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[Studying Determinants of Latrine Uptake in Garissa, Northeastern Province and Tana River, Coastal Province, Kenya Using Household Surveys and Qualitative Interviews]

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# [Studying Determinants of Latrine Uptake in Garissa, Northeastern Province and Tana River, Coastal Province, Kenya Using Household Surveys and Qualitative Interviews]

By

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[Bachelor of Science in Neurobiology ]

[University of Wisconsin - Madison]

[2009]

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An abstract of

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[2012]

# Abstract


[Studying Determinants of Latrine Uptake in Garissa, Northeastern Province and Tana River, Coastal Province, Kenya Using Household Surveys and Qualitative Interviews]

By [Eric Du]

**Introduction**: Diarrheal-related causes of deaths are prevalent in developing countries. Improved sanitation has been shown to reduce incidence of diarrhea. To date, however, around the globe, about 2.6 billion people have no safe means to excreta disposal, and only 31% of the households in sub-Saharan Africa have access to basic sanitation facilities. Millennium Water Program (MWP) is a consortium of NGOs in Kenya aimed to increase sanitation coverage in rural communities. Previous studies indicated that demand for sanitation arises from social-cultural factors, in addition to desire for better health. We used quantitative survey and qualitative interviews to investigate which factors determine sanitation adoption in the water-deprived Northeastern Kenya.

**Method**: 2,146 household surveys clustered in 222 villages were collected in all MWP regions except Tana River district in 2010. Logistic regression was used to model latrine ownership with 9 selected indicators from the survey using SAS. In 2012, 18 in-depth interviews were conducted, and equally distributed between Tana River and Garissa districts, Northeastern Province. Interviewees were categorized as self-financed adopters, supported adopters and non-adopters. MAXQDA was used for coding and analyzing of the interview results. Two key informant interviews were conducted on staff members of CARE and CRS.

**Result**: Regression shows that age, education, household size, gender and presence of community latrines are positively associated with household latrine ownership (OR =1.06; 1.17; 1.16; 1.78; 2.16). Radio and land ownerships are inversely associated with the outcome (OR = 0.20; 0.67). Qualitative interviews show that the most prominent facilitators in Garissa and Tana River are: privacy, distance to defecation site, security and health concerns; the most prominent barriers are: finance, cultural values, stigma, perceived danger, and smell.

**Conclusion**: Organizations must seek to generate demand for sanitation uptake by addressing issues of privacy, security, cultural values, stigma and finance, in addition to health messages. Manner in which interventions is executed should be adjusted to avoid dependency.

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## BACKGROUND & LITERATURE REVIEW

*Global Perspective*

Diarrhea and diarrhea-related diseases are the most frequent cause of death among children under five years of age worldwide, second only to pneumonia (Boschi et al, 2009). To this date, it kills 1.5 million children annually, more than combined toll of AIDS, malaria and measles (Black, 2010). Diarrhea is a gastrointestinal symptom that results in watery stools and severe dehydration. It is caused by a variety of vectors such as bacteria, viruses or protozoa. Common ones are *Cryptosporidium, E.Coli, Shigella, Salmonella* and *V.Cholerae*. Fecal-oral transmission is the main mode of infection – when water or food is contaminated with human or animal feces, either by direct contact or indirect pathway such as rural farming or washing down of solid wastes into ground water or other sources.

In attempt to reduce fecal-oral transmission, studies have found that the use of sanitation can greatly reduce risks of diarrheal symptoms (Ahmed, 1994; Kariuki, 2012; Fewtrell, 2005). The UN's Millennium Development Goal 7 aims to halve the world's population without sustainable safe drinking water and basic sanitation by 2015. With the current trend of sanitation adoption, the world is projected to miss the MDG target by 13 percentage points (the original proportion for people without sanitation is 46%), which translates to approximately 1 billion people who should have otherwise been benefited (UNICEF, 2010). The majority of people who have not met satisfactory sanitation status concentrate in Southern Asia and Sub-Saharan Africa, where open defecation is widely practiced at horrifying rates of 44% and 27%, respectively (UNICEF, 2010).

*Sanitation in Kenya*

To meet the MDG target, Kenya must reach sanitation coverage of 93% by year of 2015. However, it has only accomplished 71% (United Nations, 2009). In Kenya, 27,000 children per year die from diarrheal illness (WHO, 2009). In the study area of Northeastern Kenya, 61.1% of households reportedly have no toilets, and 68.5% of them practice open defecation. In the area where there are community toilets, about 57.5% of the respondents do not use them (CARE, 2010).

The Millennium Water Program in Kenya (MWP-K) is a consortium of non-governmental organizations including CARE, Catholic Relief Services (CRS), Food for the Hungry, WaterAid and others that seeks to address these needs to improve the health of rural Kenyan communities. The country is divided into different administrative districts, each sponsored by one NGO member. The MWP-K establishes water, sanitation and hygiene facilities in arid and semi-arid lands through community promotion and training, school engagement and infrastructure development; facilitates the formation of school WASH (water, sanitation and hygiene) clubs and disseminate health messages through schools to families; aims to alter behaviors by education, training and generating demand for WASH services and products.

To scale up intervention and increase sanitation coverage, some NGOs and study groups implement the PHAST strategy - Participatory Hygiene and Sanitation Transformation (Musabayane, 2000; Gungoren, 2007). It is designed to empower the local participants to be acquainted with the risks of open defecation and to be confident in the steps required to adopt adequate sanitation practices. Different organizations implement different methods to generate local demand for sanitation. For example, CARE in Garissa uses education as well as provision of supplies to lead demand, whereas CRS uses purely motivation.

*Sanitation Behavior*

The low statistics of sanitation coverage is Northeastern Kenya indicate that current intervention methods may not be as effective as they could be. CARE's 2010 report shows that 89.3% of the non-users claimed that they did not want to have latrine because of financial constraints. Current academic literature, however, suggest that determinants of latrine adoption involve a variety of social and cultural factors that are beyond superficial perceptions such as desire for better health, or having no money (Jenkins, 2007). For example, prestige and social status have been extensively identified as a facilitator for sanitation adoption, because people want to establish themselves as "urban elites", leave legacy for their children after they decease, or simply imitate habits that assemble historical royalties. Other important factors include distance to defecation site, privacy, security from wild animal attacks and sexual assaults, and comfort (Jenkins 2005; 2007;2010; Santos 2010). Barriers such as competing priorities for saving cash and money, fear of latrine disintegration (Jackson 2004), technical complexity of construction (Frias and Mukherjee, 2005), and cultural reasons such as witchcraft (Ngokwey, 1994).

For interventions to be effective, practitioners should properly identify pertinent facilitators and barriers to latrine adoption in local communities, and cater their focus toward these priorities. Our findings will help MWP partners and future programs to strengthen their methods, and accelerate the process of sanitation uptake.

## INTRODUCTION

Proper sanitation and hygiene behaviors are essential methods to avert public health threats, such as diarrhea, arisen from poor environmental standards. Around the globe, about 2.6 billion people have no safe means to excreta disposal (WHO and UNICEF, 2010) and only 31% of the households in sub-Saharan Africa have access to basic sanitation facilities (WHO and UNICEF, 2010). It has been estimated that the adoption of safe handwashing practices with soap can reduce diarrhea incidence by 42-48%, and safe excreta disposal can reduce diarrhea by 36% (Cairncross, 2010).

To achieve Millennium Development Goal 7 by 2015, which aims to halve the number of people without access to safe water and sanitation, efforts have been made to target these problems, however, to limited effect. It has been found that traditional donor-subsidized latrine provision fails to generate sanitation demand and ensure sustainability (Cairncross, 2004). Some have argued that unless the recipients of the products and services recognize the benefits and take initiative to extend the effects, pure material supply can do little to generate demand (Perssons, 2002).

A study in rural Benin from 1993-1996 was one of the first explorations to address determinants of demand for sanitation among local population. The study identified various determinants and barriers to sanitation adoption, as well as implications for modeling marketing strategies (Jenkins, 1999). A series of subsequent studies extrapolated that the drivers (and barriers) of sanitation adoption are complex and at times driven by social factors, different from traditional findings that focus people's desire for health benefits and cleanliness (O'Loughlin et al, 2006). For example, prestige

and social status have been extensively identified as a facilitator for sanitation adoption, because people want to establish themselves as "urban elites", leave legacy for their children after they decease, or simply imitate habits that assemble historical royalties. Other important factors include distance to defecation site, privacy, security from wild animal attacks and sexual assaults, and comfort (Jenkins 2005; 2007;2010; Santos 2010). Barriers such as competing priorities for saving cash and money, fear of latrine disintegration (Jackson 2004), technical complexity of construction (Frias and Mukherjee, 2005), and cultural reasons such as witchcraft (Ngokwey, 1994).

Behavior change models have been proposed to explain sanitation uptake. Most notable of which are goal-oriented consumer decision-making (Bagozzi & Lee, 1999), which explores consumers' acceptance to and resistance for innovations (e.g. latrines) and how these factors are integrated into consumers' decision in behavioral alteration; and the three-stage behavioral change process (Jenkins 2007) that will be described extensively as follows. Change in sanitation behavior is divided into three stages – preference, intention and choice. Preference is the initial stage that captures consumers' dissatisfaction with current practices (e.g. open defecation), and their awareness of beneficial alternatives (latrines). Households may have developed an interest or preference in uptake of sanitation, but have not begun planning (Jenkins, 2007). Intention focuses on how households prioritize the sanitation and eliminate possible barriers. Experiments have shown that individuals are more sensitive to loss, such as financial assets and time, than potential gains in years to come like improved health (Kahnerman 2003; Knetsch & Sinden 1994). A study in India shows that using public shaming (loss of prestige) is more effective in increasing demand for latrines than promoting health

messages (Pattanayak 2009). The final stage of behavioral change is choice. It involves households' actual abilities to realize their preference and intention, by possessing adequate knowledge to build, sending money and time for construction, and changing the outcome (Jenkins 2007). Intervention paradigms such as FOAM (focus, opportunity, ability, and motivation) also function on the same three-stage concept (Devine, 2009).

Focus on these contextual facilitators and barriers, especially accentuated during the intervention and choice stages, will further our understanding of demand and decisions for sanitation adoption, and help public health implementers to design more effective marketing schemes. In this paper, we explore: 1) What are the determinants of sanitation adoption among cultures in the Sahel region that is currently distressed by drought and famine? 2) How do male and female heads of households prioritize latrine construction and use differently in this geo-cultural context? 3) How do differences in intervention methods, such as motivation-led versus supply-led, contribute to difference in attitudes toward sanitation uptake?

## METHODS

*Study Background*

The Millennium Water Program in Kenya (MWP-K) is a consortium of non-governmental organizations including CARE, Catholic Relief Services (CRS), Food for the Hungry, WaterAid and others that seeks to address these needs to improve the health of rural Kenyan communities. MWP-K constructs water, sanitation and hygiene facilities in arid and semi-arid lands through community promotion and training, school engagement and infrastructure development; facilitates the formation of school WASH clubs and disseminate health messages through schools to families; aims to alter behaviors by education, training and generating demand for WASH services and products. Within the consortium, partners apply different strategies to address the challenge. CARE shares costs of construction and provides technical support with communities, whereas CRS focuses solely on promotional campaigns and behavioral changes, without provision of financial compensation (Emory University Center for Global Safe Water, 2012).

Emory Center for Global Safe Water is a partner with the MWP-K and provides research support to study and strengthen intervention methods. In 2010, a baseline survey conducted by Emory University Center for Global Safe Water in cooperation with MWP-K shows that that in Garissa, Northeastern Province, practice of proper sanitation is low, as 61.1% of households reportedly have no toilets, and most practice open defecation. In the area where there are community toilets, about 57.5% of the respondents do not use them (Emory University Center for Global Safe Water, 2010). These statistics indicate that more work is needed and perhaps new intervention method should be devised.

*Research Questions*

What are facilitators and barriers for latrine construction in Garissa and Tana River districts, Northeastern Kenya?

- Identify all drivers and barriers for latrine construction and use that are pertinent to the local population and cultures
- Explore gender discrepancy in ranking different drivers and barriers
- Compare difference in attitudes and perceptions of sanitation uptake between supply-led intervention villages and motivation-driven intervention villages

*Study Site and Population*

Northeastern Kenya is generally dry and hot most of the year. Temperatures range between 20ºC to 38ºC. The district has bimodal types of rainfall: long rains (March to April) and short rains (October to December). The annual rainfall is within the range of 180 mm to 300 mm. The region is inhabited by predominantly Somali pastoralist tribes, and to a lesser extent, Oromo and Pokomot (CRS, 2009). Due to the ongoing civil war in Somalia and the famine, about 1,000 Somalis reportedly cross the border into Kenya every day, multiplying the problems of water and food security, as well as hygiene and sanitation.

Sunni Islam is the main religion in practice. The main economic activities include petty trading, nomadic pastoralism and agro-pastoralism. Local vegetation has been utilized for firewood and charcoal burning. This low coverage of vegetation leaves the land vulnerable to

wind erosion and desertification. Adult literacy rate is about 20%. Approximately 64% of the population lives below poverty line (CRS 2009).

*Quantitative Methods*

Data Collection

Household surveys were conducted in June and July of 2010 by CARE and CRS enumerators in Garissa and Tana River districts, respectively (Emory University Center for Global Safe Water, 2010).

Sample Selection

The sampling frame for the household survey was the population of all MWP-K intervention villages as well as non-intervention villages that are anticipating potential coverage, with the exception of Tana River district, which was supported by the CRS. Cluster sampling technique was used. Approximately 7-15 surveys were conducted for each cluster (village). A total of 222 clusters and 2,146 surveys were collected. Respondents were both male and female heads of household above age 18, with preference given to female.

Questionnaire Design

The survey was also designed by Emory Center for Global Safe Water. Table 1 shows the topics, including demographic information - occupations of household heads, household member composition, number and age of dependents, a standard wealth asset index, education, and age; water access conditions – source water, distance to water source, water accessibility in wet and dry seasons, quantity of water use; water treatment; productive use of water – economic activities, waste water management; decision-making power dynamics of the household; typical sanitation

habits of each household member; attitudes about sanitation and hygiene; exposure to latrines; level of desire and intention to construct a latrine; the nature of the household's interaction with the MWP partners; household characteristics – land ownership, community leadership, and wealth estimation. At the end, enumerators conducted structured observations of WASH conditions at the house.

Data Entry and Analysis

Baseline survey data from 2010 were used for cross-sectional analysis using SAS 9.3 (North Carolina, USA). A list of nine indicators was selected as independent variables, while household latrine ownership was used as the dependent variable. Table 2 shows the definitions of these variables and their research implications. Logistic regression was constructed and odds ratios were used to correspond with interview results.

*Qualitative Methods*

Data Collection

In-depth interviews were given to selected respondents in July of 2012, two years after the surveys were collected, by trained staff and enumerators of the aforementioned partners. The data collection process was conducted in Kiswahili and Somali, with English as the main instrument of documentation. A digital voice recorder was used in each of the interviews to capture every detail. These digital files were transferred onto computers and translated by fieldworkers/enumerators from Kiswahili into English.

Key informant interviews were conducted on two staff members, one from CARE and another from CRS, by the principle investigators. Topics included their respective NGO's

intervention methods, community settings, general conditions and community's relations and interactions with NGOs.

Sample Selection

The sampling frame for qualitative interviews was the population in 25 CARE intervention villages in Garissa District and in 30 CRS intervention villages in Tana River District. Respondents were both male and female heads of household above age 18. Because females were reluctant to share information, more males were selected due to their inclination to provide rich data. A total of eighteen interviews were conducted, equally divided between Garissa and Tana River Districts. Among the nine in-depth interviews within each district, they were further divided into three clusters of three: self-financed latrine adopters, organization-supported latrine adopters, and non-adopters.

Qualitative Interview Design

In-depth interview is a data collection method that is used to capture the emic perspective (perspective of the participant), while reflecting the existing contexts and subjectivity of the participant's own experiences (Hennink, 2011). The in-depth interview (IDI) guide was developed by Emory University Center for Global Safe Water. It was pilot-tested in rural settlements around Garissa township by CARE fieldworkers. It was used to explore selected community members' perception on sanitation and to explain the contextual factors that underlie the results of the large-scale quantitative analysis. Main topics included: defecation practice of the village and of the respondent, open defecation, reasons to adopt or not adopt sanitations, and family dynamics with regard to decision making process.

Recruitment of Participants

From the sampling frame, participating communities were mobilized on the intended day of interview by trained fieldworkers from CARE and CRS. Households that satisfied selection criteria and adoption status (self-financed adopters, supported adopters and non-adopters) volunteered to participate in the activity, for which no financial compensation would be provided. Field workers were trained by the principal investigator in the research goals and IDI techniques. Prior to data collection, the IDI guide was piloted and revised to reach maximum utility.

Data Entry and Analysis

All interviews were transcribed verbatim and translated into English. Transcripts were then analyzed using MAXQDA 2007 (Marburg, Germany). Data were annotated to identify core themes and subthemes. Inductive and deductive coding was used, as well as thick descriptions and explanations. Intercoder reliability was addressed by comparing segments between two independent coders, mutually blinded of another's coding.

*Definition of a Latrine*

In the settings of this research, community settlements usually consist of thatched woods and mud constructed in a hut-like configuration. A household latrine is usually a separate facility located next to or near the main residence. Conditions and qualities of latrines vary. The generally recognized (and minimal) definition of a latrine is a dug pit that is covered by a slab that can support users to squat and defecate into the pit (Cairncross, 1993). Latrines are usually walled with wooden or mud superstructure to ensure privacy.

*Definition of Adopters and Non-adopters*

A household that owns a pit latrine, regardless of its quality, was considered an adopter. Among the adopters, those who saught financial means themselves for construction and maintenance of latrines were categorized as "self-financed adopters", whereas those who were assisted by NGO sponsored cost-sharing programs were considered "supported adopters". A household that does not own any form of latrine is categorized as a non-adopter.

*Latrine Construction vs. Use*

Determinants of latrine constructions are those that influence people's decision to build latrines, whereas the determinants of latrine use are those that determine if people will use latrines when they are present, or constructed. Current literature have made such distinctions and come to different findings (Jenkins, 2004;2007; Santos, 2010; Rodgers 2007). This study focuses on latrine uptake (construction). It must be noted that construction and use are not explicitly distinguished from interviewees of this region. All of them claimed that when, or if, they had latrines, they would use the latrines. Among the list of themes identified as determinants of sanitation adoption, some were categorized as associated with construction and some with use. Many of them remain ambiguous from the context of the interviews.

*Ethics*

An exempt status was approved by Emory University's Institutional Review Board. This is a minimal risk research pertaining to behaviors and attitudes on hygiene and sanitation, which are not sensitive topics, particularly when discussed within one's own gender group or alone. Oral informed consent was obtained from each participant before session began. Confidentiality was

guaranteed during and after the interview. Digital transcripts were made accessible only the principal investigator and the translators.

*Modeling Approach*

In an attempt to understand whether latrine ownership is associated with respondent's age, gender, marital status, education level, size of household, whether neighbors have latrines, whether he or she holds any community leadership position, land ownership and radio ownership, the dependent Y variable – latrine ownership (1= Yes, 2= No) was modeled with the aforementioned independent X variables (Table 2). A total of 2,146 surveys were analyzed. Cluster random effect was accounted for at village level. A full logistic regression model was used for the interest of cross-sectional, explorative approach. Maximum likelihood and odds ratios were calculated using SAS.

## RESULTS

### *A. Baseline Survey Findings*

Of the 2146 surveys conducted, 40.2% of households surveyed had access to some form of sanitation facility. Majority of respondents were female heads of households (77.5%), in either monogenic or polygenic form of marital arrangement (97.5%). Of the respondents, about 90% of them owned the land on which they lived. Mean age is 40 years (± 16.7) and average household size was 6.2 members (±2.6). On average, respondents had received 8.2 years of education (±3.2). Of the communities where surveys were collected, close to 89.7% of them did not have any presence of latrine. Radio was owned by 43.2% of the population (table 3).

Table 4 show that, among the surveyed heads of households, for every one year increase in age, the odds of having a latrine is increased by 6% (OR = 1.06; 95% CI: 1.04 – 1.09); for a year increase in education, odds is increased by 17.3% (OR=1.17; 95% CI: 1.06 – 1.30); for every addition of family member, odds is increased by 15.8% (OR= 1.16; 95% CI: 1.01 – 1.32); male respondents are 77.3% more likely to have household latrines compared to female (OR= 1.77; 95% CI = 0.88 – 3.57).

Compared to single marital status, monogenic, polygenic, widowed and divorced showed odds ratios of 1.20, 1.01, 0.53, and >999 respectively, all of them are not statistically significant. Respondents from communities that have latrines are 2.16 times more likely to own their own household latrines compared to those from communities that are void of latrines (OR = 2.16; 95% CI = 1.04 – 4.49). Respondents that held leadership roles in the community were 3% more likely compared to those who did not

(OR= 1.03; 95% CI = 0.54 – 1.98), with a statistically insignificant p-value of 0.92. Radio owners are 80% less likely to have latrines compared to non-owners (OR = 0.20; CI = 0.11 – 0.36).

Bivariate analyses were performed and the uncontrolled OR yielded same directionality as multivariate adjusted OR. Akaike Information Criteria in bivariate analyses were found to be larger than that of the full model. Multicollinearity was explored. Conditional indices and variance inflation factors suggested no indication of multicollinearity.

*B. Qualitative interview findings: Facilitators of Sanitation Uptake*

Table 5 shows a list of all themes identified in the in-depth interviews, as well as respondents' associated perceptions of those themes. The most frequently mentioned ones are discussed in details in following paragraphs.

**Security**

Security, especially at night, was repeatedly mentioned in almost every interview as a reason to want to abandon open defecation and adopt latrines. Respondents reported that they feared being attacked by wild animals, such as snakes, hyenas, lions or other poisonous creatures. A few mentioned that there may be "risk of rape in the open field." However, according to interviews collected, there had been no known anecdotes of sexual violence. In response to such fear, people without latrines tend to defecate near their homestead or on village grounds, increasing probability of contamination. Security

concern is equally shared among all interviewees, regardless of gender, education or adoption status.

**Privacy**

Privacy is a uniformly celebrated quality among the selected communities. It is ubiquitous in the interviews that people prefer not to be seen, especially by other gender or people of other age groups. Even among non-adopters, location for defecation changes to ensure privacy.

> If the bush is near you defecate but if it's far you move. This mostly changes either during the rainy or dry season. During the rainy season we have so many bushes but in the dry season they are scarce (Male, Dhobolo village, Malakote tribe).

**Distance**

To defecate in the bush, one must find a place where he or she cannot be observed. Such locations are usually at least "a stone-throw distance" away from the outermost settlement of the village. People thus find it inconvenient to defecate in the open if biological calls are imminent or at night. "When it is dry and there is no rain, the bushes are very far away. If you have a stomach problem you cannot make it to the bush." For most people who work in the field during day time, including the adopters, find themselves defecating in the bush due to difficult access to the nearest latrine. Women

who need to cook or attend young children find travelling a long distance into the bush inconvenient and impractical.

> She might leave something cooking (food) and it burns up, or a child may be left at home and it cries for many hours before the mother comes back from the bush (Female, Bawana village, Wairuana tribe).

**Health Concerns/Cleanliness**

Most respondents were familiar with the relationship between poor sanitation and health burdens. When inquired in depth, respondents were able to eloquently describe disease transmission pathway from fecal matters to food via flies, possible diseases and symptoms, and water contamination.

> When a child is eating there are flies which always want to perch on that food. The child is not able to whisk away the flies' and might not also be aware of the risks it may bring. By the time you notice the flies presence on your food, they shall have deposited the germs .To keep away the flies I had to have a latrine (Male, Bulargi village, Somali).

Respondents are aware of the immediate threat of human and animal feces lying in their communities.

> People get diseases that are as a result of the feces that are not deposited properly; if you step on feces it may bring so many diseases for example, when you have not worn proper shoes that cover the leg completely. Most diseases are brought through the feet, touching these feet's and no hand washing is done the hands moves to the mouth thus resulting to diseases (Female, Dhabolo village, Malakote tribe).

Some respondents have shared their concern that during rainy season, feces can be washed down into the ground or the river to contaminate their own water sources. As a

health precaution, latrine adoption is viewed as a way to keep "dirt" in one place to minimize exposure.

**Comfort**

In the process of defecation, people find it inconvenient to defecate in the bush, because of its vulnerability to weather, and privacy and security concerns. During the rainy season, mosquitoes flourish and excessive rainwater makes the ground muddy and unpleasant. Using a latrine provides the advantage of coping with all kinds of weather; in addition, an enclosed space to some people can mean "taking a break where no one dares to bother". In the absence of latrine, respondents have to stay constantly alerted for any breach in prvaicy and security.

> In the bush you have no time for proper anal cleansing because at times you hear people chasing over the goats and you think they are coming in your direction, so you do it so fast and end up with feces on cloths (Male, Dhobolo village, Malakote tribe).

With latrine walls blocking off the rest of the world, people are able to take time to appreciate anal cleansing in better details.

> When you get to the toilet and do the anal cleansing you are so keen and ensure that you are completely clean, you have time to admire yourself (that is to check no feces on your clothes) (Male, Gahle village, Wairuana tribe).

*C. Barriers to Sanitation Uptake*

**Finance**

Concerns were raised regarding financial costs that are associated with constructing latrines. A latrine may cost from 4,000 to 25,000 Kenya Shillings (~ 40 – 250 USD), which accounts for a significant portion of an average household's free cash. The famine that is taking place in the Horn of Africa at this moment is incurring additional financial responsibilities on our selected villages, so "constructing a latrine at this time using money is not easy because [our family] is also so hungry and my family need food."

Digging appears to be the most expensive and discouraging activity as perceived by respondents. When financial concern is raised, it is more often referred to digging the pit rather than purchasing materials for other parts.

**Culture and Stigma**

Respondents stated that defecating in the bush was a tradition that had been practiced since ancient times. Adopting this new behavior may require extraneous effort, because fear for latrines is wide-spread in some communities. "Since our grandparent's time's people used to defecate in the bush so we are used to this, I personally defecate in these nearby bushes."

Being seen to use latrines, for some people, is considered shameful in their cultures. Respondents expressed that they did not want to be seen (or identified) by people whom they respected, such as mother-in-law, or little children. It is also difficult for them to imagine "using the same hole to defecate with such a person." Parents often

keep children oblivious about the fact that adults need to defecate as well. Building a latrine is an automatic breach to this myth they have carefully maintained.

> In our society you can't inform them [children] about this because in most cases the children always think that their parents don't defecate. They think big people don't defecate only child who do so." "She [the mother] may speed up and defecate so fast and come back or the mother can just trick the child by telling him that she wants to collect firewood… using the same latrine with my small girls does not satisfy me, the cultural issues come in here (Male, Bulargi village, Somali).

Seeking help to construct pit latrines is shameful to some people. "Asking about a pit latrine is shameful and also when I talk on areas to be assisted the organizations may think I am begging so much which is not good." Concerns regarding culture and stigma are primarily shared by those who have received some education and predominantly by men.

**Danger**

Perceived danger of weak latrine structure was prevalent in many interviews. People fear that the hole may collapse and people may die inside. Because of latrines' susceptibility to harsh weather, such fear is heightened during the raining season. Households that settle along the river line are reluctant to construct latrines, because flood can easily carry away these facilities.

> During floods they believe the water will carry away the structure and the hole can result to death especially for children who may fall in these holes. The other thing is the type of soil we have in the riverline, in most times it collapse during the rainy season. So people prefer not to construct the latrines and use the bush (Male, Dabholo village, Mwilwana tribe).

Due to this common fear and distrust, visitors find themselves preferring to defecate in the bush even when there are latrines available. A man jokingly put: "it's good to die in an open place than in a hole." Parents encourage young children to defecate in the open field in order to protect from potentially falling into the pit.

**Competing priorities**

Latrine construction is not prioritized in the presence of other commitments. Male respondents spend a significant amount of time on herding livestock and working in the farms, whereas female respondents lack labor, knowledge and free time to initiate the adoption process.

> Everybody as his activities and people are willing to construct but they have other activities like farming to get something for the family. But this is slow because people were used to defecating in the bush and so even if the latrine is not ready one can use the bush. Others think that somebody will come and give a slab (Male, Bawana village, Wairuana tribe).

## DISCUSSION

From the baseline survey data, we found that age, education, household size, gender and presence of community latrines are positively associated with household latrine ownership. Radio and land ownerships are inversely associated with the outcome. The full logistic regression model indicates that the only statistically significant indicators are: age, education, household size, gender, presence of community latrines and ownership of radio; whereas marital status, land ownership, and community leadership prove to be statistically insignificant. Parts of the results coincide with the existing findings that education level of the head of household and family size are positively correlated with likelihood to own latrines (Rodgers et al, 2007; O'Loughlin et al, 2006). Our study shows odds of adopting latrines increases with respect to age, but other research show that latrine ownership is associated with younger age, i.e. young men are more accepting of new innovations (Jenkins & Curtis, 2005; Santos, 2010).

Regression shows that respondents whose neighbors have latrines are more likely to adopt their own household latrines compared to those whose neighbors that do not have any. This result reflects our qualitative finding that "conformity" is a good facilitator because as coverage of latrines increases, some respondents feel compelled to adopt because their neighbors are using it. Ownership of radio has a significant inverse correlation on adoption of latrine. It is counter-intuitive and defies the current usage of radio as a means of knowledge diffusion in existing literature (Osero, 2006; Oyediran, 2005).

Gender difference in generating demand for latrines was explored extensively in the interviews. Privacy is equally emphasized as a facilitator to building latrines among male and female respondents. Distance is weighed more heavily by females than by male, perhaps due to the pastoralist nature of men's work, which requires them to move around and defecate wherever the need strikes. On contrary, female have to stay at one location (usually the homestead) to prepare food and attend young children. Travelling a long distance to defecate is more troubling for women than it is for men. In Bangladesh, women reported that improved access to sanitation resulted in more productive use of time and resources (Allen, 2003). Health concerns are mentioned more frequently among male compared to female. This discrepancy may be a confounded effect of education, as all of the female respondents have never received proper education. In dealing with culture and stigma, men appear to be upholding traditional values firmly whereas women show less interest. Women are much more concerned with odor from latrines than men are. The difference is similar to that of the Benin study (Jenkins, 1999). Studies have also shown that women repeatedly mention need for privacy and security (TearFund 2007), whereas men are more attracted to benefits of prestige (Jenkins 2004).

The top three facilitators are generally the same between the no-education and some-education strata, except that health concerns are ranked higher among the latter group. It can be inferred that education may be associated with higher awareness in health-related threats regarding open defecation. Top three barriers across strata are ranked differently. From interviews and observations, a grounded theory can be suggested that among the respondents, people who have higher education (compared to none) tend to have stable jobs and more assets. Therefore those who have no education

are more constrained by finance, more appalled to immediate disgust such as odor and are obliged to work more hours to satisfy everyday needs, resulting in competing priorities. Interestingly, those supposedly educated people are very concerned and can be easily swayed by traditional values.

To compare difference in attitudes between self-finance adopters, supported adopters and non-adopters, facilitators and barriers were analyzed across different adoption status strata. Facilitators for sanitation adoption are generally consistent: privacy, distance and health concerns are frequently mentioned, whereas adopters in Benin valued more on affiliation to urban lifestyle, prestige and comfort (Jenkins & Curtis, 2005). For the adopters with support, outside influence (primarily from corresponding NGOs) is weighed more heavily compared to other strata. Barriers are ranked similarly between the three groups, with the exception of construction, which is barely mentioned among non-adopters possibly due to lack of experience.

Cultural values and stigma that are indigenous to Northeastern Kenya bring forth new perspectives to sanitation intervention. The concern of defecating at the same spot with the revered family members is found nowhere in existing literature. Aversion to asking for assistance to build latrines is also observed and it can be related to Islam's prohibition of begging (The Qu'ran, 2008), as well as traditional rivalries among Somali clans (Doyle 2006).

In this latrine promotion program, health was considered a key driver and many respondents were aware of health implications of open defecation. However, health is not

a main of behavioral change (Jenkins & Sugden, 2006). This coincides with the current finding that consumers' decisions have less to do with well-being than with other factors (Jenkins, 1999). However, social status or prestige was rarely mentioned by participants of this study but frequently explored in other research (Cotton, Franceys, Pickford & Saywell, 1995; Elmendorf, 1980; Goodhart, 1988; Murthy, Goswami, Narayanan & Amar, 1990; Perrett, 1983). A possible explanation is that the study area itself is deprived of sanitation coverage and isolated to any large urban settlement that provides access to latrines. Participants have little or no reference from which to project a sense of prestige.

Perceived danger of latrine use prevents households from adopting sanitation. Fear of the collapse of latrines is prevalent and repeatedly mentioned in our study, and echoed across the globe in Vietnam (Rheinländer, 2009). This indicates that people lack confidence in the quality of their latrines. It can be inferred that villagers do not have the know-how, those who take the initiative to build are left on their own to figure out everything from scratch, thus risking their lives.

Difference between supply-led intervention and motivation-led intervention is observed. Interview results indicate that participants who live in and near CARE intervention villages mention "finance" as the primary barrier to latrine adoption more frequently than do those who live in and near CRS intervention site. Key-informant interviews involving CARE and CRS field staff were conducted to explore possible explanations. A stronger sense of dependency is observed among the intervention sites for CARE, which provides substantial technical support and shared costs. People there

tend to demand items that are beyond their financial capacities, such as iron sheets and pipes, and lack the motivation to manage the construction on their own. A study in Vietnam showed that people often overestimated costs for construction, and were discouraged from adopting latrines (Frias and Mukherjee, 2005). The efforts of CARE have been spread by words and may now have a discourage effect on the population's self-initiative. On contrary, CRS focuses on encouraging people to use locally available materials to complete the construction. This could contribute to why CARE subjects are more bothered by finance compared to CRS subjects. Problems of development dependency were also observed among other heavily subsidized communities (Rheinländer, 2009; Evans et al, 2009).

Due to the cross-sectional nature of the study, causal inferences cannot be made from the household survey dataset. Hypotheses were drawn heavily from the qualitative interviews, without the support of a large statistical measurement. Biases in the answers cannot be avoided. Since this topic may involve moral judgments, people may give second thoughts before providing answers. Opinions are also likely to shift in favor of the NGOs, as courtesy is part of the culture and it is strategic to maintain good relationships for future support.

This study found that the geo-cultural context of Northeastern Kenya gives rise to determinants of sanitation uptake that are different from those of previously studied areas. The most prominent facilitators in Garissa and Tana River are: privacy, distance to defecation site, security and health concerns; the most prominent barriers are: finance, cultural values, stigma, perceived danger, and smell. NGOs should find innovative ways

to cater their intervention strategies to address the above determinants other than health benefits. Communities need to be empowered and take initiatives toward sanitation, in order to reduce dependency on NGO's handouts.

## TABLES

**Table 1. Topics covered in in-depth interviews, administered to adopters and non-adopters**

| Topics | Adopters | Non-adopters |
|---|---|---|
| Defecation habits of people in the village | ✓ | ✓ |
| Practice of open defecation | ✓ | ✓ |
| Reasons for open defecation, likes and dislikes | ✓ | ✓ |
| Reasons to build a latrine – priorities and values | ✓ | |
| Outside influences with regard to latrine adoption | ✓ | |
| Decision making dynamics within household | ✓ | |
| Availability of community or additional support | ✓ | |
| Process of latrine construction, materials needed, and difficulties encountered | ✓ | |
| Latrine use within household – knowledge and behaviors | ✓ | |
| Reasons for not having a latrine | | ✓ |
| Barriers to latrine adoption when desire is present | | ✓ |

**Table 2. Household level variables, definitions and research indications**

| Variables | Category | Definition | Indications |
|---|---|---|---|
| *Dependent Variable* | | | |
| Latrine ownership | categorical | Whether a household owns a latrine | |
| *Independent Variables* | | | |
| Age | continuous | Age of respondent (in years) | |
| Gender | categorical | Gender of respondent | Gender difference in demand and decision-making |
| Marital status | nominal | Marital status of respondent | Family support and responsibility |
| Education | continuous | Education received (in years) | Association between education and sanitation |
| Size of household | continuous | Number of family members | Need and financial capacity |

| | | | |
|---|---|---|---|
| Community latrine | categorical | If there is a community latrine in the village | May be a motivation or inhibition. |
| Community leadership | categorical | Whether the respondent's family hold leadership role | Prestige/social status |
| Land ownership | categorical | If the household owns its land | Prestige/social status, access to land |
| Radio ownership | categorical | If the household owns a radio machine | Knowledge diffusion |

**Table 3. Descriptive statistics for variables of modeling interest from MWP-K dataset**

| **Variable** | **Characteristics N= 2146** | **Sample Description** |
|---|---|---|
| *Dependent Variables* | | |
| Latrine ownership | Yes | 40.2% |
| *Independent Variables* | | |
| Age | Mean (SD) | 40.2 (16.7) years |
| Years of Education[1] | Mean (SD) | 8.2 (3.2) years |
| Size of Household | Mean (SD) | 6.2 (2.6) people |
| Gender Proportion | Female | 77.5% |
| | Male | 22.5% |
| Marital status[2] | Married (monogyny) | 77.6% |
| | Married (polygyny) | 19.7% |
| | Widowed | 1.6% |
| | Divorced | 0.6% |
| | Single | 0.3% |
| Community has any latrine[2] | Yes | 10.3% |
| Whether respondent's household holds any community leadership[2] | Yes | 24.2% |
| Land ownership[2] | Yes | 90.2% |
| Radio ownership[2] | Yes | 43.2% |

[1] Highest education attained by the patriarch, regardless of the gender of respondent
[2] Missing value: marital status – 358; community latrine -31; community leadership - 9; lander ownership – 19; radio ownership - 7

**Table 4. Logistic regression model for household latrine adoption in Millennium Water Program – Kenya study sites, excluding Tana River and Garissa Districts**

| Variable | Adjusted Odds Ratio[1] | 95% CI | *p-value* | Unadjusted Odds Ratio (95% CI)[2] |
|---|---|---|---|---|
| Age* | 1.06 | 1.04-1.09 | <0.01 | 1.01 (1.00-1.02) |
| Years of education* | 1.17 | 1.06-1.30 | <0.01 | 1.09 (1.01-1.17) |
| Size of household* | 1.16 | 1.01-1.32 | 0.03 | 1.01 (0.98-1.05) |
| Gender* | 1.78 | 0.88-3.57 | 0.11 | 1.26 (1.03-1.55) |
| Marital status (compared to single) | | | | |
| Married (monogyny) | 1.20 | 0.10-14.80 | 0.89 | 5.01 (0.56-45.0) |
| Married (polygyny) | 1.02 | 0.07-15.04 | 0.99 | 10.9 (1.20-98.7) |
| Widowed | 0.53 | 0.02-16.98 | 0.72 | 4.00 (0.39-40.4) |
| Divorced | >999.99 | >999.99 - >999.99 | 0.99 | 6.00 (0.48-75.3) |
| Community has a latrine* | 2.16 | 1.04-4.49 | 0.04 | 1.12 (0.83-1.48) |
| Community leadership | 1.03 | 0.54-1.98 | 0.92 | 1.01 (0.75-1.15) |
| Land ownership | 0.67 | 0.22-2.00 | 0.47 | 0.26 (0.18-0.38) |
| Radio ownership* | 0.20 | 0.11-0.36 | <0.01 | 0.17 (0.14-0.21) |

*Statistically significant

[1]Multivariate adjusted OR

[2]Bivariate OR

**Table 5. Beliefs, attitudes and behaviors associated with determinants of sanitation adoption in Garissa and Tana River Districts, Kenya.**

| Themes | Associated Beliefs, attitudes and behaviors |
|---|---|
| *Drivers* | |
| Security[α] | • Attacks from wild or poisonous animals<br>• Sexual violence against women |
| Privacy[α] | • Avoid being seen, or made association to defecation |
| Distance[α] | • Long travel to defecation site is unpleasant and unsafe<br>• Must leave children unattended for a prolonged period of time<br>• Inconvenience for extreme weathers or bodily |

| | |
|---|---|
| | conditions (i.e. running stomach) |
| Cleanliness[1,α] | • Keep environment free from undesirable contaminants<br>• Essential for health improvements |
| Health Concerns[1, α] | • Reduce WASH-related diseases<br>• Cover feces to keep away flies<br>• Choose defecation site that is distant from village or homestead |
| Comfort [β] | • Discomfort caused by extreme weather<br>• Anal cleansing is made easy and done more thoroughly because of privacy<br>• Avoid contacting other people's feces scattered around |
| Social Status[α] | • Latrine is associated with higher educational, financial and social status<br>• Visitors pay more respect and feel more gracious toward the host who has a latrine |
| Conformity[α] | • Latrine is associated with fashionable development and urban lifestyle<br>• Trendiness – a tendency to keep up with neighbors who have latrines |
| Influence[α] | • Influence on making a decision to adopt latrines from NGOs, local administration, schools, community or any other source |
| *Barriers* | |
| Finance[α] | • The entire construction is expensive and outweighs the importance of latrine adoption<br>• Latrines are finished poorly due to lack of resources<br>• Quality maintenance is limited |
| Danger [β] | • Latrines can be washed away or torn apart during extreme weather<br>• Small children may fall into the pit<br>• Fear of collapse for adultery users |
| Competing priorities[α] | • Daily work discourages people to construct latrines<br>• Remaining time is allocated for other economic production activities |
| Construction[α] | • Digging is difficult without proper tools and training<br>• Soil composition in some regions are unfit for construction |
| Smell [β] | • Latrine produces odor whereas fresh air is enjoyed during open defecation |
| Culture and stigma [α] | • Defecating at the same spot (latrine) with the revered members of the community is unimaginable<br>• Societies have practice open defecation for a long time |

| | |
|---|---|
| Latrine sharing [β] | • Asking for assistance to build latrines is considered as begging<br>• Sharing latrines delay people's motivation to construct their own latrines |

[1] Cleanliness and health concerns were mentioned concurrently, but they all essentially referred to health outcomes. For analysis, they were coded together as "health concerns"

[α]themes associated with construction of latrines

[β]themes associated with use of latrines

**Table 6. Three most frequently mentioned facilitators and barriers stratified by gender, education and adoption status subgroups, ranked in order of frequency**

| | **Facilitators** | | **Barriers** | |
|---|---|---|---|---|
| *Gender* | Male | Female | Male | Female |
| | Privacy | Privacy | Finance | Finance |
| | Security | Distance | Culture and Stigma | Smell |
| | Health Concerns | Security | Competing Priorities | Competing Priorities |
| *Education* | No Education | *Some Education* | No Education | *Some Education* |
| | Privacy | Privacy | Finance | Culture and Stigma |
| | Distance | Distance | Smell | Finance |
| | Security | Health Concerns | Competing Priorities | Danger |
| *Adoption Status* | Adopters (self-financed) | Adopters (with support) | Adopters (self-financed) | Adopters (with support) |
| | Distance | Privacy | Finance | Construction |
| | Privacy | Distance | Culture and Stigma | Finance |
| | Health Concerns | Influence | Construction | Competing Priorities |
| | Non-adopters | | Non-adopters | |
| | Privacy | | Finance | |
| | Security | | Smell | |

| Health Concerns | Culture and Stigma |
| --- | --- |
| | |

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## PUBLIC HEALTH IMPLICATIONS

Our findings will help partnering NGO and future practitioners to strengthen their intervention strategies and marketing plans, by mending their messages toward community members' priorities and adjusting existing schemes to correct for shortcomings. The following paragraphs identify repeating themes that pertain to stakeholders.

*Promote facilitators*

Findings indicate that health benefits are not the sole or the most important drivers for sanitation uptake. Practitioners must incorporate messages on privacy, distance/convenience, security and comfort, while diffusing latrine promotion. Current campaigns can be adjusted to put more emphasis on the factors presented in our study.

*Provide training*

Construction was frequently mentioned by the respondents. The process is difficult to initiate not only because of financial constraint, but people do not know how to properly dig the pit, which tools to use or where to get the materials. In addition to providing seminars on WASH behaviors, partners should consider devising a training module for hands-on construction work.

Interviewees were also constrained by competing priorities that they found little time to dedicate to building latrines. It must be noted that due to past NGO effort, almost every intervention village has a standing water committee that is supposed to liaise organizations with villagers and assume leadership in water management. According to

interviewees, however, the water committees "don't do much." Partners may seek to mobilize the existing leaders, such as the committees or religious heads, to organize a construction team, and carefully divide and share the efforts of increasing sanitation coverage for the whole village while ensuring every family's livelihood.

*Reduce Dependency*

Supply dependency was observed in our study area and in other developing countries. Partners must revisit their current intervention methods to ensure a long-term sustainability. Guidance should be provided on community self-organization and self-help microfinance (such as rotating savings or solidarity lending, if applicable).

*Rebuild Confidence*

Perceived danger for latrines, especially disintegration due to harsh weather or poor construction quality, was repeatedly stated in our interviews. This fearful perception has a discouraging effect on non-adopters and causes additional mental stress on users as well. Practitioners and other stakeholders should be alarmed that this is partly due to a general lack of technical knowledge – when people who have seen latrines want to make one for themselves, they are left without engineering knowledge of which tools and materials to obtain and the procedure that has to be followed. In addition, while NGOs have official guidelines for building a proper latrine, in a resource-deprived area such as Northeastern Kenya the fact suggests otherwise. Key informants shared that NGO-supported latrines here did not follow standardized specifications and the quality of construction by fieldworkers and contracted artisans was ambiguous. In order to rebuild

people's confidence in latrines, NGO partners must make efforts to provide adequate training or demonstration of construction, and perform monitoring and evaluation for the latrines supported by organizations.

*Reduce cultural stigma*

Cultural taboos of defecating at the same location with the revered elders, and children believing adults do not defecate, are preventing latrine uptake. Partners must seek to alter these cultural perceptions and de-stigmatize defecation.

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