations. For example, the association is a consultant for stakeholders involved in issues like solid waste management, sanitation, climate change, and disaster risk reduction in Yaoundé, Cameroon. Here, we introduced some interview results on people's perceptions of toilets (e.g., conditions of well-built toilet facilities) (for more details, see Etoga et al. 2023). We conducted sensitization campaigns and targeting urban slum dwellers toward the prevention of Covid-19 (Figure 1). At the same time, questionnaire surveys were administered to local residents to investigate their values and needs related to WASH to conceptualize approaches suitable for local contexts based on their lived experiences.

2) Mutcare

Mutcare, established in Bertoua, the capital of the East Region, in 1991 by former employees of Care International, obtained official recognition as an autonomous and independent organization from the Cameroonian government in 2002. Mutcare's core mission is to provide support to vulnerable populations, including widows, orphans, refugees, disaster survivors, impoverished communities, and ethnic minorities, by addressing a range of community issues related to Water, Sanitation, and Hygiene (WASH), environmental conservation, HIV/AIDS, and COVID-19. Over the years, Mutcare has engaged in a variety of activities, primarily in five of Cameroon's ten regions, with a strong focus on vulnerable areas in the far north, north, east (where their headquarters is situated), and Adamaoua



Figure 1 Sensitization campaign on hand hygiene practices (a photo taken by TamTam Mobile)

Province, serving as their primary target intervention areas. Here, we described ongoing activities that are focused on promoting toilet use among local farmers through realizing the economic value of human feces for food production and income generation (Zobome et al. 2023). Through the previous project, the NGO and researchers have initiated a project called “Fruit Toilet” in an agricultural village in a suburb area of Bertoua, which was designed to facilitate behavioral change from practice open defecation to using toilets through generating economic value in the agricultural use of human excreta (Figure 2).

3) Association Okani

Founded in Bertoua in 2007, Association Okani is an organization dedicated to supporting indigenous societies in Cameroon, with a particular emphasis on safeguarding human rights, equity, and development in these communities. Their primary objective is to enhance living conditions through capacity-building and amplifying the voices and awareness of hunter-gatherer communities, such as the Baka communities dispersed throughout the country. Furthermore, their efforts are aimed at preserving the unique cultural and lifestyle aspects of indigenous populations, especially their use of forest land, which often goes unnoticed or undervalued by society. The organization also strives to empower these communities against a spectrum of potential threats, from infectious diseases to identity-related challenges, by offering the necessary support. Here, we delivered interview results on the use of toilets that had been co-created with the NGO members and residents to grasp the actual situation and better understand the true needs of people on sanitation (Messe et al. 2023) (Figure 3). Upon building the toilets in the community, we have conducted interview surveys with local residents in an attempt to get a sense of “indigenous sanitation” conceptualized by hunter-gatherers who



Figure 2 Planting citrus shrubs in close proximity to the toilet (a photo taken by Mutcare)

have led nomadic and sparse lives compared to those who live in a densely populated form.

Study 2. Further exploration of indigenous-specific conditions for toilet use

1. Participants and study sites

To more deeply understand and examine the extracted factors, we further conducted a study in February 2024 targeting indigenous communities, Baka hunter-gatherers in Lomie (intervened by the NGO: see above explanations and Messe et al. 2023) and in Gribe (out of reach of NGOs), East Region, Cameroon. Semi-structured interviews were administered to 36 participants (21 males and 15 females) from 61 households in Lomie, whereas 12 participants (10 males and 2 females) from 30 households were interviewed in Gribe.

2. Measurements

In semi-structured interviews, the focus was placed on investigating current issues happening around their lifestyle and sanitation and the needs and values for ideal sanitation among local residents. In this study, we particularly focused on their sanitation-related lived experiences based on our previous study (Konishi & Yamauchi 2022; Konishi et al. 2022; Messe et al. 2023). Interview items were all designed in English first (official languages of Cameroon: English and French)



Figure 3 Toilets built by the local NGO

first, translated into French and finally, into the local language of Baka with the support of the local research assistants (including a NGO member, agricultural man and chiefs from Baka communities) who were fluent in English and French or French and Baka.

Unlike interviews that require instantaneous responses, we also asked some participants to draw, allowing them to more easily describe inner values that are sometimes difficult to verbalize (Nyambe et al. 2022, 2024; Wang & Burris 1997).

RESULTS & DISCUSSION

In this section, (1) fundamental and (2) living condition-based (urban slum, agricultural village, indigenous communities) factors for using WASH facilities were discussed. As to the latter, we further discussed these factors in the indigenous context through interview results.

I. Common and essential factors across communities

Table 1 shows the fundamental conditions necessary for encouraging toilet use. The common conditions found across different communities were safety, privacy, comfort, cleanliness, distance (between the house and toilet), and property, which are the essential elements that constitute the conditions of toilet-use.

In this regard, in the capital city of Yaoundé with the highest population density, for example, the residents have reported that toilets serve not only for human

Table 1 Conditions for using sanitation facilities among local residents

Communities	Conditions for using toilets among local residents	
	Common and essential factors	Living-condition based factors
Yaoundé (urban slum)	Safety	Water accessibility
	Comfort	
	Privacy	Maintenance
	Cleanliness	
	Distance away from house and water source	
	Ownership	
	Structure (incl. locally available resources)	
Bertoua (rural village)	Safety	Economic incentive
	Comfort	Subsistence activities (food production)
	Privacy	
	Cleanliness	
	Distance away from house	
	Ownership	
Lomie (indigenous community)	Safety	Property (modernization)
	Comfort	Cultural identity
	Privacy	
	Cleanliness	
	Distance away from house and water source	
	Ownership (access to toilets)	
	Structure (incl. locally available resources)	

waste disposal but also security, privacy, cleanliness, comfort and relief, showing that there are several key conditions that need to be considered for individuals to perform excretion. In support of this point, our previous study in indigenous communities in Cameroon found that the toilets for the residents built by the local NGO that offers no privacy and does not secure distance from each house was abandoned by local residents (Konishi et al. 2022). Indeed, some male participant emphasized this point by sharing his personal experience of embarrassment in the interview,

“When I went to the toilet at night, I saw my wife’s father was defecating. It’s not a good thing to see.” (Male, Lomie)

Aside from privacy concerns (e.g., preventing children from accidentally intruding), our study found that informants highlighted safety (e.g., risk of insect or animal bites when defecating at night), comfort (structure), and ownership (having a private toilet) as key factors for an ideal sanitary environment. Participants linked their ideal toilet structure to weather conditions, like rain. As previously discussed in a review on WASH and mental and social well-being (Sclar et al. 2018), privacy and safety are critical to sanitation, impacting both physical and mental health. The findings indicate these elements are essential across various living environments.

Regarding toilet ownership, some participants reported having to defecate outside because toilets are owned by specific families, preventing shared use. This can lead to continued open defecation (Caruso et al. 2017) and feelings of fear and discomfort among those practicing it (Saleem et al. 2018).

Inadequate and inappropriate sanitation affects not only physical well-being but also mental and social well-being (Sclar et al. 2018). Participants in various WASH studies reported that feelings of dignity, privacy, shame, embarrassment, anxiety, fear, and safety significantly influence their mental and social well-being. These feelings can be impacted by factors such as poor design (e.g., lack of doors, locks, or gender segregation), hygiene issues, and human factors (e.g., sexual assaults, physical attacks, verbal insults). A lack of attention to these issues may discourage residents from using modern toilets.

II. Living-condition based specific factors

In addition, our findings reveal new conditions emerging from the unique characteristics of each community (Table 1). For urban slums, residents expressed a need for upgraded facilities, emphasizing the importance of water for waste disposal and handwashing practices. In contrast, in an agricultural village, economic values related to food production and income generation were identified, alongside sociocultural factors such as habits, lifestyle, cultural norms, and relationships with the Bantu for indigenous communities. When narrowing down to the indigenous context, modernization and cultural identity have emerged as critical considerations, which have been further categorized based on the Integrated Behavioural Model for Water, Sanitation, and Hygiene (IBM-WASH) (Dreibelbis et al.

Table 2 Contextual, psychosocial and technology factors for using sanitation facilities among indigenous communities broken down by various ecological levels

	Lomie and Gribé (indigenous communities)		
	Contextual	Psychosocial	Technology
Societal	Weather (dry and rainy seasons)		
Community	Ownership (access to toilets) Distance away from water source	Taboo (on sites unavailable for open defecation: around water source and spiritual places)	
Interpersonal/ household	Ownership (kinship-based access to toilets)		Ownership (sharing of access to toilets)
Individual		Disgust (seeing, smelling, stepping on feces by open defecation)	Property (modernization)
Habitual	Distance away from home	Motivation (meaning of toilets) Privacy Comfort Traditional lifestyle (mobility)	Safety Cleanliness

Based on Integrated Behavioral Model for Water, Sanitation, and Hygiene (IBM-WASH) (Dreibelbis et al. 2013; Lopez et al. 2019).

2013; Lopez et al. 2019) (Table 2).

Our findings suggest that water availability is crucial in densely populated areas, such as slums. For instance, more than half of the participants in a slum area reported using flush toilets that require water for waste disposal and hygiene practices, underscoring that water is an essential condition. Additionally, approximately half of the participants noted that water is vital for maintaining toilets, indicating that access to water is inseparable from both users and facilities. Studies have shown that access to water significantly contributes to maintaining hygiene and preventing WASH-related diseases in slum settings (Hubbard et al. 2020). Similarly, research in indigenous Australian communities found that overcrowding negatively impacts hygiene maintenance, leading to adverse health effects (Hall et al. 2020). These studies emphasize that, in densely populated environments, maintaining hygiene is challenging without reliable access to water.

In our rural village activities, where most participants engage in agriculture, economic incentives—specifically food production and income generation—emerged as key factors promoting toilet use (Table 1). Some research exploring compost use for fecal sludge management argues that the Community-led Total Sanitation (CLTS) approach, which emphasizes the health risks of exposure to human feces, may not effectively encourage behavioral change (Mariwah et al. 2022). Instead, promoting toilet use by highlighting the value of human feces could foster a more sustainable, long-term shift from “open” defecation to “in-house” defecation. However, perceptions of human excreta often pose barriers to compost use due to perceived health risks and concerns about cleanliness, lead-

ing to disgust and reluctance (Drangert 2004; Mariwah & Drangert 2011). Nonetheless, some studies suggest that negative perceptions of human-derived manure can be altered through necessity and local factors (Drangert & Nawab 2011). This supports our findings that local farmers' behaviors regarding open defecation and perceptions of human excreta shifted when they recognized its potential value for supporting their households.

In the indigenous Baka hunter-gatherer communities of Lomie and Gribé, our interview surveys confirmed essential factors influencing toilet use, including safety, comfort, privacy, cleanliness, distance, and ownership. Additionally, sociocultural factors, particularly lifestyle and the necessity of using toilets, impacted the motivation to adopt "modern facilities" installed by outsiders. Since the 1950s, the nomadic Baka have semi-settled along roadsides due to various factors, including a relocation plan by the Cameroonian government, which has significantly influenced their lifestyle (Hattori 2014). However, several studies have shown that this semi-sedentary population continues to rely heavily on forest activities (Sato et al. 2012; Yamauchi et al. 2014). The continuance of traditional lifestyle that embodies their indigenous identity may account for their preference for hygiene attitude and behavior (Jiménez et al. 2014).

In this regard, our previous study with the Baka in the eastern region highlights the importance of considering the complex nature of lifestyle and sense of belonging when co-creating ideal sanitation solutions with indigenous populations (Messe et al. 2023). For instance, the Baka's perspectives are deeply rooted in their traditional lifestyle, subsistence activities, sense of belonging, and relationships with their neighbors, the Bantu, who are the agricultural group and majority in the community. They emphasized the significance of their natural habitat, illustrating their profound historical connection to and dependence on the forest for their livelihoods:

"The forest is our home and our source of livelihood. We depend on the forest and can never be separated from it." (Male, Lomie)

Some Baka in Lomie also described particularly about government policies that dislocated them from the forest and resulted in "uncomfortable" lifestyles, which supports their sense of belonging with the forest:

"Government policies and laws have sent us out of the forest to areas where we are not used to and we are very uncomfortable where we are, we are suffering at our present sites."

"It is true that the government has constructed modern schools, hospitals, and home toilets, but a greater majority of our communities do not consider these as important factors."

"We are being forced to embrace lifestyles that are originally not ours. So we don't consider this a priority, and find it difficult to adapt. This explains why the schools constructed by the state are always abandoned and you will hardly find any Baka children in any of such schools."

(Male, Lomie)

As shown above, some expressed discomfort in adapting to practices introduced by external agents, which they found insignificant. A sense of strong connection to their traditional lifestyle may make it challenging to accept modernized goods, such as toilets (Jiménez et al. 2014). The Baka likely find satisfaction in their way of life, which contrasts with what local authorities and others consider appropriate regarding modernization, formal education, healthcare access, and WASH facilities.

In our survey in Gribé, a community less affected by modernization and where all men engage in forest activities, we observed that many still use fallen trees for defecation (Figure 4). An elderly female participant explained that she does not use the modern toilet—essentially a hole in the ground with wooden boards built by her son, the chief—because she prefers the convenience of fallen trees. She recounted being advised by her father to use fallen trees, a sentiment echoed by almost all community members, showing that this defecation practice has been generational act. There is also a cultural taboo, which states that every member is forbidden to defecate near or in the water source. Some men testified that those who break this rule will perish. This suggests that the Baka have traditional preferences or community norms for defecation that local governments and NGOs may overlook by imposing their standards and values. Supporting this notion, studies of CLTS initiatives that have failed emphasize that excluding locals from understanding their values and needs in decision-making undermines the longevity, sustainability, and autonomy of WASH programs (Nelson et al. 2021; Westoby et al. 2020).

Interestingly, whereas the Baka in Gribé have linked their strong sense of belonging to their traditional lifestyle to their defecation, some of their Lomie



Figure 4 Fallen trees for defecation (Gribé)

counterparts have reported the need for modern toilets that can be seen in the town (Lomie: local NGO has built toilets as described above). Some man answered:

“I want a toilet built with cement and roof. Like Bantu one.” (Male, Lomie)

Other men have also reported the same desire when asked, which has been shown in the drawings (Figure 5). The man showed his desire for a toilet that can be seen in Bantu community. It is plausible to think that their proximity to the town, which is characterized by the Bantu neighbors living modernized life-style, may cause some members to opt for toilets as property rather than their actual need to use.

To add to this, their historically unique relationship with the Bantu (agricultural group) may help further explain this phenomenon (Ngima Mawoung 2016). In Lomie, the present study confirmed that participants of older generations reported in terms of current life, which may link with their longing for modern goods:



Figure 5 Actual picture (school toilet) and drawing on ideal toilets (Lomie)

“We were like animals before. Now, we live like humans.”

“We live like the Bantu.” (Male, Lomie)

While acknowledging the change from the past, they continued by reporting having received insults from the younger generations in terms of “being behind”:

“Young men come back from town and school insult us.” (Male and female, Lomie)

This has also been followed by showing the weakened sense of belonging to the culture among young members by acknowledging the loss of tradition.

“Young men don’t enter the forest.”

“We used to hunt the elephant in the forest, but we are no longer able to do so now because of governments’ policy. Young men don’t know that.” (Male, Lomie)

These accounts indicate that while older Baka members compare their lifestyle to that of their Bantu neighbors, younger Baka—who lack the same level of cultural connectedness—may express a stronger desire for modern toilets to demonstrate their cultural sensitivity within the community. More specifically, it is possible that having a modern toilet is considered as cultural advancement as compared to those who do not own (Festinger 1954; Sclar et al. 2018). This intergenerational cultural conflict may intensify the aspiration for modern sanitation facilities among community members.

CONCLUSIONS

Our findings demonstrated that (1) distance (contextual), (2) privacy and comfort (psychosocial), (3) safety and cleanliness (technology) and (4) ownership (contextual and technology) are fundamental for the use of sanitation facilities across different living conditions. Furthermore, in the indigenous context, (1) cultural norms and identity as a hunter-gatherer (psychosocial) and the exposure to modernization (technology) emerged as important factors for promoting WASH behavioral change.

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