MTUMBA SANITATION AND HYGIENE PARTICIPATORY APPROACH IN TANZANIA




Sanitation training and demonstration centre




Situation before Mtumba sanitation approach implementation




Situation after Mtumba sanitation approach implementation

OUTCOME AND IMPACT MONITORING FOR SCALING UP MTUMBA SANITATION AND HYGIENE PARTICIPATORY APPROACH IN TANZANIA

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EXECUTIVE SUMMARY

BACKGROUND

The Participatory Hygiene and Sanitation Transformation (PHAST) was implemented in Tanzania in 1997 and after 8 years, an evaluation was carried out by the National Institute for Medical Research (NIMR) to monitor the progress. NIMR identified a number of shortfalls and put forward a number of recommendations. On this background, WaterAid Tanzania and her partners convened in September, 2007 at MTUMBA village in Dodoma to review different participatory approaches used in the promotion of hygiene and sanitation in the country. The meeting deliberated and ironed out strengths and weaknesses of various participatory approaches implemented in the country and finally used the strengths to form an approach that would be effective with particular emphasis to Tanzanian context. The meeting finally came up with MTUMBA Sanitation and Hygiene Participatory Approach, named after the MTUMBA village in Dodoma region in Tanzania. MTUMBA Sanitation and Hygiene Participatory Approach is basically amalgamated from PHAST, community led total sanitation (CLTS) and participatory rural appraisal (PRA) tools. MTUMBA sanitation approach is targeted to achieve its goals through capacity building in terms of skills development of the district sanitation team/department, community based artisans and animators, lobbying for the District Health Department to adequately budget for Sanitation and include the same in the Council Comprehensive Health Plans (CCHP). The MTUMBA approach was piloted in three districts of Iramba, Nzega and Mbulu under the Irish Aid (IA) Rural Sanitation Project from March 2008 to March 2011.

METHODOLOGY

The evaluation aimed to measure the outcome of MTUMBA approach in terms of behavior change and sanitation demand creation and establish social factor for choice of sanitation and hygiene technologies. The study was carried out in the MTUMBA Sanitation Approach piloted wards of Masieda in Mbulu, Mtoa in Iramba and Mambali in Nzega districts in Tanzania. MTUMBA evaluation activities included: In-depth interviews of policy and decision makers and implementers at district level, desk review of ward sanitation and hygiene activities, ward and village levels in-depth interviews, focus group discussions (FGDs) and household surveys. In addition, we collected data on program costs from the sanitation centres and from project partners and based on the inputs, cost analysis was done to estimate costs per person at household level for implementing MTUMBA approach. A total of 1,203 households from the 3 wards in three districts of Iramba, Nzega and Mbulu were visited and sanitation and hygiene data collected. Households were randomly selected from each ward in the districts and at least one head of household from each selected household was interviewed.

FINDINGS

Socio-economic characteristics of the surveyed households

Overall, the household questionnaire was administered to total number of 1,203 as summarized in the table below.

Item	Nzega district	Mbulu district	Mtoa district	Total
Number of respondents	398	403	402	1,203
Literacy level	51.26%	67.25%	67.91%	62.18%
No formal education	50.25%	34.24%	34.33%	39.57%
Primary education	47.49%	58.81%	61.69%	56.03%
Secondary education	1.76%	6.45%	3.48%	3.91%
Adult education	0.25%	0.25%	0.50%	0.33%

There were more respondents who cannot read and write in Mambali ward as compared to those in Masieda and Mtoa wards. The large majority of respondents have primary school level education whereas the second large majority of the respondents have no formal education. Very few of the respondents have secondary education, adult education and those with above secondary education (0.17%). Majority of the respondents in Mambali ward in Nzega and Mtoa ward in Iramba are subsistence farmers and they engage in income-generating activities. On the other hand, majority of respondents in Masieda ward in Mbulu district are engaged in agriculture and animal keeping. The large majority of the respondents conceded to fetch water from surface sources whereas only 27.6% have access to piped water. Twenty two of the surveyed households (1.83%) reported to collect water from the sources they own, five of the households (0.42%) collect water from sources owned by their neighbors whereas the large majority of households (95.76%) collect water from community owned sources.

Awareness about MTUMBA sanitation approach in the study sites

Majority of the community informants in the visited households (80.38%) and the key informants in the focus groups discussions were aware about the MTUMBA approach and were able to outline the approach differentiating it from other approaches. The sanitation centre was identified by majority of the informants as the centerpiece of knowledge about improved latrines, designs, construction costs and approaches based on different locally available materials. Triggering meetings conducted by hygiene and sanitation partners: Sustainable Environmental Management Action (SEMA) and Health Action Promotion Association (HAPA) in Mtoa ward in Iramba district and Mambali ward in Nzega district; and Diocese of Mbulu Development Department (DMDD); were identified as being key in the sensitization, awareness and demand creation to adopt MTUMBA sanitation approach. The MTUMBA approach trained animators and artisans were moving from house to house to inform and offer explanations on the importance of latrine construction and use, use of safe water for drinking and washing, hand washing after visiting latrine and the known health gains associated with the such a behavior change.

Sanitation facilities in the surveyed households

The commonest sanitation facilities observed in the surveyed households are the pit latrines which were present in an overall of 1,083 (90%) of the surveyed households. The coverage of latrines ranged from 78.1% in Mambali ward in Nzega district up to 98.8% in Masieda ward in Mbulu district as depicted. Traditional pit latrines constituted 64.3% of all latrines constructed in the surveyed households as shown in figure 8. Construction of ventilated improved pit latrines (VIPs) (3.1%), improved pit latrines (13.9%), pour flush latrines (1.8%) and water closet (2.6%) were also observed in some of the surveyed households. Different latrine designs were demonstrated at sanitation centres, accommodating needs of different groups of people.

Open defecation practices in the surveyed households

Out of the 1,203 households sampled, 120 (10%) of them didn't have latrines and majority of them were not using latrines. Households which conceded not to be using latrines during the survey put forward a number of reasons as to why they are not using latrines including: *"our latrine is full; we don't have a latrine; our latrine has collapsed; our latrine is under construction; and our latrine is water logged".*

Latrine situation before and after the MTUMBA sanitation approach

The sanitation and hygiene situation before the implementation of the MTUMBA approach in the project areas was reported to be poor. Information gathered from ward and village leaders in the wards reveals previously poor situation of hygiene and sanitation in which only very few of household had latrines. It was further revealed that, all of the latrines were temporary and poor. Among the mentioned reasons for having poor quality of latrine includes: lack or poor technology for improved latrine construction, poor understanding on the importance of having and using latrines, lack of understanding on the ill-effects of water and soil contamination with human feces and the existence of negative traditions and beliefs. The introduction of the MTUMBA approach have gone hand in hand with the provision of education which helped people to realize the link between human feces and ill-health, the dangers associated with improper disposal of human feces and the importance of latrines to human health. In addition, latrine designs have been demonstrated in the village setting. As a result, now majority of people have awakened, they have been and they are constructing latrines and increasingly improved latrines are being constructed in the wards.

Hygiene and sanitation behavior change after MTUMBA

An overall of 80.05% of the respondents in the household survey indicated to have noted sanitation and hygiene behavior changes in a span of three years of MTUMBA implementation. Key changes were the decline of open defecation and that majority of people are now using latrines. It was further explained that, there is also a change in thinking as previously thought that child feces were harmless and that is why were not disposed off; at the moment majority of the households are disposing child feces in latrines.

Effectiveness of MTUMBA approach in creating demand for hygiene and sanitation behavior changes

Since the introduction of MTUMBA approach in the study areas, there have been behavior changes towards increased construction and use of improved latrines. Sanitation promotion work carried out through MTUMBA approach resulted in increasing demand for latrines. Community animators and artisans helped to increase awareness hence many people demanded improved latrines.

Preference of sanitation technologies in the study sites

Results from household surveys, in-depth interviews and focus group discussions revealed that majority of households in the study sites preferred Improved Pit Latrine with "*Sungura* (Swahili word for rabbit)" slabs. *Sungura* slab is also known as *sanplat*, it is a 2ft by 2ft smooth and washable concrete slab which is safe for children. The preferred latrine superstructures in Mbulu and Iramba sites were the '*Tembe*' – the local names for common houses in these areas whereas in Nzega was the mud /wattle (*kihenge*). Majority of households preferred technology which is affordable (cheap), that which uses materials which are locally available, affordable costs of labor and the availability of *sungura* slabs in the sanitation centres.

Trends of hygiene and sanitation tracer diseases after MTUMBA in piloted areas

Respondents claimed of a decreasing trend of hygiene and sanitation tracer diseases in the past three years coinciding with the duration of MTUMBA implementation in their areas. The most common among them was diarrhea as mentioned by an overall 24.69% of respondents. Next to it were intestinal helminthes (16.46%), skin infections (11.14%) and other infections including eye infections, typhoid fever and schistosomiasis listed by 9% of respondents. Health facility data for the five years 2006 – 2010 showed an overall sharp decline in diarrhea and slight decline as well as a slight up and down trend in other tracer diseases. After the three years of MTUMBA implementation, an overall low prevalence of hygiene and sanitation tracer diseases as compared to the time before was considered to exist in the study sites by the informants.

Costs of implementing MTUMBA

Triangulation of information from different data sources show that costs of constructing latrines were affordable for majority of households in the study sites. Affordability was associated with availability of sanitation options from traditional improved pit latrine to VIP latrine. *Most households can afford the Sungura latrine type of technology which costs only Tshs 11,000.* Comparison of latrine construction costs obtained in this study and those previously reported with Odiachi, 2010, showed slight variation. The cost of improved pit latrine ranged from Tshs 56,000 to 194,000 (exchange rate in Tshs 1,462.18 = $ 1 and Tshs 2,400 = £ 1) this study whereas in the Odiachi study ranged from 51,000 to 90,000 (exchange rate in Tshs 2,140 = £ 1). Total annualized economic costs for running a demonstration site in Mtoa ward in Iramba district was **30,353,968** Tanzania shillings (equivalent to US$

20,759.39). Out of these, economic costs of buildings (excluding demonstration latrines) are estimated at 23,698,889 Tanzanian shillings (equivalent to US$ 16,207.91489) or 78.1% of total economic costs. The MTUMBA approach costs to reach each household for sanitation and hygiene promotion and demonstration of sanitation facilities in the study areas was estimated at an average of Tshs. 17,582.7 (US$ 12.0).

CHALLENGES ENCOUNTERED IN IMPLEMENTING MTUMBA

The MTUMBA hygiene and sanitation actor at the implementation level is the District. At community level, the MTUMBA project faced geographical, economic, and social-cultural challenges during its implementation. High water table forced shallow pits in Mambali, and resulted to latrine collapses. Unfavorable competition rather cooperation was identified to exist between health and water departments on issues of water, sanitation and hygiene; water department has put hands-off on MTUMBA issues and only left to the health department. District health team does not conduct any supervision or evaluation at ward and community level on MTUMBA activities, and therefore they lack information on what has been done in the community. Disjunctive relationship exist at district level of the departments jointly implementing water, hygiene and sanitation activities (no joint meetings, plans, supervision, monitoring and evaluation, reports) hence limited and disintegrated resources for district, ward and village plans to support the MTUMBA approach. The lack of district based joint planning, implementation, monitoring, supervision, evaluation and reporting mechanisms to reflect hygiene and sanitation activities including the MTUMBA approach issues in the surveyed districts was noted.

CONCLUSION AND RECOMMENDATIONS

MTUMBA approach motivated the district council to budget for establishing a sanitation center in Nzega district and continuation of promoting the approach in other areas according to findings from key informants at the district level. Generally, MTUMBA approach has prospects for sustainability as it focuses on demand creation and empowers community people with skills to advocate and construct improved latrines matching community contexts.

MTUMBA approach as it is effective in promoting hygiene, sanitation and community promotion of latrine construction and use. MTUMBA needs multi-sectoral collaboration; key district departments need to be effectively involved. In the course of this study and other activities in health related activities at community level, we have identified three critical issues for MTUMBA approach improvement.

i. Institution of effective MTUMBA sanitation activities coordination and support mechanisms at district level involving the District Executive Director (DED), District Planning Officer (DPLO), Councilors, and District Departments: Health, Water, Community Development Department, Agriculture and Food Security, Livestock Development and Fisheries and Education.

ii. Institution of effective MTUMBA sanitation activities coordination and support mechanisms at ward level involving the Councillor, Ward Executive Officer, Ward Health Officer, Ward Community Development Officer, Ward Agricultural Officer, Ward Livestock Development Officer and Ward Education Officer.

iii. An innovative approach to customize MTUMBA hygiene and sanitation activities by strongly link MoHSW with MoW (RWSSP staged 'Household water and sanitation project Cycle): the two ministries with other stakeholders and water, sanitation and hygiene partners must network and have collective actions.

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Acronyms/Abbreviations

BCC	Behaviour Change Communication
CBO	Community Based Organization
CCHP	Comprehensive Council Health Plan
CLTS	Community Led Total Sanitation
CSO	Civil Society Organization
DED	District Exective Director
DMDD	Diocese of Mbulu Development Department
FGDs	Focus Group Discussions
HAPA	Health Action Promotion Association
HBS	Household Budget Survey
IA	Irish Aid
IEC	Information, Communication and Education
LGA	Local Government Authority
MDGs	Millennium Development Goals
MKUKUTA	Mkakati wa Kuinua Uchumi na Kupunguza Umaskini Tanzania
MoHSW	Ministry of Health and Social Welfare
NEHHASS	National Environmental Health, Hygiene and Sanitation Strategy
NETWAS	Network for Water and Sanitation
NGO	Non-Governmental Organization
NIMR	National Institute for Medical Research
NSGRP	National Strategy for Growth and Reduction of Poverty
PHAST	Participatory Hygiene and Sanitation Transformation
PRA	Participatory Research Appraisal
SARAR	Strengths, Resourcefulness, Action-planning and Responsibility
SEMA	Sustatinable Environment Management Action
SHARE	Sanitation and Hygiene Applied Research for Equity
TOTs	Trainer of Trainers
UNICEF	United Nations Childrens Fund
VEO	Village Executive Officer
WEO	Ward Executive Officer
WHO	World Health Organization

1.0 INTRODUCTION

1.1 Sanitation situation in Tanzania

In Tanzania, only 42% of rural populations and 73% of urban population have access to improved sanitation [1, 2]. Low coverage of quality latrines have been noted in rural areas in Tanzania [3 - 6]. The 2004 - 2005 Demographic and Health Surveys (DHS) showed that households with *any* form of latrine/toilet are 85% and only 10% of improved latrines although some areas have latrine coverage as low as 12% [7]. The Household Budget Survey (HBS) revealed almost a similar picture on latrines as for the DHS of 2004 -2005. Review by the MoHSW (2005) revealed that only 47% of existing latrines were sanitarily and acceptable, whereas the World Health Organization (WHO) in 2005 estimated that the access level to basic sanitation in Tanzania was47% [8]. *The 2010 DHS report showed a very low improvement on the coverage of improved latrines from 10% in 2004 to 12% in 2010 as shown in Table 1*. It is evident that, about 88% (around 35 million) of Tanzanians use unimproved latrines, the commonest of which is the pit-latrine without a washable slab and open pit which is used by 71.4% of households in rural areas and 49.8% of households in urban areas [12]. *More worrying it has been revealed that 14% of households do not have any form toilet facility (shared or not shared) hence open defecation in the bush/field.*

Table 1: Tanzania's Current Latrine Coverage

Type of latrine/toilet	DHS 2004-2005	HBS 2007	DHS 2010
1. Pour flush	5%	3%	5%
2. VIP	5%	5%	5%
3. Improved pit latrine	-	-	1%
4. Unimproved pit latrine	-	-	66%
5. Unclassified pit latrine	85%	85%	-
6. Shared latrine/toilet	-	-	8%
7. No latrine	5%	7%	14%

Sources: Demographic and Health Survey (DHS) 2004-2005, 2010; Household Budget Survey (HBS) (2007)

Relatively, Tanzania has a high level of household access to basic latrines owing to the legacy of a high profile campaign of the 1970s spearheaded by President Julius Nyerere, although most of these latrines are of poor quality [4]. The sewerage coverage in urban areas in Tanzania is estimated at 17% while the household connection to the sewerage system is about 2% [9]. *Recent surveys have estimated that less than 10 percent of Tanzanians wash their hands after cleaning a babies' bottom, only 40 percent wash their hands after using a toilet, and less than 20 percent wash their hands before preparing meals [10].*

The Millennium Development Goal (MDG) MDG 7 target 7c is to halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation. This requires that 75% of the Tanzanian population has access to improved drinking water and 66% has access to adequate sanitation [11]. In the shorter term, the National Strategy for Growth and Reduction of Poverty (NSGRP) (in Swahili *Mkakati wa Kuinua Uchumi na*

Kupunguza Umasikini Tanzania (MKUKUTA) commits Tanzania to achieving the MDGs for access to safe water, sanitation and a sustainable environment, also set targets for 2010. The targets were to increase proportions of the rural population with access to clean and safe water from 53% in 2003 to 65% by 2010, 79% by 2015 and to 90% by 2025 for the rural population. It also called for increased access to clean and safe water to the urban population to rise from 73% in 2003 to 90% by 2010, to 95% by 2015; and by 100% by 2025. *Review on the MDG progress made, it is evident that sanitation has not made appreciable progress and that Tanzania is off-track to meet MDG target 7c unless there is radical revolution.* The report of the Joint Monitoring Programme (JMP) of WHO and UNICEF revealed that in 2008, only 33% of households in Tanzania had access to improved latrines (34% urban and 31% rural). It was further challenging on the observation that, the estimates were scaled down after considering the acceptable definition of improved sanitation facilities such that in urban areas, 22% of households have improved toilet facilities that are not shared compared with 9% in rural areas [12].

Access to adequate sanitation facilities and hygienic practices are all essential to child survival and maternal health. Diarrhea and acute respiratory infections (ARIs), both influenced by water, sanitation and hygiene results to 40% of underfives deaths globally and 25% of neonatal deaths are due to infections as a result of poor hygiene and unclean delivery environment. *It is reported that, 30 percent of all neonatal deaths in Tanzania are related to infections or diarrhea and yet only 37 percent of all health facilities in Tanzania do not have a client latrine.*

1.2 Aims and structure of the report

1.2.1 Aims of the evaluation

The major aim of this evaluation was to monitor outcome and impact of the MTUMBA sanitation approach within the project districts and possibility for scaling up in other districts. The specific aims of the evaluation were to:

1) Measure the outcome of MTUMBA approach in terms of behavior change and sanitation demand creation
2) Measure the impact of MTUMBA approach in terms of gastrointestinal diseases trend
3) Quantify cost implication of implementing MTUMBA approach per person, household or community.
4) Establish social factor for choice of sanitation and hygiene technologies

1.2.2 Structure of the report

This Final Evaluative Report presents the outputs for the MTUMBA sanitation evaluation. *The evaluation of the MTUMBA approach focused on the assessment of quality, quantity, equity and sustainability of: environmental sanitation and personal hygiene which were measured based on the below listed indicators.*

Table 2: MTUMBA sanitation approach effectiveness indicators and sub indicators

Indicator	Sub-indicators of successful behaviour change
Construction and use of latrines	• Building an improved latrine • Use of latrines • Children washing hands after visiting the toilet • Adults washing hands after visiting the toilet • Safe disposal of children's excreta into toilets or by burying in the absence of toilets • Evidence of latrine use • Clean latrine (no human faeces on the slab) • Drop hole properly covered to prevent access by flies
Hand washing at 4 critical moments	• Hand washing with soap after defecation. • Hand washing with soap after cleaning a defecated child. • Hand washing with soap before food preparation. • Hand washing with soap before eating.
House environment	• No human faeces around
Sustainability of latrine construction bussiness	• CBO Funds in Bank • Active members • Artisans Skills • LGAs – Funds allocated for Sanitation/MTUMBA • Per capital implementation costs of MTUMBA
Sanitation and hygine technologies buy-in	• Prefered or mostly adopted technologoes

Table 3: Methods of assessment for each indicator

Indicator	Sub-indicator	Method of measurement
Construction and use of latrines	Presence of latrine	spot observation with rating in the checklist
	Cleanliness of latrine	structured observation with rating in the checklist
	Evidence of use	structured observation with rating in the checklist
	Status of latrine	structured observation with rating in the checklist
Hand washing	Presence of hand washing place	spot observation with rating in the checklist
	Evidence of use	spot observation with rating in the checklist
	Presence of soap at the hand washing facility	structured observation with rating in the checklist
House environment	No human faeces around	spot observation with rating in the checklist
Sustainability of latrine construction bussiness	CBO Funds in Bank	Review bank statemments/financial records or reports
	Active members	Physical observations of members and interview
	Artisans Skills	Interviews of artisans and spot observation
	LGAs – Funds allocated for Sanitation/MTUMBA	Review district development plans
	Per-capita implementation costs of MTUMBA	Financial anaysic of the implemntation costs
Adoption of sanitation and hygine technologies	Types of sanitation and hygine facilities adopted	Review of report and spot observation with rating in the checklist

This design took into account the indicative questions formed from information provided in table 2 and 3.

Parts of this report include:

i. Executive summary
ii. Introduction
iii. Context of the review (qualitative interview and survey)
iv. Data Analysis (with links to the literature)
v. Findings (including recommendations).

1.3 Hygiene and sanitation participatory approaches

1.3.1 Community Led Total Sanitation (CLTS)

Community Led Total Sanitation (CLTS) is an innovative methodology for mobilizing communities to completely eliminate open defecation (OD). CLTS was pioneered by Kamal Kar (a development consultant in India) together with Village Education Resource Centre (VERC), a partner of WaterAid Bangladesh, in 2000 [14]. Kar advocated change in institutional attitude and the need to draw on intense local mobilization and facilitation to enable villagers to analyze their sanitation and waste situation and bring about collective decision-making to stop open defecation.

In CLTS, communities are facilitated to conduct their own appraisal and analysis of open defecation (OD) and take their own action to become open defecation free (ODF) community. CLTS emphasizes on the behavioral change needed to ensure real and sustainable improvements by investing in community mobilization instead of hardware, and shifting the focus from latrine construction for individual households to the creation of "open defecation-free" villages. CLTS focuses much on raising awareness on the ill-health effects resulting from human feces that as long as even a minority continues to defecate in the open everyone is at risk of disease [14]. On this realization, CLTS triggers the community's desire for change, takes them into action and encourages innovation, mutual support and appropriate local solutions, thus leading to greater ownership and sustainability.

CLTS creates a culture of good sanitation which is an effective entry point for other livelihoods activities. It mobilizes community members towards collective action and empowers them (with knowledge) to take further action in the future. The Water and Sanitation Programme (WSP) of the World Bank is playing an important role in popularizing CLTS in India, Indonesia and parts of Africa. In addition, Plan International, WaterAid and UNICEF have become important disseminators and champions of CLTS. Recently, the Community Led Total Sanitation (CLTS) Workshop conducted in 2011 organized jointly by Plan Sudan and Goal Ireland in cooperation with the government and NGOs in Sudan. Sanitation experts came together and discussed on their experience of why a sanitation project in their area have failed. The workshop came up with two most

important answers; firstly, the absence of community participation, ownership and leadership in these projects, and secondly, the neglect to take into consideration and benefit from local knowledge which led after sometime to the collapse of most of the latrines. *It was revealed by sanitation experts that, "CLTS focuses on igniting change in sanitation behavior rather than constructing toilets .It does this through a process of social awakening that is stimulated by facilitators from within or outside the community. It concentrates on the whole community rather than on individual behavior". CLTS has the advantage of collective benefits from stopping open defection (OD) and can encourage a more cooperative approach. People can jointly decide on how they will create a clean and hygienic environment that will benefit everyone. "CLTS involves no individual household hardware promotion through subsidies and does not prescribe latrine models. Social solidarity help and cooperation among households in the community is a common and a vital element in CLTS hence, it is weak in promoting the construction of quality latrines"*(http://news.sudanvisiondaily.com/details.html?rsnpid=203756).

1.3.2 Participatory Rural Appraissal (PRA)

Participatory rural appraisal (PRA) is an innovative approach that aims to incorporate the knowledge and opinions of rural people in the planning process and management of development projects and programmes. It originates from the activist adult education methods of Paulo Freire and the study clubs of the Antigonish Movement. *In this context, it is postulated that an actively involved and empowered local population is essential to successful rural community development. Robert Chambers, a key exponent of PRA, argues that the approach owes much to the Paulo Freire (Freirian) theme, which advocates that, "poor and exploited people can and should be enabled to analyze their own reality"[14].*

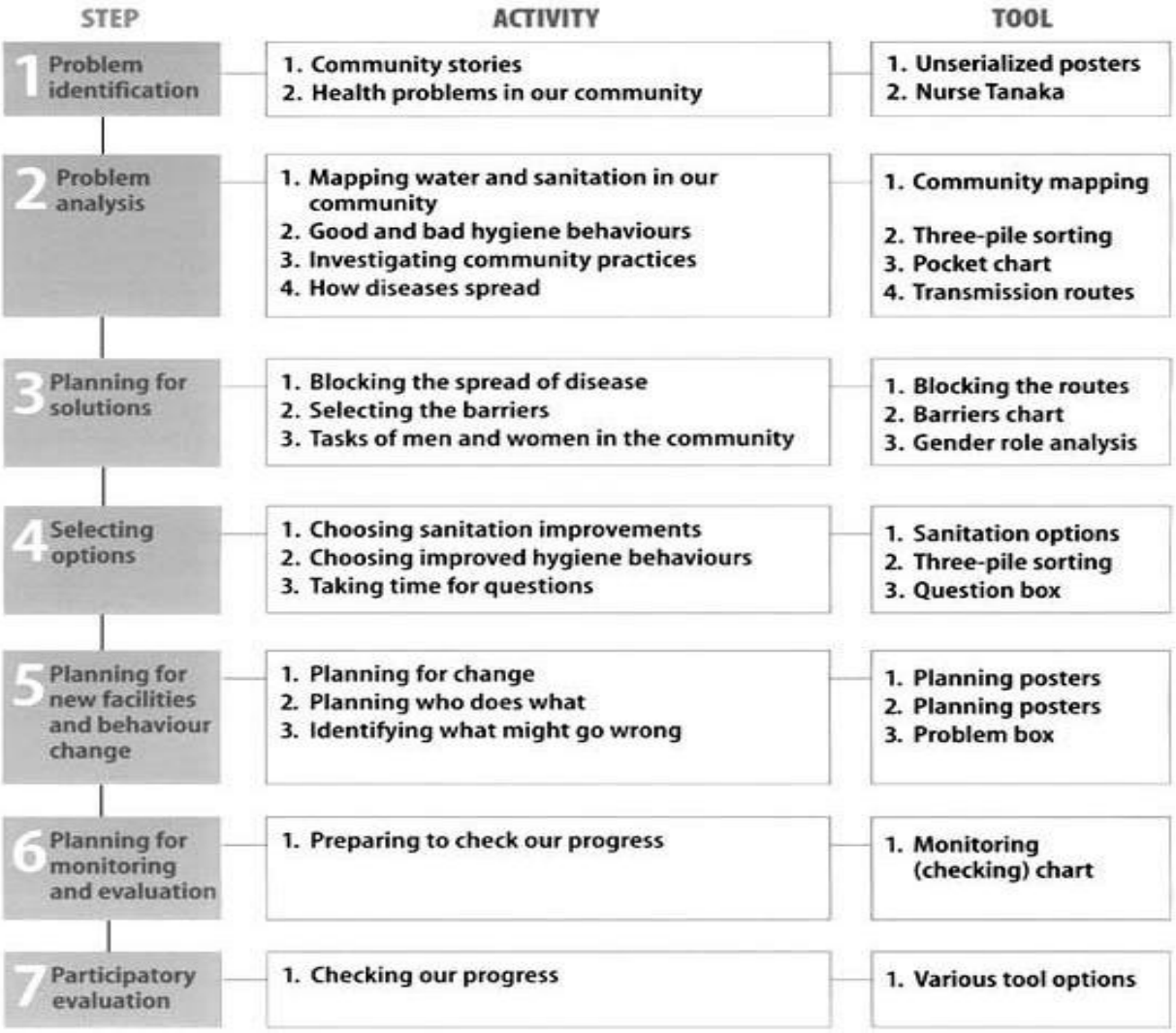
By the early 1980s, there was growing dissatisfaction among development experts on the applicability of PRA in development projects. *The limitations of PRA are associated with its high ability to raise a complex set of expectations in communities which frequently cannot be realized given the institutional or political context of the area. Connected to this, is that the "playing field" in PRA has practically no boundaries and this can make the approach inappropriate for sectorally oriented agencies. The relative lack of outside involvement in a participatory planning process can make this much easier and that poor people in the community might support "community" decisions which will not benefit them at all because they are supported by their wealthier and more influential patrons. The fact that PRA is often carried out with the community as a whole can mean that stratification within the community, whether by wealth, social status, gender or ethnic group, can often be obscured and ignored.*

1.3.3 Participatory Hygiene and Sanitation Participatory (PHAST)

The Participatory Hygiene and Sanitation Transformation (PHAST) methodology is an adaptation of the self-esteem, associative strengths, resourcefulness, action-planning, and responsibility (SARAR) strategy developed during the 1970s by Dr Lyra Srinivasan and colleagues for a variety of development purposes [13]. PHAST methodology is based on

participatory learning, which builds on people's innate ability to address and resolve their own problems. It is intended to empower communities to manage their water and to control sanitation-related diseases, and it does so by promoting *health awareness and understanding* which, in turn, lead to environmental and behavioral improvements. PHAST utilizes methods and materials intended to stimulate the participation of women, men, and children in the transformation process. PHAST relies heavily both on the training of extension workers and on the development of graphic materials (tools kits) that can be modified and adapted to reflect the actual cultural and physical characteristics of communities in a particular area [14]. The production of PHAST materials therefore requires trained artists as well as trained extension workers.

Figure 1: PHAST seven steps to community planning for the prevention of diarrhea disease



Source: WHO/UNDP-World Bank Water and Sanitation Program, 2000 [15]

1.4 PHAST implementation and progress made in Tanzania

PHAST was introduced in Tanzania in 1997 by the Ministry of Health and Social Welfare (MoHSW) in collaboration with UNICEF through a 3 week training for a number of districts

and NGOs hygiene and sanitation promoters. The training was facilitated by the Network for Water and Sanitation (NETWAS) Nairobi and more than 80 out of 112 districts were reached in eight years. *PHAST was introduced as an approach to health promotion that was intended to focus on community participation and capacity development rather than health messages.* However, the degree of implementation and coverage varied considerably from one district to another. Full coverage was attained in Magu, Mbarali, Kilosa, Mtwara rural and Hai districts. Other districts managed to implement at varying levels of coverage. Recent evaluation by the National Institute for Medical Research (NIMR) revealed a number shortfall shown in box 1 below. Such shortcomings are considered to compromise the sustainability and scalability of PHAST in poor communities [4].

BOX 1: IDENTIFIED PHAST SHORTFALLS

- ***PHAST is relatively costly in terms of running trainings at all levels***
- ***The outcomes have not been apparent in terms of behavioral changes and improvements in sanitation facilities at community level (Messages conveyed but not linked to sustainable behaviour change)***
- ***The disease – behaviour link is not compelling as people's hygiene practices are determined by multiple, not single, triggers***
- ***Bulkiness of the tools that did not support easy facilitation***
- ***Approach did not indicate the follow-up actions after the communities have developed action plans or after demand creation for improved sanitation facilities and hygiene behaviors***
- ***Lack of incentive/compensation for trainers***
- ***Disjunctive relationship at district level of the departments jointly implementing PHAST (no joint plans, monitoring and evaluation, reporting) hence limited resources for district, ward and village plans.***
- ***PHAST activities not being adequately included in the district comprehensive council plan and therefore not given fund for implementation of planned activities.***
- ***Competition rather cooperation was identified between health and water departments on issues of water, sanitation and hygiene.***

Thus the NIMR evaluation concluded that, PHAST that was carried out in Tanzania for over 8 years, was found to be effective at conveying key health messages but not so effective at invoking the all important improved hygiene behaviour change. PHAST set of steps takes communities to the point where behaviour transformation might be possible and then abruptly stops due to weak commitments by the districts to continuously activate and sustain the desired health transformations. Furthermore, PHAST approach in its present form was revealed not to be working effectively; a minimum, affordable, acceptable, doable PHAST package which is harmonised with different approaches is needed. Thus, the need to improve on these shortfalls made the Ministry to organize a workshop to review the approach and came-up with Revised PHAST Approach for cholera, trachoma, schistosomiasis and intestinal worms' prevention and control.

1.5 MTUMBA sanitation approach

Following PHAST limitations as identified and the recommendations put forward by NIMR [4], WaterAid Tanzania and her partners convened in September, 2007 at MTUMBA village in Dodoma to review different participatory approaches used in the promotion of hygiene

and sanitation in the country. The workshop deliberated and ironed out strengths and weaknesses of various participatory approaches implemented in the country and finally used the strengths to form an approach that would be effective with particular emphasis to Tanzanian context. The meeting finally came up with MTUMBA Sanitation and Hygiene Participatory Approach, named after the MTUMBA village in Dodoma region in Tanzania. Basically, the workshop reviewed the weakness of a number of approaches, proposed changes (*demand creation through sanitation marketing with households (consumers) triggered to invest on sanitation improvements using locally available materials and own financial resources*) and then tested these in three districts.

In principle, MTUMBA Sanitation and Hygiene Participatory Approach draws on the strengths of PHAST, community led total sanitation (CLTS) and participatory rural appraisal (PRA) tools. The MTUMBA approach is an amalgamation of modified tools from PHAST, CLTS, and PRA and as well adapted them to the Tanzanian context. These are triggering, transect walk and community planning. In this approach a wide range of latrine options are displayed in sanitation centres. The different latrine options at the centre are targeted to meet community's preferences and needs derived from community opinions and propositions on latrine construction during the village meeting. The MTUMBA approach focuses on community involvement through participatory planning, implementation, monitoring and evaluation. *Hence, MTUMBA was purposively conceived to overcome the weaknesses noted with PHAST, CLTS and PRA by anchoring on quality, quantity, equity and sustainability as key pillars (box 2).*

Box 2: PILLARS OF MTUMBA SANITATION APPROACH

- ***On quality it aims at increasing the latrine standards.***
- ***Latrine promotion for Tanzanian situation should now focus on enabling households to have improved latrines and not any type of latrine.***
- ***On equity MTUMBA focuses on ensuring that appropriate types of latrine are available in every household/institutions to serve all including the vulnerable people such as elderly, disabled and small children.***
- ***The approach requires a baseline survey at community level to understand sanitation status, extent and type of disabilities and problems they encounters before design is made.***
- ***The sustainability aspect is about empowering community to continue accessing improved latrines even after the project tenure.***

The MTUMBA approach uses the village meeting to identify and select sanitation artisans and hygiene animators to be trained on 'Mtumba Sanitation and Hygiene Participatory Approach', then followed by the construction of a sanitation centre in each ward, the setting up of formal latrine construction community based organisations (CBOs), providing entrepreneurship skills and opening of banck accounts. Artisan CBOs namely KIWAMA (Nzega), KIMAUUVYOM (Iramba) and Geme (Mbulu) was established in the pilot areas. Hence, *MTUMBA sanitation approach is targeted to achieve its goals through capacity building in*

terms of skills development of the district sanitation team/department, community based artisans and animators, lobbying for the District Health Department to adequately budget for Sanitation and include the same in the Council Comprehensive Health Plans (CCHP). The approach focuses on empowerment of the district team to continue promoting latrine construction and use even after the project has ended. In addition, the approach also targeted to empower the community to continue taking individual and collective actions to ensure latrine construction and use of its members even after the project has ended. There are five key steps that are used for the implementation of the MTUMBA approach as provided in Table 4 below.

The MTUMBA implementation process starts by entry and introduction to local government authority (LGA), training of the district sanitation team and then collection of baseline data. At ward and village level, the process starts with triggering meetings and transect walk followed by village wide discussion to fight open defecation and improve latrine construction in their community. The meeting resorts to action planning, making plan for implementation and monitoring and evaluation. The MTUMBA process also provides for the community selection of artisans and animators who later receives training and become community resource in the promotion and assistance in the construction of improved latrines in the village.

Table 4: MTUMBA approach implementation steps

STEPS	PARTICULARS	ACTIVITIES
Step 1	Entry into the District, Ward and Village	• Introduction of intervention to LGAs and community leaders • Collection of baseline information • Conduction of triggering meetings • Selection and training of artisans, animators and a sanitation committee
Step 2	Community planning	• Community decision to address poor sanitation • Community and individual households make choices of latrine technologies displayed at the sanitation centre. • Community and individual households decides based on affordability on locally available materials to use and as per their cultural values.
Step 3	Implementation of community action planning	• Formation of a hygiene and sanitation committee • Training of a hygiene and sanitation committee • Formation of artisans and animators groups • Construction of a sanitation centre • Identification of early adoptors
Step 4	Participatory monitoring	• Monitoring of progress against the community action plan
Step 5	Participatory evaluation	• Community members review and discusses sanitation changes and coverage • Community discusses differences between what was planned versus achievement • Community discusses problems faced, challenges, opportunities and way forward for sanitation improvement

The MTUMBA approach was piloted in three districts in Mambali (Nzega), Mtoa (Iramba) and Masieda (Mbulu) – covering 13 villages with a total population of 54,081 under the Irish Aid (IA) Rural Sanitation Project support from March 2008 to March 2011. The MTUMBA approach has been focusing on sanitation and hygiene promotion, demonstration of sanitation facilities and latrine construction in the three wards. The MTUMBA sanitation approach has a number of similarities and differences with PHAST, CLTS and PRA approaches as summarized in table 5 below.

Table 5: Similarities and differences of PHAST and MTUMBA sanitation approaches

	PHAST	MTUMBA	PARTCIPATORY RURAL APPRAISAL	CLTS
Target groups	Community	Community	Community	Community
Action planning	Utilizes pictures for community planning.	'Triggering' is used to initiate community action by exposing them to a disgusting, annoying or shameful situation about open defecation. It also uses pictures to link open defecation to health problems in their community.	Facilitate an open dialogue by sharing knowledge and enables local people to undertake their own investigations, analyses (ignition), presentations, planning and take action	Transect 'triggering' walk is used to ignite the community action by exposing them to disgusting/shameful open defecation sites, facilitate them to conduct their own appraisal and analysis of the situation and take action to become open defecation free (ODF).
Mapping of defecation sites/facilities	Reveals defecation and water facilities in the community.	Reveals open defecation sites and status of latrine at household level through transect walk and village register.	Reveals open defecation sites and status of latrine at household level through a transect walk.	Reveals open defecation sites through a transect walk.
Application	Appropriate for urban and rural areas.	Appropriate for urban and rural areas.	Appropriate for urban and rural areas.	Appropriate for urban and rural areas.
Technology	Uses sanitation, water and house ladder. Encourages incremental improvement and usage of sanitation facilities.	Demonstrate improved latrine options and encourage communities to construct improved or improve existing latrine facilities and increase their use in the long term.	Encourage community members to innovate freely with their own designs of latrine models.	CLTS is focused on igniting a change in sanitation behavior rather than constructing latrines. There is no any latrine technology which is promoted.
Promotion on construction of improved latrine	PHAST encourages latrine construction and use disregard the quality of latrine.	MTUMBA is effective in empowering artisans on constructing and promoting the construction of quality latrines. It creates demand for quality latrines.	PRA is encouraging community members to freely construct latrines of their choice disregard the quality.	CLTS discourages open defecation and encourage latrine construction disregard the quality. It is weak in promoting the construction of quality latrines
Sustainability	Community empowerment is by selection and training of community owned resource persons (CORPS). It facilitates the development of action plans at community level (Bottom – up). It advocates on the establishment of village building brigades for sanitation facilities.	Capacity building by selection and training of the animators and artisans groups is emphasized. The training focuses on entrepreneurship and establishing of Sanitation centers. It also encourages community and local government authorities (LGA's) to monitor and provide advisory support and incorporate in the comprehensive council health plan.	Capacity building by selection and training of field staff, partner NGOs, local government authority, community resource people and village leaders in the approach and so that local actions are initiated by the community and undertaken by the community.	Capacity building by selection and training of facilitators, NGOs, local government authority, community resource people and village leaders to take continuous action.

2.0 METHODOLOGY

2.1 Study Design

A cross-sectional qualitative and quantitative design was adopted in the study. Participatory method involving different stakeholders at ward level whereby triangulation of techniques including interviews, observations and focus group discussions (FGDs) as well as desk review of existing data in the district was used.

2.2 Study Areas

The study was carried out in the MTUMBA Sanitation Approach piloted wards of Masieda in Mbulu, Mtoa in Iramba and Mambali in Nzega districts in Tanzania.

2.3 Sample size

Based on 2002 Population and Housing Census Report, the mean population for Mbulu, Iramba and Nzega districts is 122,072 persons. A household for statistical surveys has a special meaning. It is defined as a group of persons who usually eat together and share some common living arrangements. For this survey, the estimated average number of persons per household in rural areas was 5.7. The targeted study population is the proportion of heads of households and needed to cover 50% of them that it gives the higher sample size per district. Using the WHO Sample Size Determination in Health Studies (Version 2) software, the sample size was calculated with the following parameters:

- Anticipated population proportion (P) = 50%
- Confidence Interval (1-α) =95%
- Power of statistic (1-β) = 0.80
- Absolute precision (d) = 5%
- Population size N = 122,072

Equation (Formula)

$$\text{Sample size n} = \frac{Z^2_{1-\sim/2} P(1-P)N}{d^2(N-1) + Z_{1-\sim/2} P(1-P)}$$

Since N was large then the sample size was approximately

$$n \cong \frac{Z^2_{1-\sim/2}\, P(1-P)}{d^2} \cong \frac{(1.96)^2 * (0.5)(1-0.5)}{(0.05)^2}$$

$$n \cong 384$$

In order to accommodate the missing data and some errors 4.7% of the sample was added and thus the sample size estimated to be 400 households in each study ward in the districts. The sample size for the 3 wards in three districts was calculated at 1,200 households covering an estimated population of 6,840. Households were randomly selected from each ward in the districts and at least one head of household from each selected household was interviewed.

2.4 Sampling procedures

Each study ward was stratified into its constituent villages as clusters, whereby four villages were selected randomly using a blind picking lottery. Systematic sampling used to select a total of 75 study households from each selected village divided equally into the constituent hamlets.

2.5 Data collection on knowledge, attitude and perceptions of households on environmental sanitation and personal hygiene

Enumerators were selected on the basis of having a minimum of form IV education whereas previous experience in household survey was an added advantage. The selected enumerators were trained on research ethics, ethical conduct in conducting household survey and data collection techniques. After the training, the enumerators were involved in the pilot data collection exercise in Mvomero district in Morogoro region. After the piloting, the semi-structured interview questionnaires and observational checklist were refined and used to collect data from households with the aims to:

1) To establish social, economic, gender and geographic factors associated with construction and usage of latrines in the survey districts.
2) To identify social, economic, geographic, environmental and behavioral factors associated with hand washing practices at critical times.
3) Identification of the available latrine options, coverage and utilization in the project area
4) To assess the operation and maintenance aspects of latrines and hygiene facilities
    a. latrine structural condition
    b. hygiene and cleaning facilities
5) To identify social, economic, geographic, environmental and behavioral factors associated with hand washing practices after defecation.
6) Household survey to determine the number of household members with diarrhea in the past 14 days
7) Ward health data on diarrhea and other water related infections was collected from the district health management information system (HMIS), annual district health report and the comprehensive council plans.

2.6 Interviews with water, sanitation and hygiene stakeholders implemented programs in the study areas

Interviews were conducted with local partners namely; Local Government Authority for Nzega, Iramba and Mbulu districts and the CSOs involved in the previous Sanitation programs *viz.* IrishAid rural project notably SEMA for Nzega, HAPA for Iramba and DMDD for Mbulu. Data were collected on the approaches used, coverage, and impacts on human health, behavior change and its sustainability, programs costs per person and per household and program sustainability issues. Interview with artisans CSO formed in the project villages; information were carried out to collect data on their business model, cost charged

for construction of various types of latrine facilities, profit, bank accounts and money available.

2.7 Cost analysis of implementing MTUMBA approach per person, household or community

MTUMBA activities included: community entry at district, baseline surveys and desk review, ward and village levels; triggering, community planning meetings, empowerment of communities on latrine designing and construction which include; training of artisans and animators, facilitate formation of artisans CBOs, construction of sanitation centres as display points for sanitation marketing, community mobilization and re-triggering. Other activities involved are development of IEC/BCC materials and training of MTUMBA TOTs from implementing partners and LGAs. Based on these inputs cost analysis was done to estimate costs per person at household level for implementing MTUMBA approach.

Cost analysis was conducted by classifying costs as either economic or financial. Economic costs were collected and analyzed to reflect the opportunity costs of resource use. Financial costs on the other hand only considered expenditures incurred in the purchase of items or their current scrap values. Costs were further classified as capital or recurrent. Capital costs included such items as buildings, equipment, furniture and vehicles/motorcycles whose useful life was estimated to be one year or more. In this case, even personnel's long-term-training of one year or more would have been treated as capital costs. However, we in this case, did not have a single case of long term training among personnel who were involved in implementing the activities of MTUMBA sanitation demonstration centres.

Recurrent costs included such items as personnel (salary, allowances, bonuses etc), supplies, buildings' maintenance costs, vehicles/motorcycles operations costs, and short term training of artisans and animators . Any other items which had a life span of less than one year and which did not cost more than 100$ (or Tanzanian Shillings equivalent) were treated as recurrent notwithstanding their seemingly 'capital' nature. Physical counting of all capital items such as furniture and vehicles/motorcycles/ buildings/ demonstration toilets etc. was done to ascertain the exact number and their current condition. Only items which were functional or used were included for costing. In consultation with district coordinators and in-charge of demonstration centres, costs of buildings were estimated by reviewing existing official documents. Where such costs estimates were not available from the official documents, floor space of the buildings were measured physically and their current market values in respective localities, and thus cost, were estimated.

Capital costs were annuitized in order to take into account the fact that such resources are bought in one year but their useful life span over several years (Drummond *et al,* 2005). The annuitized financial costs of capital items were calculated using a straight line depreciation method whereby an item's total cost was divided by the length of its useful life years. Based on how long an item has been in use since it was purchased, the answer from the depreciation calculation was deducted from the purchase price or its current estimated

value. Economic costs of capital items were calculated based on 13.5% official (Average official interest rate as of December 2010) (Bank of Tanzania, 2011). Buildings used as demonstration centre offices were assumed to have a useful life of 30 years while the useful life of other capital items such as equipment were varied based on recommendations on costs and prices used in the "World Health Organization's Choosing Interventions that are Cost-Effective (WHO-CHOICE) analysis" (WHO, 2003). All costs were estimated from the provider's point of view/perspective.

2.8 MTUMBA approach Study respondents

Study respondents were categorized as shown in the table below:

Table 5: Categorization of study respondents

Data collection techniques	Source of data	Targeted respondents per site	Coverage
Household survey	Head of households	400	1,203
Focus Group Discussions (FGDs)	Community members in sanitation centres (both women and men)	Two FGDs-community members	50
In-depth Interviews	Implementing partners, MTUMBA District Focal Persons	Two	6
In-depth Interviews	Ward & Village leaders	Three	9
In-depth Interviews	Artisans & Animators	Five	14
In-depth Interviews	National level Water & Hygiene Focal Persons	Two	07
Total			**1,291**

2.9 Data management

Data Management at NIMR is fully computerized. Prior to data entry, a data entry screen was created considering all instructions as stipulated on the respective survey forms followed by orientation of the data entry clerks.

Data was managed through the Data Processing Unit (DPU) with one work station linked to a Database Server. The server keeps a copy of data from the DPU as well as acting as a back-up for work completed at individual work stations within the building. The DPU use double entry system for data entry and the Software in use are Epinfo, and Microsoft Access. These softwares are programmed to checks and controls for common mistakes. The programs provide data dictionary and batch editing facilities. Analysis work was done using statistical software named; Stata (Stata Co-operation, College Station, Texas, USA).
All forms were double entered and verified (compared) using EPI-Info software. STATA was used in analyzing entered data. Qualitative information from the districts was analyzed manually.

2.10 Ethical consideration

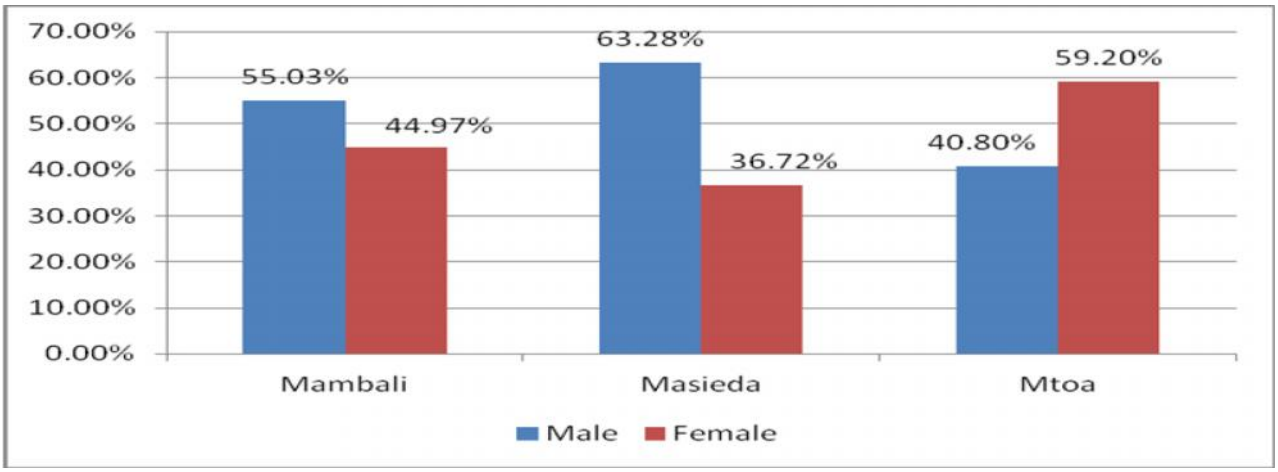
Ethical clearance to conduct the study was sought from the National Medical Research Coordinating Committee at the National Institute for Medical Research. Participation in this study was absolutely free, consent to participate in the study was sought from each head of household.

3.0 RESULTS AND DISCUSSION

3.1 Socio-economic characteristics of the surveyed households

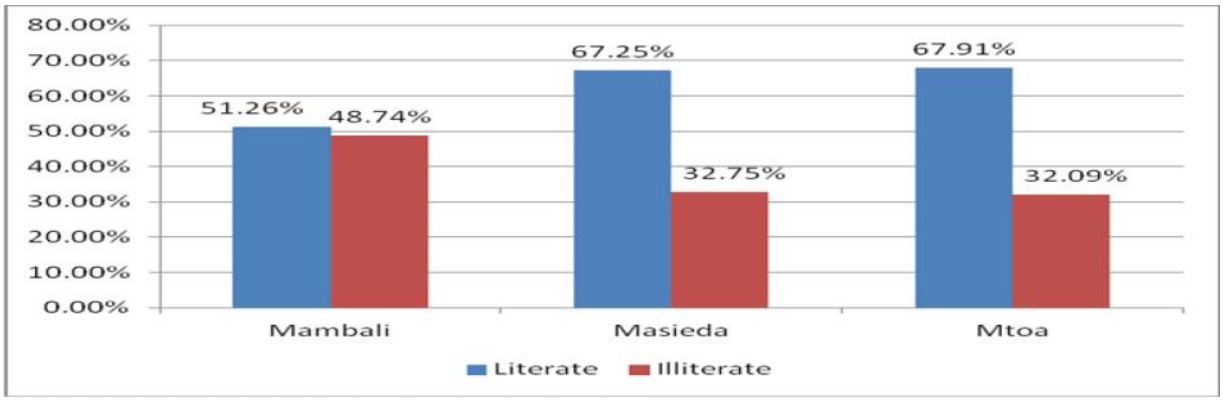
Appendix 1 and 2 presents demographic and socio-economic characteristics of respondents surveyed per study districts in detail. Overall, the household questionnaire was administered to total number of 1,203 respondents this being 398 respondents in Mambali ward, 403 in Masieda ward and 402 in Mtoa ward. Majority of respondents in the three districts were men (53.03%) as shown in figure 1. Although the number of respondents varied from one district to another, in Iramba district the survey covered more females', 238 (59.20%) as compared to men.

Figure 1: Gender distribution of respondents in the surveyed districts



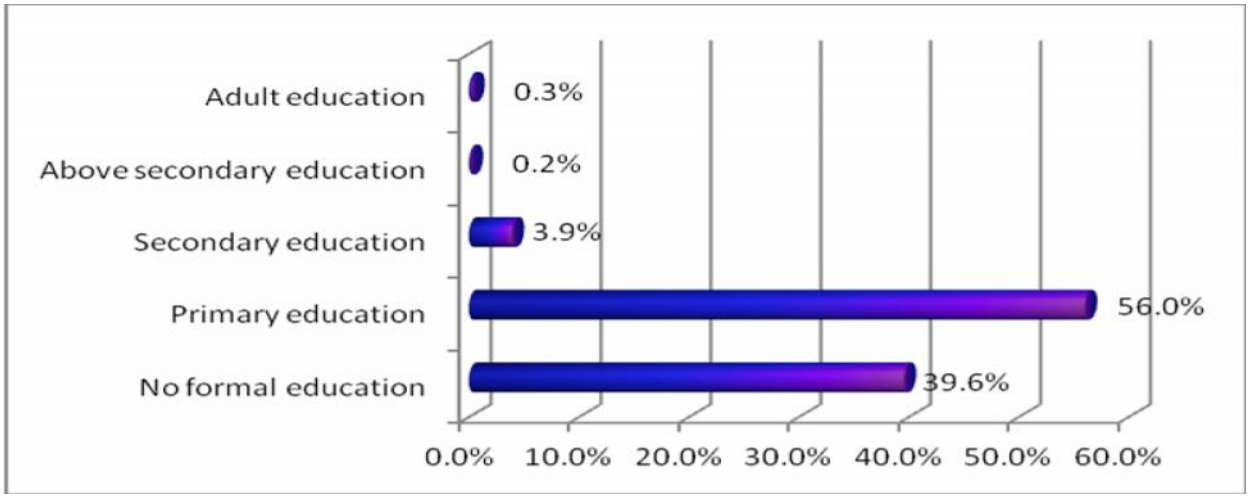
The mean age scores of the respondents ranged from 37.8±11.9 in Mambali ward, Nzega to 40.1±14.4 in Mtoa ward in Iramba district. During the survey it was found that, majority of the respondents were married (84.21%). There were few single led households (6.48%) whereas some other few were cohabiting (2.99%), widowed (3.99%), divorced (1.33%) and separated (1.33%). The overall literacy level of the respondents was 62.18% which ranged from 51.26% in Mambali ward in Nzega, to 67.91% in Mtoa ward in Iramba district as shown in figure 2. There were more respondents who cannot read and write in Mambali ward as compared to those in Masieda and Mtoa wards.

Figure 2: Literacy level of respondents in the surveyed districts



The large majority of respondents have primary school level education (56.03%) whereas the second large majority of the respondents (39.57%) have no formal education (Figure 3). Very few of the respondents have secondary education (3.91%), adult education (0.33%) and those with above secondary education (0.17%).

Figure 3: Education level of respondents in the surveyed districts



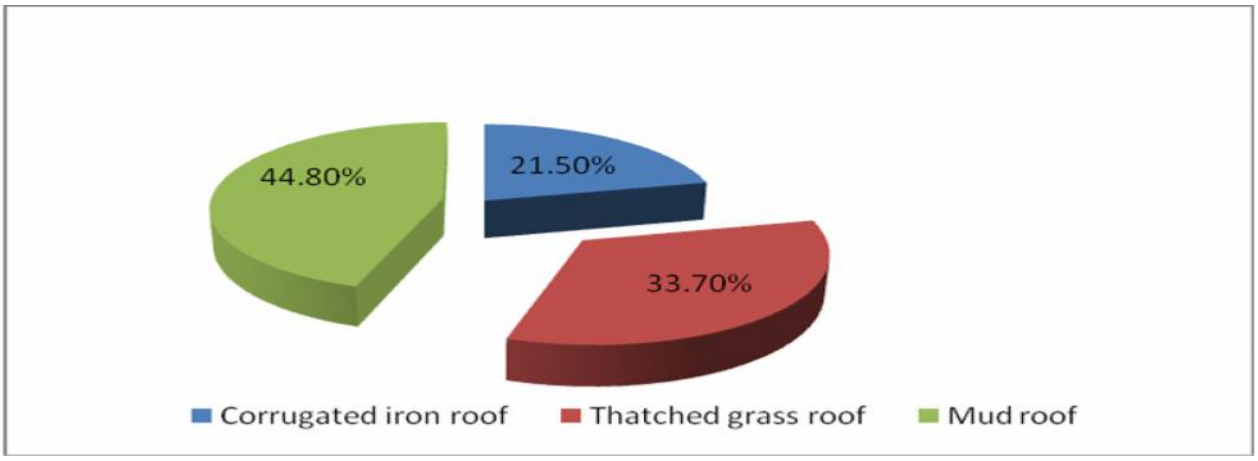
Majority of the respondents in Mambali ward in Nzega (67.09%) and Mtoa ward in Iramba (80.85%) are subsistence farmers, growing primarily maize, millet, sorghum, rice and groundnuts, and they engage in income-generating activities such as gardening, raising livestock, and growing sunflower and cotton. On the other hand, majority of respondents in Masieda ward in Mbulu district (72.46%) are engaged in agriculture and animal keeping. Very few of the respondents (2.23-3.73%) are engaged in petty businesses. Majority of the surveyed households were raising chicken, cows, goats, ducks, donkey and pigs as source of income and meat for the households. On ownership of assets it was revealed that, majority of the houses in the surveyed districts are being owned by the households (95.84%). Some of the households own radio (58.19%), bicycles (56.28%) and cell phones (41.73%). Other assets owned by very few households are TVs (2.41%), motorcycles (4.16%), cars (2.49%) and solar system (3.66%).

During the focus discussions in the three surveyed wards it was consistently revealed that, men are financially responsible for the family, although women may partake in small income-generating activities and keep this money for themselves. In terms of household duties, the men are responsible for providing food, shelter, clothing, health care, construction of latrine and education, whereas women are responsible for raising the children, cooking, cleaning, and collecting water.

The mean household size in the surveyed wards was found to be 6.7 persons. The large mean household size was found in Masieda with 7.4 persons. Most of houses in the study areas are made of mud bricks or mud and sticks. Most of them have walls plastered with mud. Most of the roofs are made of mud (44.80%), followed by thatched grass (33.67%). The

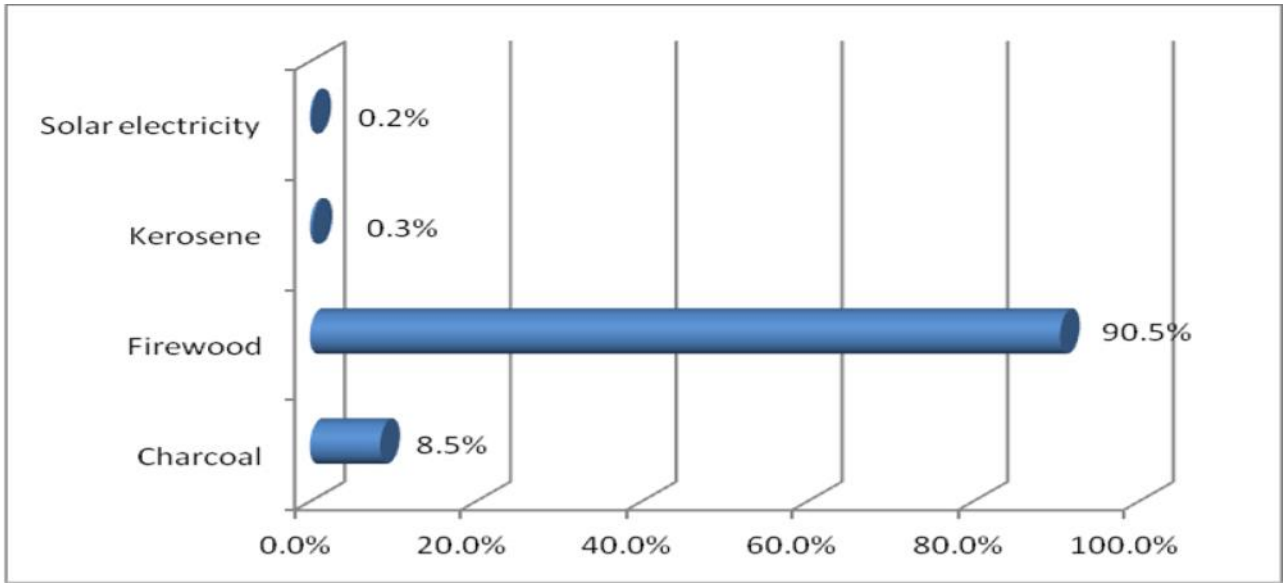
houses of wealthier households are of mud bricks and they are sometimes made with cement bricks with corrugated iron roofs (21.45%).

Figure 4: Roofing materials of respondents' houses in the surveyed districts



Most of the households in the study areas are using firewood (90.52%) and charcoal (8.48%) as their main source of energy for cooking. Minor sources of energy mentioned included solar electricity (0.17%) and kerosene (0.33%) as shown in figure 5.

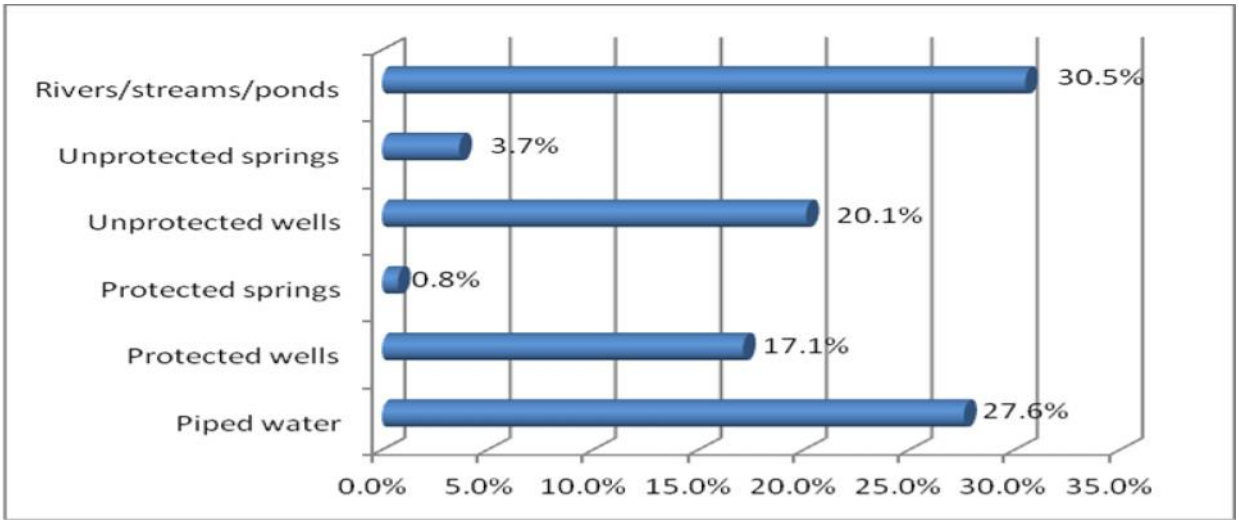
Figure 5: Source of energy for cooking used by respondents' in the surveyed districts



The six major types of water supplies that exist in the study areas are tap/piped water, protected wells, protected springs, unprotected wells, unprotected springs and rivers/streams/ponds (Figure 7). Twenty two of the surveyed households (1.83%) reported to collect water from the sources they own, five of the households (0.42%) collect water from sources owned by their neighbors whereas the large majority of households (95.76%) collect water from community owned sources. Majority of the respondents (30.51%) reported to collect water from rivers, streams and ponds. The second major source of water serving

27.60% of the respondents is piped water. Unprotected wells also reported to serve another large majority of the households (20.12%) and unprotected springs (3.66%). Protected wells were rare in the surveyed areas forming only 0.75% of the main sources of water for domestic purposes.

Figure 6: Major sources of water for domestic purposes used by respondents' in the surveyed districts



It is well known that, during the rain season, runoff water carrying many forms of debris from the surrounding area flows into the unprotected wells, rivers, ponds and streams contaminating as well as increasing contamination of water. The water-logged ground surface surrounding the openings of many of these water sources are a source of contamination from the feet of humans or animals that visits the surrounding water bodies.

The relationship between socio-economic differentials and health status in developing countries has been documented in several previous studies (Mwageni et al., 2005). In general the poorest are below average in most of the items or services to which the better off have access. In terms of asset ownership in the Mwageni et al., study, 12% of the poorest have a bicycle compared with 55% of the least poor, four times more. The same applied for radio, sofa, mattress and wardrobes. Thus, as expected, the better off are likely to own more assets than the poorest. Like asset ownership, housing conditions tend to reflect the economic status of the household. A similar pattern is noted for the sources of energy for cooking and sanitation (Mwageni et al., 2005). Households that ranked lower in the index are more likely than the better off to use firewood and water from unsafe sources.

3.2 Awareness about MTUMBA sanitation approach in the study sites

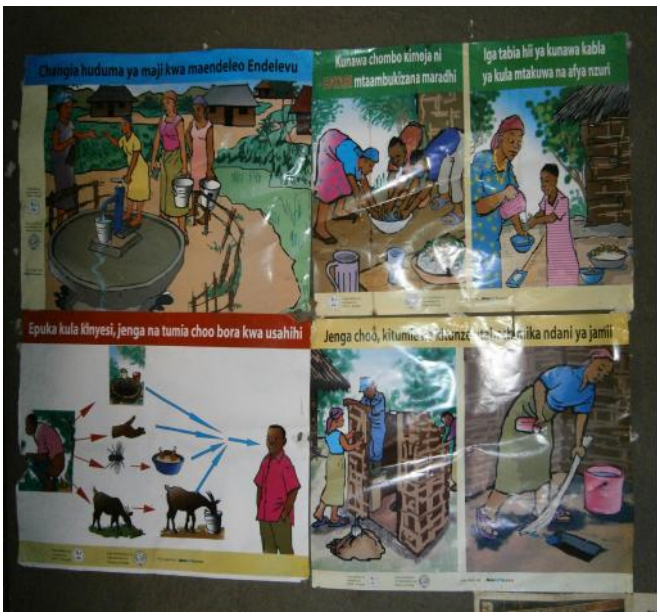
Ever since in the implementation of MTUMBA approach in the piloted areas the word MTUMBA was used, respondents were asked if they know MTUMBA and what it means to them. Our findings revealed that, majority of the community informants in the visited households (80.38%) as depicted in appendix 3 and the key informants in the focus groups

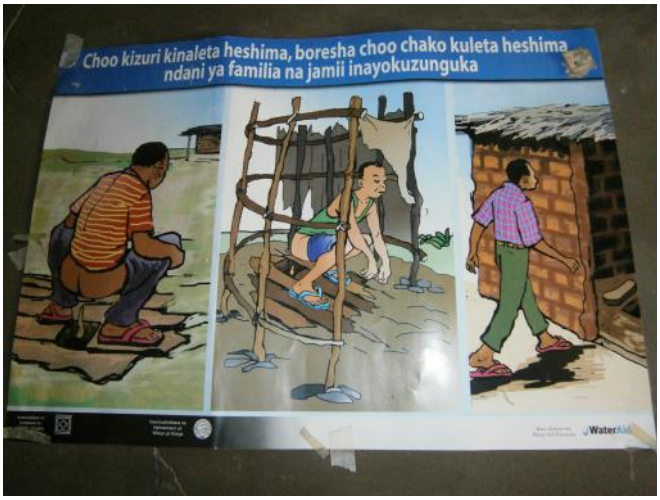
discussions were aware about the MTUMBA approach and were able to outline the approach differentiating it from other approaches.

Similarly, the respondents were also asked on who and how the MTUMBA approach information reached them. *In response to the question, the informants identified their village leaders, artisans and animators and the organized village meetings as they were instrumental in informing and spreading the information about the MTUMBA approach in their communities. The sanitation centre was identified by majority of the informants as the centerpiece of knowledge about improved latrines, designs, construction costs and approaches based on different locally available materials. Triggering meetings conducted by hygiene and sanitation partners: Sustainable Environmental Management Action (SEMA) and Health Action Promotion Association (HAPA) in Mtoa ward in Iramba district and Mambali ward in Nzega district; and Diocese of Mbulu Development Department (DMDD); were also identified as being key in the sensitization, awareness and demand creation to adopt MTUMBA sanitation approach.* It was further explained that, the MTUMBA approach trained animators and artisans were moving from household to household to inform and offer explanations on the importance of improved latrine construction and use, the use of safe water for drinking and bathing, hand washing after visiting latrine and the known health gains associated with such a behavior change.

Informants in the visited households explained on how they were informed and showed fliers, brochures and posters available in their households which they received during the MTUMBA approach training as well as those distributed to the households by animators and artisans (Figure 7). The informants were able to provide a clear description of the pictures and explained on the health message depicted.

Figure 7: MTUMBA educational posters found in respondents' houses in the surveyed districts





Generally, at all levels informants were aware with the MTUMBA approach and majority was able to provide a clear description of the approach. All Key informants demonstrated awareness about MTUMBA approach as they were able to give out clear description and associated reasons for its introduction. The reasons provided partly address the weaknesses of other approaches of improving hygiene and sanitation, namely PHAST, CLTS, and PRA as depicted below;

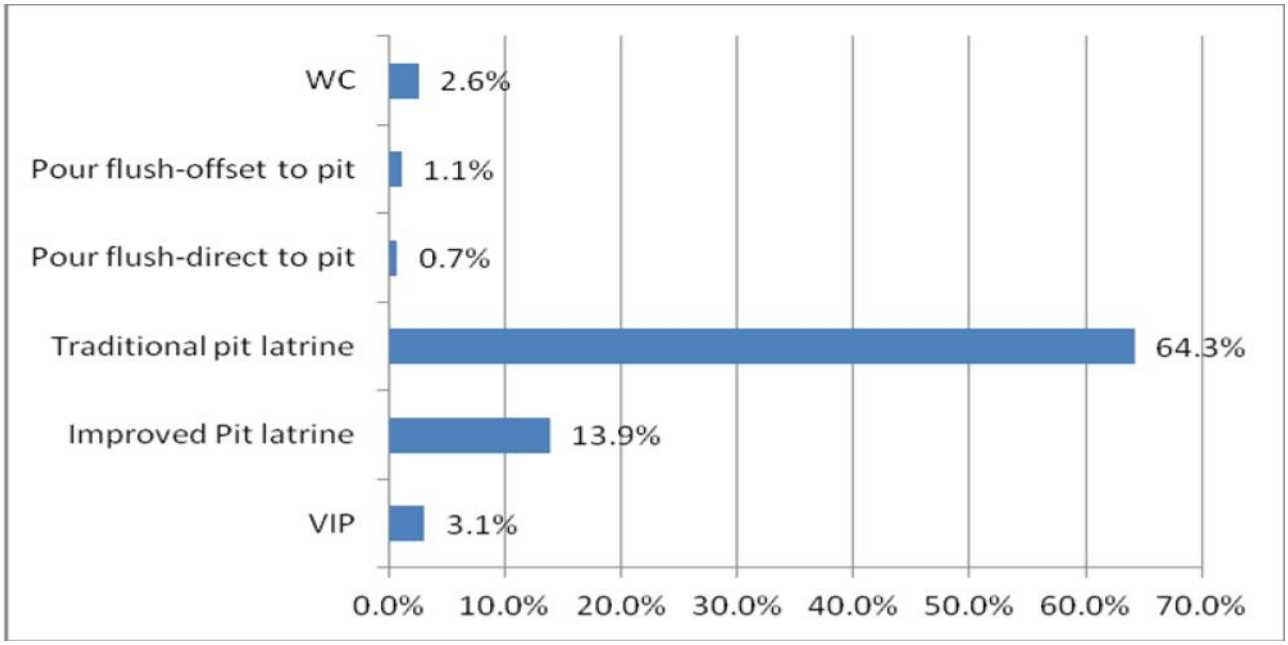
> *"There are many approaches of hygiene and sanitation tried before the establishment and implementation of the Mtumba approach…All these approaches have not managed to take us somewhere in improving sanitation and hygiene especially in rural areas"* from water and hygiene focal person national level interviews, Dar es salaam.

> *"The main reason for introduction Mtumba approach was to compliment other approaches. Mtumba approach is short, simple, use minimum resource in terms of cost and use of locally available materials"* implementing partner from Singida site.

3.3 Sanitation facilities in the surveyed households

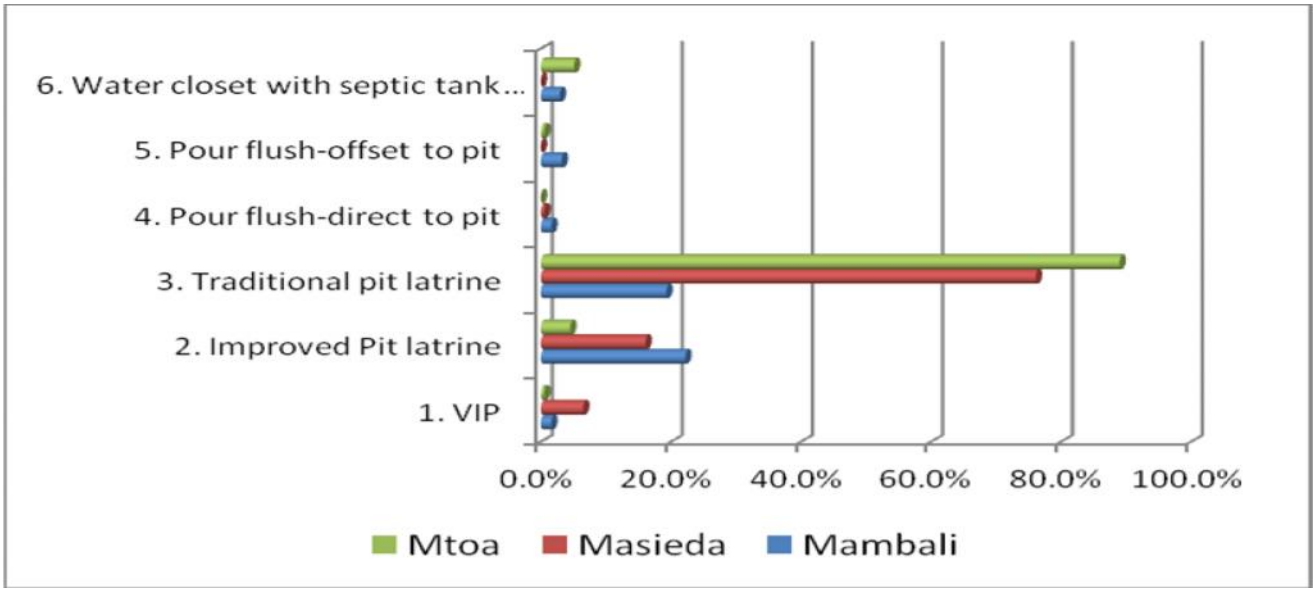
The commonest sanitation facilities observed in the surveyed households are the pit latrines which were present in an overall of 1,083 (90%) of the surveyed households (Appendix 4.1). A total of 120 (10%) of households were found to have no any form of latrine. Traditional pit latrines constituted 64.3% of all latrines constructed in the surveyed households as shown in figure 8. Construction of ventilated improved pit latrines (VIPs) (3.1%), improved pit latrines (13.9%), pour flush latrines (1.8%) and water closet (2.6%) making a total of 21.4% were observed in some of the surveyed households. It is interesting to note that, the observed percentage improvement went from 0% in 2007 to 21.4% in 2011 which is higher than the national average of 12% (DHS, 2010).

Figure 8: Overall percentage of latrine options constructed by households in the surveyed districts



The coverage of latrines ranged from 78.1% in Mambali ward in Nzega district up to 98.8% in Masieda ward in Mbulu district as depicted in figure 9.

Figure 9: Overall percentage of latrine options constructed by households in the surveyed wards



A traditional pit latrine is typically a hole dug in the ground, with a cover slab made of wood, mud overlaying the wood, and a superstructure built from locally available materials for privacy (Figure 10). Our findings revealed that in most cases the pits are shallow, the superstructures are of temporary materials and most of the latrines not roofed hence allow a lot of light in, the slab is simply of mud or wood floor, and a cover plate is not used, in general majority of the latrines were not clean. During our

observations we found that most of the pit latrines are open pits that smell bad and had visible breeding areas for flies. It was evident that, a pit latrine that is very shallow or full, with the contents very close to the drop hole, smelled badly. It was also evident that, the wood and mud floor observed in traditional pit latrines are difficult to keep clean, the floor that is not clean and does not allow water to flow and drain away is unhygienic, unsanitary and provides for a favorable breeding ground for flies and hookworm larvae. The wood and mud floors are also subject to deterioration from weathering processes.

Figure 10: Traditional pit latrine observed in one of the households in the surveyed wards

Ventilated improved pit latrines, improved pit latrines, pour flush latrines and water closet were constructed in some of the visited households in most cases the pits were deep, the superstructures were of permanent materials and all of the latrines were roofed, in general majority of these latrines were clean as depicted in figure 11.

Figure 11: Improved pit latrine observed in one of the households in the surveyed wards

The head of household's level of education (*know-how*) and household roofing materials as proxy of high household income (*economics*), helped to predict the chance that a household owned a latrine. Latrine presence was associated with an educated head of household and having an iron sheet roof (Appendix 4.2).

Know-how: In the MTUMBA evaluation two proxies for knowledge was considered: the ability to read and write (LITERACY) and at least primary education attained (EDUCATION). Those respondents who can read and write had 79.2 % higher of odds ratio

(95% CI, OR = 2.5 – 5.6, *p*-value = 0.0) of owning a latrine than their illiterate counterparts. The respondents with at least primary education have 78.3% higher likelihood of owning latrines than their fellow villagers without formal education and those with adult education (95% CI, OR = 2.4 – 5.4, *p*-value = 0.0). These findings suggest education of respondents is key to the understanding and adoption of latrine construction to bring about sanitation changes. This observation is consistent with Wagstaff's (1986) argument that, one might reasonably suppose that the better educated are in a better position to assimilate information about health matters from triggering meetings and the mass-media than the uneducated thereby being better equipped to digest information about the importance of sanitation improvement.

Economics: Our study had one proxy for economic well-being: household roofing material as a reflection of high income (INCOME). Thus, it was observed that, the more expensive household roofing material the greater the log of odds of owning a latrine. Households roofed of earth or mud had a 43.5% higher log of odds of owning a latrine than their counterparts with households roofed with thatched grass (95% CI, OR = 3.0 – 7.5, *p*-value = 0.0). On the other hand, households roofed of corrugated iron sheets had a 47.2% higher log of odds of owning a latrine than households roofed with thatched grass (95% CI, OR = 2.7 – 9.6, *p*-value = 0.0). These findings imply there is a close relationship between households roofing materials and household income in adopting improved latrine construction.

Latrine facilities for special groups: Findings from the FGDs conducted in the three sites consistently revealed that, the sanitation facilities promoted by MTUMBA approach were reported to have considered the needs for different special groups of people like disabled, children, elderly and poor. Different latrine designs were demonstrated at sanitation centres, accommodating all groups of people. Education was also given to artisans on how to construct such latrines. However, study findings show that households have given little importance in construction of latrines with facilities for disabled people and elderly. Interviews with respondents in the surveyed areas showed that 20.86% of the households have young children, disabled persons and very old people requiring special type of latrine as depicted in appendix 4.3. During the survey we found that, an overall of 2.41% of latrines constructed in the surveyed areas were reported to have been constructed in consideration of the special needs of young children, disabled persons and very old people requiring special type of latrine (Appendix 4.4). Majority of the latrines were constructed without consideration of the special needs of young children, disabled persons and very old people.

Majority of respondents in almost all FGDs concurred that the sample latrines for disabled people and the elderly were demonstrated in sanitation centres and education on construction was provided to artisans. However, for some reasons households could not adopt such designs (Appendix 4.5). For example, it was argued in Masieda site (Mbulu District), by the majority of respondents that there were no disabled people in their area and they would not be found, therefore there is no need to consider such a group. Very few or completely absent disabled persons in Mbulu could be construed from some cultural

hostilities as some tribes react negatively towards children with disabilities, and disabled children are hidden, abandoned or even killed after birth.

> *"Given the nature of land and economic activities in semi-arid land for small scale farming, hunting, gathering and migration nature of people, it is not easy to locate disabled people". Implementing partner- Mbulu district.*

It is important to note that the same technology of latrine design have features allowing use by the elderly. Respondents in most (Five) FGDs, all of the interviewed Implementing Partners, all interviewed District Focal persons and all village and ward leaders in all study sites said that people were advised to construct latrines with small holes so that children of 3-5 years of age can be able to use. They also said that sanitation centres demonstrated latrines that can accommodate needs of children and many households have adopted the designs. A number of reasons were provided as to why majority of households constructed latrines without taking into consideration of the special needs of young children, disabled persons and very old people including; poverty, higher costs of latrine construction, lack of knowledge on the types of latrines suitable for special groups and absence of disabled persons in the households. Many respondents of all three sites said that there are different samples of latrine designs using different construction materials at different costs demonstrated at sanitation centres. However, the findings reveal that poor people opted for latrines of lowest construction costs using locally available materials like tree poles, mud and grass.

> *"Based on the options displayed at the sanitation Centre, majority of households could afford. There are 10 options starting from cheapest to more expensive (ranging from Tshs 6,000 to 70,000). The options on construction materials include woods, thatched grass, sands and cements which the poor could afford."* Key Informant, Nzega.

In Mtoa and Masieda, many latrines were constructed using mud and pole walls and mud roofings known as tembe. In Mambali Ward, Nzega the common roofing's used by poor were grass.

3.4 Open defecation practices in the surveyed households

Out of the 1,203 households sampled, 120 (10%) of them didn't have latrines and majority of them were not using latrines. Households which conceded not to be using latrines during the survey they were asked and they put forward a number of reasons as to why they are not using latrines including: *"our latrine is full; we don't have a latrine; our latrine has collapsed; our latrine is under construction; and our latrine is water logged".*

The visited households without latrines were asked on where they go for defecation and they revealed the options as: *"using neighbors' latrine; by digging a hole in the bush/forest ground and burry feces in the soil; and also practice open defecation in the nearby bush or forest".*

For children feces the common practice reported by respondents without latrines was: burying in the soil; throwing feces in the household surroundings; leaving them to be eaten by dogs/chicken/pigs; and throwing feces in the waste pit. Over half; 721 (59.93%) of respondents in all regions were aware of existence of bylaws governing construction and use of latrines. However, while the proportion was highest in Mbulu district with 341 (84.62%) followed by Iramba 276 (68.66%), and Nzega had very few respondents 104 (26.13%) who were aware of bylaws.

3.5 Latrine situation before and after the MTUMBA sanitation approach

Majority of the respondents indicated that, the sanitation and hygiene situation before the implementation of the MTUMBA approach in the project areas was poor. Information gathered from the visited households, ward and village leaders in Masieda ward reveals previously poor situation of hygiene and sanitation whereby only less than 5% of household had latrines in 2007. It was further revealed that, all of the latrines were temporary and of poor quality. Among of the mentioned reasons for having poor quality latrines include: lack or poor technology for improved latrine construction, poor understanding on the importance of having and using latrines, lack of understanding on the ill-effects of water and soil contamination with human feces and the existence of negative traditions and beliefs.

> *"Some households construct latrines, but their use is restricted by the belief of not sharing latrines at family level. For example in such beliefs a woman cannot share a latrine with her farther/mother in law"*. Woman from Mambali ward during FGD

After triggering meetings, villagers, artisans, animators and village leaders carried out a transect walk and found that there were problems of sanitation and hygiene, specifically majority of households didn't have latrines, observed open defecation grounds with a lot of human feces, availability of few but poor quality latrines and lack of hand washing facilities near latrines. Respondents indicated to be disguised by the higher extent of open defecation observed, and most of bushes near households were full with human feces and flies. Furthermore, a baseline study conducted by health department before the implementation of MTUMBA found out that in Mambali Ward (Nzega) majority of people (59%) did not have latrines as most of them were practicing open defecation (Unpublished district report). Sanitation information gathered from ward and village leaders in Masieda ward reveals poor situation of hygiene and sanitation and that the coverage of latrines went from 5% in 2007 to 98% in 2011. *Such a high improvement in latrine coverage in a short period coincides with the period of MTUMBA approach implementation in the area; hence it contributed to the observed changes.* Moreover findings from FGDs reveal that before the implementation of MTUMBA approach people did not value the use of latrines, most of people did not have the understanding on the importance of having and using the latrine, and they didn't construe of any health problem with un-disposed human feces.

The introduction of the MTUMBA approach have gone hand in hand with the provision of education which helped people to realize the link between human feces and ill-health, the dangers associated with improper disposal of human feces and the importance of latrines to human health. In addition, latrine designs have been demonstrated in the village setting. As a result, now majority of people have awakened, they have been and they are constructing latrines and increasingly improved latrines are being constructed in the wards. Therefore implementation of MTUMBA approach increased people's awareness and understanding on the importance of constructing and using improved (quality) latrines to improve health condition. In a period of three years of MTUMBA piloting in between 2008 and 2011, there has been paradigm shift towards construction of improved latrines as well as continuous improvement of the existing latrines. It was noted that, 50.21% of the latrines available in the study households were observed as newly constructed improved latrines (23.69%) whereas those modified were (26.52%). It was revealed that 32% of respondents' constructed improved latrines and those modified to improve their latrines conceded to have been influenced by the MTUMBA approach as shown in appendix 5.1 and 5.2.

Findings from FGDs conducted in Masieda, Mambali and Iramba wards with Community members in sanitation centres revealed that the number of latrine users has been increasing as most households have constructed improved latrines and actually they use them. This information was complemented by key informants, for example in Mambali village (Nzega) where the majority (98%) of people were reported to have constructed and been using any type of latrines, the remaining 2% were the migrants who resisted adopting and using latrines. The implementation of MTUMBA increased the percentage of availability of quality toilets from 2% to 48% in just 3 years according to information from key informants.

Desk review of ward health data in Masieda ward in Mbulu and Mambali ward in Nzega district in between 2007 and 2011 revealed a significant decline in the number of households without latrines e.g in Masieda was 1,405 in 2007 which declined to 153 in 2011. Likewise in Mambali ward, the number of households without latrines declined from 2,443 in 2007 to 120 in 2011. A clear increasing trend of improved latrine constructions was traced from the baseline of 0 in both Masieda and Mambali in 2007 to 2,206 and 2,600 in 2011, respectively as depicted in figures 12 and 13 below. On average, latrine coverage increased from 36.3% in 2007 to 68% in 2011.

Figure 12: Latrine construction trend in Masieda ward, Mbulu district

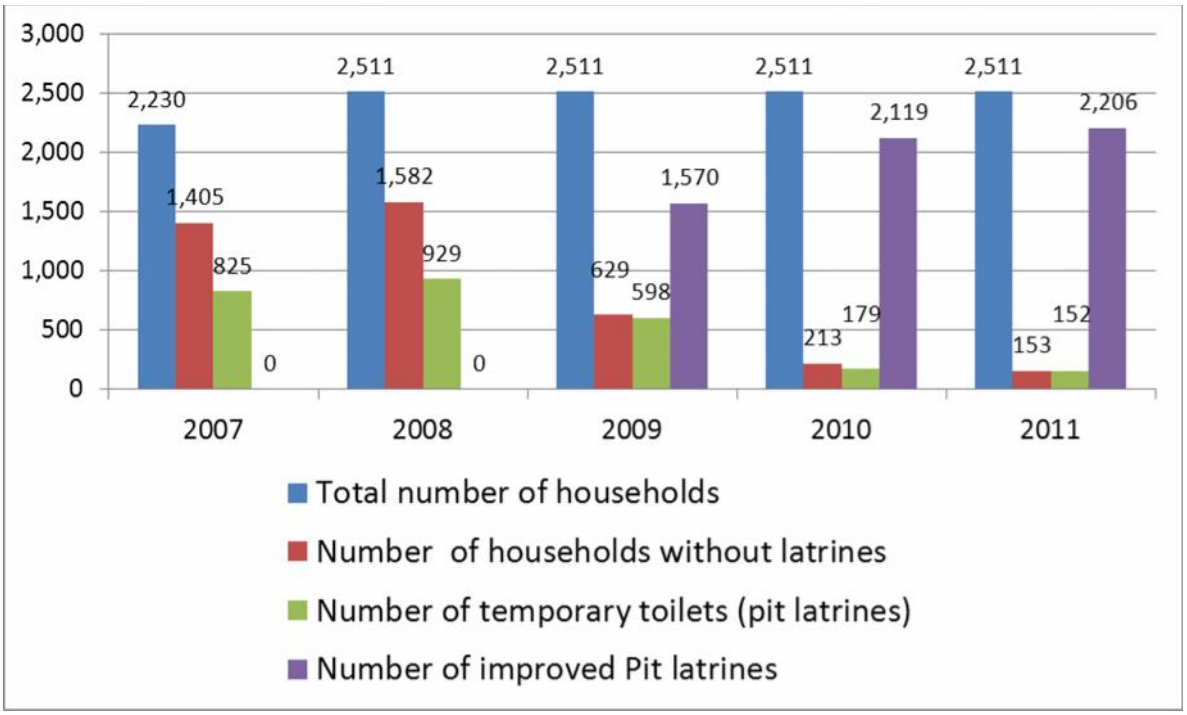
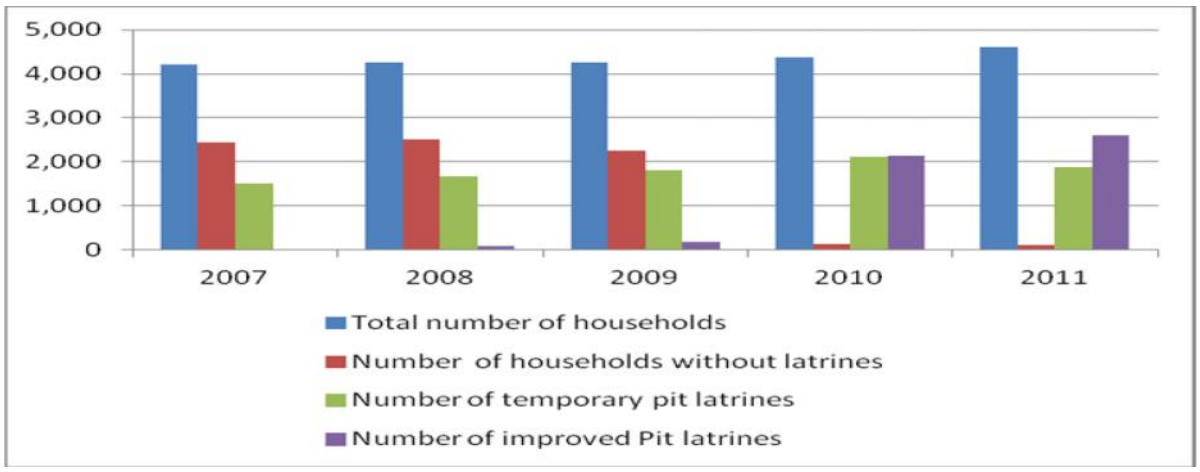


Figure 13: Latrine construction trend in Mambali ward, Nzega district



Overall, very few respondents (21.53%) reported that their latrines had collapsed or being full since MTUMBA was introduced in their areas, with most of such events reported in Singida region by 114 (28.36%) respondents (Appendix 5.3 and 5.4). Data suggest that most households have been able to construct new latrines according to 181 (69.88%) respondents. Interestingly, reconstruction of new latrines has been very high in the project areas with higher collapsed latrines as evidenced by for instance in Iramba district whereby 82.46% respondents reported that their household managed to reconstruct their latrines. Although in smaller proportion (2.32%), reported having opted to defecate in the bushes after their latrines collapsed, the highest prevalence of this behavior prevailed in Singida region as confirmed by 3.51% among the respondents.

3.6 Sanitation and hygiene behavior change after MTUMBA

Notably, an overall of 80.05% of the respondents in the household survey indicated to have noted sanitation and hygiene behavior changes in their village in a span of three years of MTUMBA implementation. Key changes cited were the decline of open defecation and that majority of people are now having and using latrines. It was further explained that, there is also a change in thinking as it was previously thought that child feces were harmless and that is why were not disposed off; at the moment majority of the households are disposing child feces in latrines.

Majority of the respondents (65.67%) reported changes in hand washing behavior in the piloted areas after the introduction of MTUMBA approach as depicted in appendices 6.1-3. It was also noted that, 27.43% of respondent indicated to have noted no any changes in hand washing behavior in their community. *Informants listed the notable behavior changes as the increasing hand washing with water and soap; people have abandoned the use of communal pot for hand washing; hand washing by running water; hand washing after cleaning child bottom, hand washing after touching/handling dirty things; and hand washing after visiting latrine*.

3.6.1 Contribution of MTUMBA in the observed sanitation and hygiene behavior change

Respondents further provided a number of reasons for the observed changes in their community whereas majority of them (63.45%) associated the changes with the introduction of MTUMBA approach in their wards (Appendix 6.1 and 6.2), as a coincidence that, the period of such a big change in a very short time coincides with the period of intensive investment in the piloting of the approach in their area. The second weighted reason was the personal initiatives of the households after being sensitized and triggered they realized their states and they want to look modern or civilized as open defecation and other unhygienic behavior was discouraged during MTUMBA approach meeting by terming them backward and shameful as well as being the major sources of illnesses and some deaths.

3.6.2 Contribution of bylaws, health education, health workers and media in the observed sanitation and hygiene behavior change

Respondents in the household survey and in FGDs also considered some of the strategies employed in promoting sanitation and hygiene in their areas to be ineffective due to a number of reasons. The Bylaws were mentioned to only influence very few of the households due to laxity in their implementation and lack of regular inspection in the households. Health education and health workers teachings are ineffective due to irregular meetings with the community which can happen once in two or three years and the overall lack of follow up after the meeting. Radio news on community health (*Afya ya Jamii*) was also mentioned to have a very little influence on latrine constructions happening in the study sites due to the fact that, though an overall 58.2% of the respondents have radios, electricity is not available to the majority and that, availability of batteries for radio use is limited by cost. Respondents indicated to use their radios occasionally especially during

religious festivals (Easter, Eid and Christmas). It was further explained that, some of the households especially those with businesses use their radios mostly for musical entertainment of their customers. We also found that, 2.4% of the respondents had TVs which are used commercially for showing videos and sports especially for the Euro and World cup.

3.7 Effectiveness of MTUMBA approach in creating demand for hygiene and sanitation behavior changes

Discussants in the FGDs and key informants in the in-depth interviews in the three surveyed wards consistently indicated that, since the introduction of MTUMBA approach in their areas, there have been behavior changes towards increased construction and use of improved latrines. This follows true that, the MTUMBA approach has been successful in creating awareness and demand for construction and use of latrines in the study areas as revealed in the in-depth interviews. Many community members have gradually been changing their behavior by taking initiatives to build new toilets, improving their toilets and increase hand washing practices. The MTUMBA approach has also been found to be effective and instrumental in creating demand even beyond the project areas according to pilot study conducted in Mvomero district wherein these areas, CARE have adopted and is implementing the approach in the nearby villages of Kibati, Gonje, Sagase, and Kilagama. It is worth noting that some elements of MTUMBA approach were in Mvomero villages although sanitation centre was not established.

In the in-depth interviews with artisans and animators in the three surveyed wards, it was explained that, sanitation promotion work carried out through MTUMBA approach resulted in increasing demand for latrines. Community animators and artisans helped to increase awareness hence many people demanded improved latrines. For example, in Mambali the association of artisans was organized to help on latrines construction in the community and neighboring villages. Similar situation was found in Masieda site as revealed by the interviews artisans;

> *" Despite the fact that Bunyoda area was outside the project area, many people were motivated and majority adopted improved technology as there was increased demand for improved latrine"*artisan from Masieda Site- Mbulu District

3.8 Preference of sanitation technologies in the study sites

Results from household surveys, in-depth interviews and focus group discussions show that majority of households in the study sites preferred Improved Pit Latrine with "*Sungura* (Swahili word for rabbit)" slabs. *Sungura* slab is also known as *sanplat* which was originally developed in Mozambique, it is a 2ft by 2ft smooth and washable concrete slab which is safe for children. The preferred latrine superstructures in Mbulu and Iramba sites were the '*Tembe*' – the local names for common houses in these areas whereas in Nzega was the mud

/wattle (*kihenge*). Results in table 6 show that majority of households preferred technology which is affordable (cheap), that which use materials which are locally available, affordable costs of labour for artisans in the surrounding areas and the availability of slabs (*sungura* type) in the sanitation centres. These factors contributed to the success for the choice of sanitation and hygiene technologies in the study sites. However, *Kilimo Kwanza* latrine was not liked as majority of the respondents felt unhappy to use composited feces as it is uncommon in their areas.

Table 6: Latrine technologies preferred by surveyed households in the study areas

Domain	Masieda- Mbulu	Mambali- Nzega	Mtoa- Iramba
Attributes of preferred technology	i. Slab- *Sungura* type ii. Walls- poles with mud iii. Roof- poles with mud	i. Slab- *Sungura* type ii. Walls- mud bricks iii. Roof- thatched grasses (*Maluli*)	i. Slab- *Sungura* type ii. Walls- mud bricks iii. Roof- poles with mud
Local name	*Tembe*	*Kihenge*	*Tembe*
Reasons for the preferred technology	• Affordable for majority of people • Local materials- soil, poles easily available • Aunts destroy building materials- grasses if used • Grasses are scarce as the area is dry • Artisans are available in the area and costs of labour manageable • Slabs (Sungura type) are available at Sanitation Centre and prices are affordable	• Costs are affordable to the majority of people • Local materials- soil, grasses easily available • Artisans are available in the area and costs of labour manageable • Slabs (Sungura type) are available at Sanitation Centre and prices are affordable	• Costs are affordable • Local materials- soil, grasses easily available • Artisans are available in the area and costs of labour manageable • Slabs (Sungura type) are available at Sanitation Centre and prices are affordable
Price (Tshs)	10,000- 20,000 Tshs	6,000- 25,000 Tshs	No information on price
Relevance to local cultural context	Yes- Latrines resemble the houses	No information	Latrines resemble the houses
Constraints in adopting technology	i) Transportation- roads are not passable during rainy season- or are not there at all ii) Water scarcity during construction and for use of toilets- the area is dry iii) Migration of ethnic groups *hadzabe* and *tatoga*- do not have permanent latrines only 40% have adopted MTUMBA technology iv) Stony and rocky areas for pit digging v) Costs of constructing slabs too expensive –subsidy is needed	i) Transportation of building materials during rainy season ii) Water scarcity during construction activities vi) Stony and rocky areas for pit digging iii) Costs of constructing slabs too expensive –subsidy is needed iv) Water table is too high- difficult to dig deep latrine	i) Transportation of building materials during rainy season ii) Water scarcity during construction activities (except for Tyme Village) iii) Costs of constructing slabs too expensive –subsidy is needed

3.9 Costs of implementing MTUMBA

Triangulation of information from different data sources show that costs of constructing latrines were affordable for majority of households in the study sites. Affordability was associated with availability of sanitation options from traditional improved pit latrine (costing minimum of Tshs 20,000) to VIP latrine (estimated at Tshs 85,000). Respondents

also mentioned other reasons for affordability including local availability of construction materials, cheap price for materials and reasonable costs of labor. The following accounts below from key informants show costs were not a barrier for the majority of households in the study sites; *I am not aware of a household in Masieda site which has been unable to build a latrine due to lack of money. The good thing with MTUMBA initiative is the fact that, there are many latrine options with differing costs for a household to choose. Most households can afford the Sungura latrine type of technology which costs only 11,000 Tshs.'* Ward Leader- Masieda Site-Mbulu District.

Artisans provided detailed costed latrine options at the sanitation centres in Mambali and Masieda wards in Nzega and Mbulu districts, respectively (Appendices 7 and 8). Eleven latrines were on display in the sanitation centre at Mambali ward; ten latrine options for households and one institutional latrine with a urinal. The costs of each latrine option as provided by artisans in the Mambali ward are shown in Table 7 below.

Table 7: Costs of latrine options in Mambali ward

Type of latrine	**Description**	**Total (Tshs)[4]**
1. VIP	Roof of corrugated iron sheet, dry bond lined pit, floor with dome slab	332,000
2. Improved Pit Latrine 1	Thatched roof, pit made of cement-earth bricks, floor with dome slab	180,700
3. Improved Pit Latrine 2	Thatched roof, pit made of burnt bricks, floor with dome slab	194,200
4. Improved Pit Latrine 2	Roof of corrugated iron sheet, pit made of cement bricks, floor with dome slab	159,300
5. Improved Pit Latrine 4	Roof of corrugated iron sheet, pit made of dry bonds, floor with dome slab	169,300
6. Improved Pit Latrine 1	Thatched roof, pit made of wattle (*kihenge*), floor with SanPlat	56,200
7. Institutional latrine	Roof of corrugated iron sheet, pit made of dry bonds, floor with dome slab	870,000
8. Urinal	Roof of corrugated iron sheet, floor with a urinal farrow for men	268,500
9. Abaloo	Thatched roof, pit made of mud/wattle (*kihenge*), floor with small dome slab	20,000
10. Pour flush offset latrine	Ferro-cement roof, pit made of dry bonds, floor with SanPlat	234,100
11. Disabled and elderly latrine	Roof of corrugated iron sheet, pit made of dry bonds, cement floor, with a chair form of latrine, metal rails for support	425,000
12. Kilimo kwanza latrine	Roof of corrugated iron sheet, pit made of dry bonds with doors for removal of composite, floor with dome slab with urine diversion	1,063,500

[4] At the time of compiling these costs the exchange rate for Tanzania shillings (Tshs):

Tshs 1,462.18 = $ 1 (USD) and Tshs 2,400 = £ 1

In Masieda ward, a total of 6 latrine options were on display at the sanitation centre; five latrine options for households and one institutional latrine. The costs of each latrine option as provided by artisans in the Masieda ward are shown in Table 8 below.

Table 8: Costs of latrine options in Masieda ward

Type of latrine	Description	Total (Tshs)*
1. VIP latrine	Roof of corrugated iron sheet, burnt brick wall, floor with SanPlat	290,000
2. Institutional improved pit latrine	Roof of corrugated iron sheet, burnt brick wall, floor with SanPlat	499,000
3. Traditional improved pit latrine		
i. Tembe	Mud/earth roof, wattle/mud wall, floor with SanPlat	129,500
ii. Songe	Thatched roof, wattle/cow dung wall, floor with SanPlat	135,000
iii. Kambi	Thatched roof, cement finish wattle/mud wall, floor with SanPlat	210,500
4. Special groups	Roof of corrugated iron sheet, burnt brick wall, with a chair form of latrine, metal rails for support	199,000

*At the time of compiling these costs the exchange rate for Tanzania shillings (Tshs):

Tshs 1,462.18 = $ 1 (USD) and Tshs 2,400 = £ 1 (British Pound)

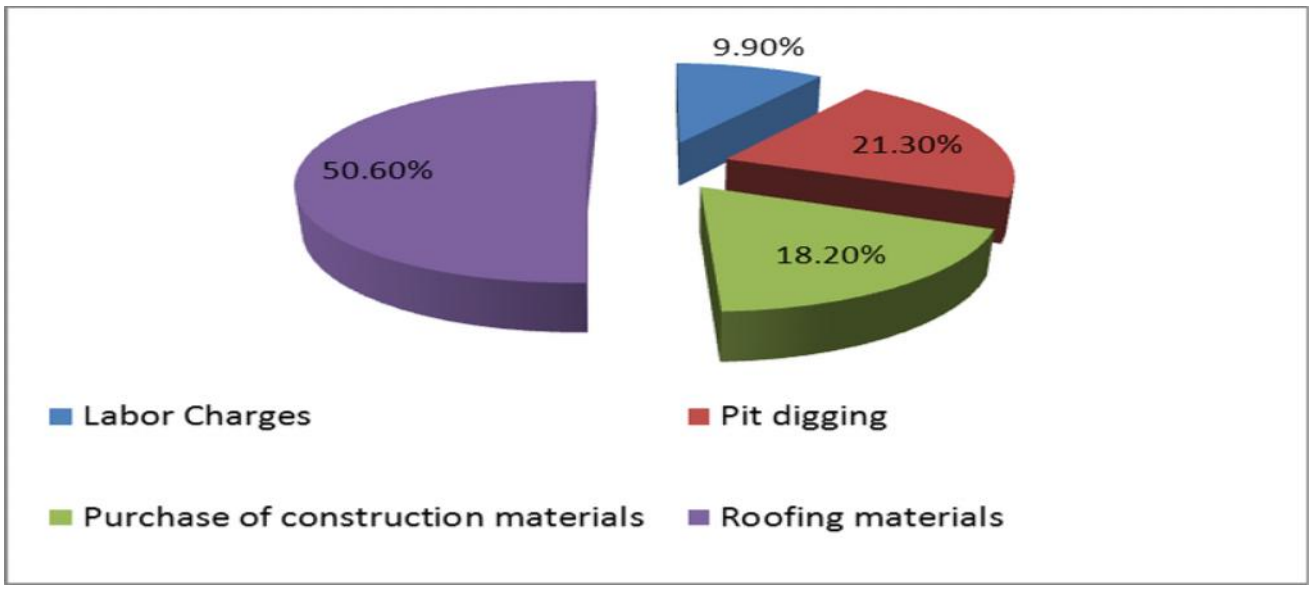
Comparison of latrine construction costs obtained in this study and those previously reported with Odiachi, 2010, showed slight variation. The cost of improved pit latrine ranged from Tshs 56,000 to 194,000 (exchange rate in Tshs 1,462.18 = $ 1 and Tshs 2,400 = £ 1) this study whereas in the Odiachi study ranged from 51,000 to 90,000 (exchange rate in Tshs 2,140 = £ 1). The total household (financial) cost for improved pit latrine construction was estimated retrospectively by asking heads of households to estimate how much was spent to construct or improve the existing latrines in their respective households. Average financial and economic costs were estimated and are reported in Table 9 below. Average economic costs were estimated to reflect the opportunity costs of resource use. For example, if the same resources were deposited in a bank account for a period of one year at a particular bank interest rate, what could be its value or rather how better and efficiently could the same resources be spent? The latest official interest rate of 13.85 % (as recorded by BoT in 2011) was used to calculate economic costs

Table 9: Average financial and economic cost for construction/improvement of pit latrines in the surveyed areas

Cost item	Financial costs	Economic costs
Pitt digging	16,261.63	18,768.63
Purchase of construction materials	13,868.19	16,006.20
Roofing materials	38,583.99	97,57.52
Labour charges	7,500	86,56.25
Total Average cost	**76,213.81**	**126,667.35**

The total average economic cost for construction of an improved pit latrine in the surveyed areas is Tanzanian shillings 53,189.0. Analysis of the cost distribution indicated that, pit digging, purchase of construction materials and labor charges constitute almost 50% of latrine cost, whereas roofing materials were considered more expensive reaching slightly more than 50% of all costs as compared to other cost components. As indicated in the above table this figure could be grossly underreported because of underreporting of labor charges as indicated in figure 14 below.

Figure 14: Percentage distribution of each cost item towards construction of an improved pit latrine



It is worth noting that MTUMBA approach includes implementation of activities at different levels. These included community entry at district, conducting a baseline survey, triggering, community planning meetings, training of artisans and animators for empowering communities on latrine designing and construction, as well as construction of sanitation centers as display points for sanitation marketing. It emerged that the cost of implementing MTUMBA approach was high specifically on construction sanitation centres. Informants at the national level/some development partners were of the view that the cost of constructing one sanitation center is high (Tshs 15-20 Millions). In general, costs were not important impediments that hindered members of community in adopting MTUMBA initiative leading to construction of improved latrines in the study sites except for the elderly and poor people. Overall, our findings suggest that around half of households (47.80-51.21%) rely on their own labor mostly, followed by sole income of household members to construct new toilet.

Tables 10 - 12 presents a summarized description of different cost items (financial and economic) for three wards. The estimated total costs of running demonstration sites varied from one site to another. For example total capital costs of all capital items (financial) for

running a demonstration site in Mtoa ward were estimated at Tanzanian shillings **32,789,000 equivalent to US$** 22,424.74. Total economic costs on the other hand were estimated to stand at Tanzanian shillings 37,843,970.83 (US$ 25,881.88). Total annualized economic costs for running a demonstration site in Mtoa ward in Iramba district was **30,353,968** Tanzania shillings (equivalent to US$ **20,759.39**[5]). Out of these, economic costs of buildings (excluding demonstration latrines) are estimated at 23,698,889 Tanzanian shillings (equivalent to US$ 16,207.91489) or 78.1% of total economic costs. Annuitized total capital costs (financial) are estimated at 26,513,866 (US$ 18133.11). Annuitized total capital costs (economic) are estimated at 30,601,421 Tanzanian Shillings (US$ 20,929).

In all cases, costs of buildings seem to constitute a relatively big part of all capital costs. Similarly, costs of buildings operations and that of operating machinery and transport facilities also constitute a large part of recurrent costs. Note that the figures reported here might somewhat be biased downwards because the national level (WaterAid) had disbursed 171,360,000 Tanzanian Shillings in which case, 57,120,000 Tanzanian shillings was allocated to each implementing partner (HAPA, SEMA and Mbulu). The MTUMBA approach has been focusing on sanitation and hygiene promotion, demonstration of sanitation facilities and latrine construction in three wards, one from each of the three districts – in Mambali (Nzega), Mtoa (Iramba) and Masieda (Mbulu) – covering 13 villages with a total population of 54,081. The MTUMBA approach costs to reach each household for sanitation and hygiene promotion and demonstration of sanitation facilities in the study areas was estimated at an average of Tshs. 17,582.7 (US$ 12.0).

Table 10: Cost description

CAPITAL COSTS	MTOA	MBULU	NZEGA
Buildings			
Financial	22,000,000	25,000,000	27,000,000
Economic	25,391,666.67	28,854,166.67	31,162,500
Motorcycles/vehicles/tractors			
Financial	5,600,000	4,500,000	4,500,000
Economic	6,463,333.33	5,193,750	5,193,750
Demonstration toilets			
Financial	859,000	790,000	920,000
Economic	991,429.17	911,791.67	1,061,833.33
Other Costs			
Financial	440,000	320,000	526,000
Economic	507,833.33	369,333.33	607,091.67
Total capital costs	**62,253,263**	**65,939,042**	**70,971,175**

[5] Based on 2010 US$ equivalent (1US$=1462.18 Tanzanian Shillings)

Table 11: Annuitized total capital costs (in Tanzanian shillings)

	Mtoa	Mbulu	Nzega
Buildings: Financial	20,533,333	24,166,666.70	26,100,000
Economic	23,698,889	27,892,361.11	30,123, 750
Motocycles/tillers/bycles: Financial	4,480,000[6]	3,600,000	3,600,000
Economic	5,170,666	4,155,000	4,155,000
Demo Latrines: Financial	642,600	632,000	736,000
Economic	774,643	729433.34	765,235.60
Total cost	**55,300,131**	**61,175,461.2**	**35,356,236**

Table 12: Recurrent costs in Tshs from three implementation sites

RECURRENT COSTS	MTOA/IRAMBA	MASIEDA/MBULU	MAMBALI/NZEGA	TOTAL
Personnel				
Financial	13,680,000	11,567,000	14,453,000	39,700,000
Economic	98,058,000	13,012,875	16,259,625	127,330,500
Short term training				
Financial	4,690,000	4,534,000	3,900,000	13,124,000
Economic	5,413,041.67	5,100,750	4,387,500	14,901,291.67
Supplies				
Financial	651,000	725,000	765,000	2,141,000
Economic	751,362.5	815,625	860,625	2,427,612.5
Building operations				
Financial	1,140,000	12,000,000	11,875,600	25,015,600
Economic	1,315,750	13,500,000	13,360,050	28,175,800
Vehicle/motorcycle/tractor operations				
Financial	1,706,000	1,500,000	1,680,000	4,886,000
Economic	1,969,008.33	1,687,500	1,890,000	5,546,508.33
Total cost	**129,374,163**	**64,442,750**	**69,431,400**	**263,248,313**

3.10 Trends of hygiene and sanitation tracer diseases after MTUMBA in piloted areas

Respondents claimed to observe a decline of hygiene and sanitation tracer diseases in the past three years coinciding with the duration of MTUMBA implementation in their areas. The previously most frequent diseases were diarrhea, intestinal helminthes, skin infections and other infections including eye infections, typhoid fever and schistosomiasis. After the three years of MTUMBA implementation, an overall low prevalence of hygiene and sanitation tracer diseases as compared to the time before was considered to exist in the study sites by the informants.

[6] Total financial cost for power tiller and motorcycle used by ward officer

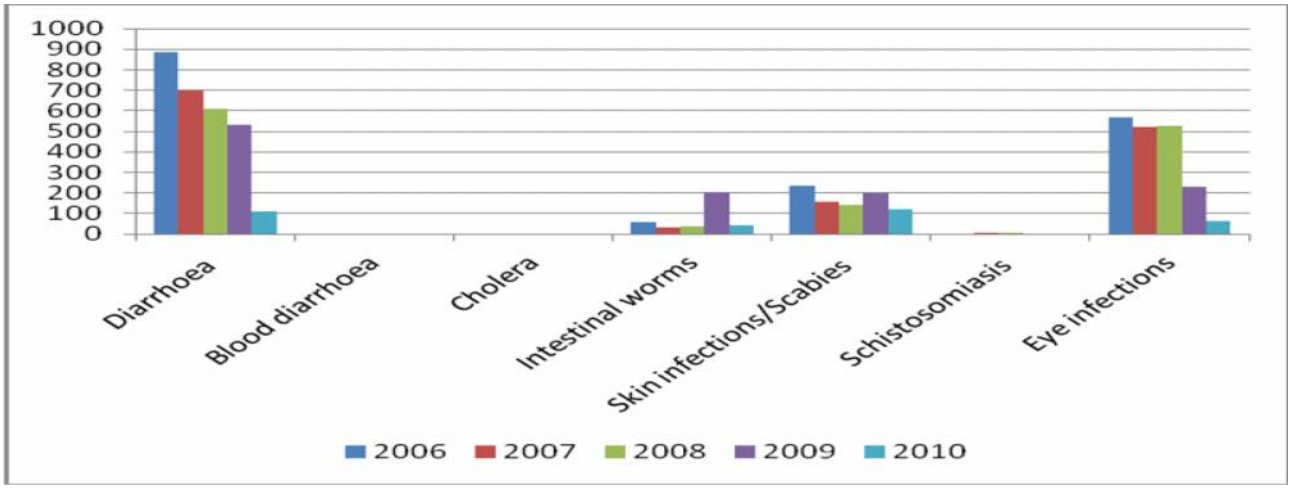
Table 13 shows the kind of hygiene and sanitation tracer diseases mentioned by the respondents at the time of interview. Overall low prevalence of the tracer diseases was considered to exist in the study sites. The most common among them was diarrhoea as mentioned by an overall 24.69% of respondents. Next to it were intestinal helminthes (16.46%), skin infections (11.14%) and other infections including eye infections, typhoid fever and schistosomiasis listed by 9% of respondents.

Table 13: Trends of hygiene and sanitation tracer diseases after MTUMBA in piloted areas

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
	N=398	N=403	N=402	N=1,203
Diarrhea	153 (38.44%)	54 (13.4%)	90 (22.39%)	297 (24.69%)
Cholera	6 (1.51%)	4 (0.99%)	3 (0.75%)	13 (1.08%)
Dysentery	34 (8.54%)	15 (3.72%)	16 (3.98%)	65 (5.40%)
Intestinal helminth	142 (35.68%)	37 (9.18%)	19 (4.73%)	198 (16.46%)
Skin infections/scabies	97 (24.37%)	16 (3.97%)	21 (5.22%)	134 (11.14%)
Others (Eye infections, Typhoid, schistosomiasis)	21 (5.28%)	27 (6.70%)	61 (15.17%)	109 (9.06%)

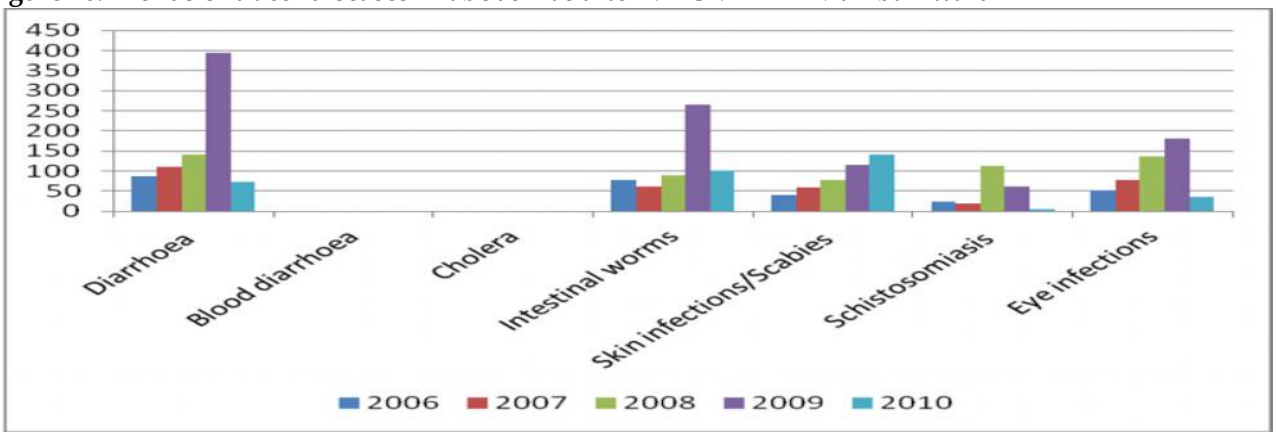
The perceived low prevalence of diseases was supported by health facility data from dispensaries serving Mambali and Masieda wards in Nzega and Mbulu districts, respectively. The five year Mambali and Masieda wards health data 2006 – 2010 shows an overall sharp decline in diarrheal diseases and slight decline as well as staggering trend in other tracer diseases coinciding with the period of MTUMBA approach implementation as depicted in figures 15 - 18.

Figure 15: Trends of tracer diseases in underfives after MTUMBA in Mambali ward



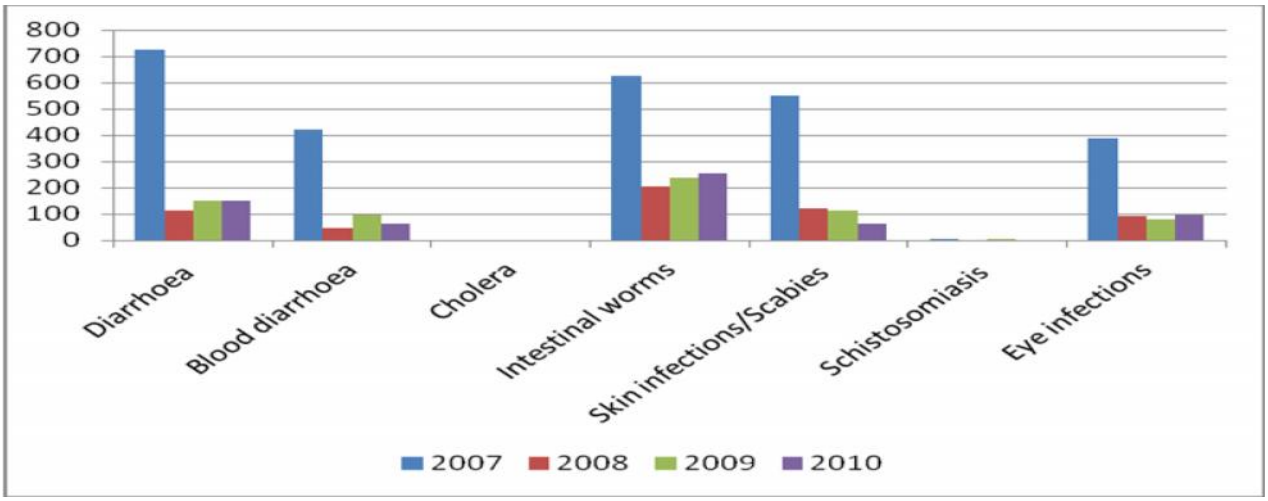
Source: Mambali ward HMIS 2006-2010

Figure 16: Trends of tracer diseases in above five after MTUMBA in Mambali ward



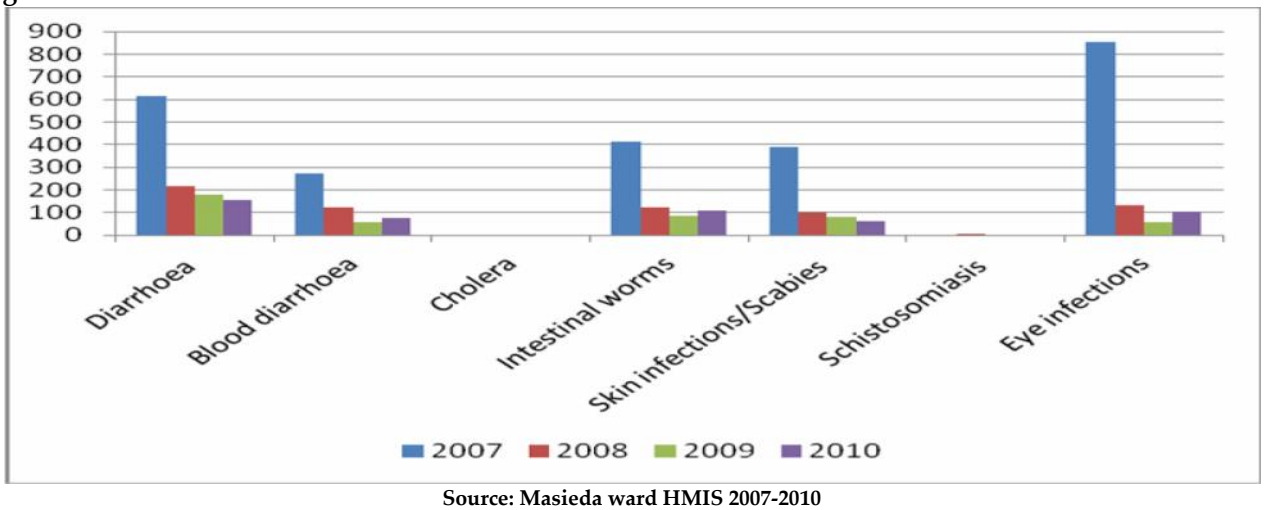
Source: Mambali ward HMIS 2006-2010

Figure 17: Trends of tracer diseases in underfive after MTUMBA in Masieda ward



Source: Masieda ward HMIS 2007-2010

Figure 18: Trends of tracer diseases in above five after MTUMBA in Masieda ward



Source: Masieda ward HMIS 2007-2010

3.11 Sustainability and scale up of MTUMBA approach in the piloted districts

The integration of MTUMBA approach into the government structures is regarded to be an important step towards improving the effectiveness and efficiency of the approach in bringing about the desired community sanitation and hygiene behavioral changes. MTUMBA approach motivated the district council to budget for establishing a sanitation center in Nzega district and continuation of promoting the approach in other areas according to findings from key informants at the district level.

> *"Increased demand has significantly touched the council leadership such that the council has budgeted Tshs 25,260,000 millions funds for2010/2011 financial year to construct sanitation center in Nata ward"* District leadership- Nzega

Discussions with community members revealed that other nearby wards went to the extent of requesting artisans from Mtoa site (Singida) to help them in construction of quality toilets and even other sanitation products thus indicating MTUMBA approach was successful in creating demand within the project areas and beyond.

Implementation of MTUMBA approach has obviously triggered demand for sanitation products such as sanplats and tippy tap (*vibuyu chirizi*). The MTUMBA approach has great prospects for sustainability due to nature of its implementation which is centred on demand creation, matching local contexts with latrine samples of manageable costs and using locally available materials. This makes it different from approaches like PHAST, CLTS and PRA. The approach is focused in addressing the National Sanitation Guidelines governing the open defection in the environment developed by the National Environmental Health, Hygiene and Sanitation Strategy (NEHHASS), the quality which will attract the Government to invest in the project.

Many respondents appreciated the fact that artisans and animators (people of the same community) were trained and empowered with skills to construct latrines and advocate to create demand for latrine construction and use in the community. Demand for improved latrines has been rising through advocacy. Artisans were empowered with capital to run construction activities through their groups and many respondents said construction activities were s continuous as demand was said to be high even after the project was left to communities. Close supervision and cooperation from village and ward leaders was said to add strength to sustain the project. Many respondents revealed that acceptance was high and even people from other villages and wards beyond project areas approached artisans from the program areas for construction of improved latrines. District Officials showed interest in scaling up the project to other wards while at the same time awarding tenders to trained artisans. For example Mbulu District allocated Tshs. 20,000,000 to scale up the

project by constructing a new sanitation centre. The Nzega District Authority also allocated funds to scale up the project;

> *"The District has already budgeted for scale up, already establishing a sanitation centre in Nata ward also the District has budgeted for supervision of MTUMBA activities. Each year, District Council allocates fund to support environmental and sanitation activities through village competition and the winning village receive reward"* Key Respondent, Nzega Site

However, some obstacles were mentioned including inadequate budgets for allocation to hygiene and sanitation (at District level) as health priorities are given to curative and immunization services compared to preventive services. High illiteracy levels of people in communities prevented them from understanding the importance of hygiene and sanitation making it hard to change behavior.

Generally, MTUMBA approach has prospects for sustainability as it focuses on demand creation and empowers community people with skills to advocate and construct improved latrines matching community contexts.

3.12 Challenges encountered in implementing MTUMBA

3.12.1 Political challenges

The MTUMBA hygiene and sanitation actor at the implementation level is the District. Districts in Tanzania play an important role in linking the national level and the community who are the end users of the intervention packages. They are involved in planning, mobilization and training of communities for execution and maintenance of facilities and monitoring and evaluation of water, sanitation and hygiene facilities and community management systems. The Government of Tanzania is committed to strengthening and rationalizing the framework for monitoring and evaluation at the different levels of local governments. Therefore training of the District team on MTUMBA hygiene and sanitation approach was a step in building their capacity to implement, monitor and evaluate their programs and also steer them basing on evidence, lessons learnt and data generated from the supportive supervisory visits. MTUMBA raises hygiene and sanitation expectations and needs which must be met with an appropriate range of products and services provided by the private sector. In all districts visited systems to facilitate training, supervision, monitoring and regular assessment of MTUMBA and other hygiene and sanitation activities were not in place.

During the evaluation a number of obstacles were mentioned by different actors in the districts. They include:

i. Disjunctive relationship exist at district level of the departments jointly implementing water, hygiene and sanitation activities (no joint meetings, plans, supervision, monitoring and evaluation, reports) hence limited and disintegrated resources for district, ward and village plans to support the MTUMBA approach.

ii. Lack of joint monitoring, supervision, evaluation and reporting mechanisms to reflect MTUMBA approach issues in the surveyed districts. Most of reports were health facility based not reflecting community issues whereby MTUMBA has been promoted and implemented.
iii. Unfavourable competition rather cooperation was identified to exist between health and water departments on issues of water, sanitation and hygiene; water department has put hands-off on MTUMBA issues and only left to the health department.
iv. Inadequate fund for follow up the implementation and progress of MTUMBA approach by the district team, hence no follow up was made in the districts.
v. NGOs implementing MTUMBA approach in the districts do not inform or report to the council about their work in the communities (there is no monthly, quarterly, mid-year and annual reports). Further analysis also revealed that, the district themselves didn't have mechanisms in place to follow up as well as to make use of the reports wherever could be provided.

The observation made by our team is that implementation of MTUMBA activities at the district level is affected by low political will and policy support; the varying degrees of integration of MTUMBA into government structures and the lack of resources both financial and human resource. Under the local government setting of Tanzania, a ward is a link between district council and a village in rural areas and street in urban setting. Information gained from the study indicates that there is no a single person like a patron responsible for MTUMBA issues at ward level. On the side of the Ward government structure, no one is real responsible for the implementation and sustainable running of MTUMBA activities at Ward level.

Lack of supportive supervision from district level was also mentioned to be the major short fall in implementing MTUMBA activities. It is with supervision where people can monitor the progress of implementation and make the necessary improvement. Our findings indicate that;

i. In planning MTUMBA approach it is more of multi-sectoral but during implementation, it appears as they are only health related activities as the only player is the health department
ii. Feedback from district to community level has been lost because ward councillors were not involved in the process, as they act as important link between district and community
iii. District health team does not conduct any supervision or evaluation at ward and community level on MTUMBA activities, and therefore they lack information on what has been done in the community.

3.12.2 District health departments' approaches on sanitation

Despite the efforts by partners; DMDD, HAPA and SEMA in promoting sanitation and hygiene in the study areas by insisting on improved latrine construction and use, the health departments are still insisting on just having latrines disregarding the quality.

> An animator in Mambali ward explained, *"the district health department provides no or limited professional advice as they are only interested to see households are having latrines. To them any latrine is ok, one with a poor quality latrine and the other with good quality latrine to them they are considered to have complied with the district health department requirement for each household to have a latrine. Some people seem confused when we tell them on the need to improve their latrines as the Ward Health Officer who penalizes households without latrines have inspected and accepted the latrine as it is".*

An artisan in Mambali ward complained that, "*the exercise of rallying the community behind the MTUMBA approach on construction or improving the existing latrines was made difficult because those households with latrines which were accepted by Health Officers were not understanding as to why they have to improve or construct improved latrines in their households*". The coordinator of hygiene and sanitation at the department of health in Nzega council explained that; "*due to lack of funds, we normally don't undertake hygiene and sanitation promotional activities in the council and we only do that during cholera or other diarrheal diseases outbreaks as at this time an emergency fund is made available to control the disease outbreak*".

3.12.3 Geographic, economic and social-cultural challenges

At community level, the MTUMBA project faced geographical, economic, and social-cultural challenges during its implementation. Types of soil structure in some of the areas were identified to slow down construction of latrines by making pit digging a challenging task. Many respondents mentioned hard rocks in their areas as a challenge forcing them to dig shallow pit latrines a bit far from houses to avoid smell while sandy soil was said to be unstable and collapsed any time even when digging. High water table forced shallow pits in Mambali, and resulted to latrine sinking. The presence of a forest in the nearby area made it difficult for people in its neighborhood to build and use latrines as they defecate easily in the forest. Long distance, poor road infrastructures and lack of remunerations were challenges for artisans and animators when making outreach advocacy and construction of latrine services. Scarcity of water was mentioned by most respondents to be affecting construction of slabs, latrine structures and for other sanitation purposes as people have to fetch water a far distance from their houses and working places. Another challenge was posed by low productivity of economic activities of the areas.

In Masieda site, all respondents mentioned small scale gold mining activities in the area was discouraging the project as the mine site was said to consist more than 3,000 miners who had not adopted the approach. Instead, they defecated in open spaces and near the river,

the feces getting into the only water source in the area contaminating water which is used by people in community.

> "*Mining activities at Masieda discourage and bring back the project to 2007 situation. You have three thousand people who do not use toilets. They mine in the same source of water for people and animals –consumption, the only source*". Key informant, Masieda.

Results also show that people from some ethnic groups do not appreciate the importance of sanitation technology due to the nature of their activities; nomadic life that leads to frequent shifting from one place to another in search for food for themselves and pasture and water for their animals. Such groups included the Hadzabe, living by hunting and gathering fruits, the Tatoga and Sukuma who are animal keepers.

Shortages of fund was said to be a challenge as district authorities do no allocate funds to support the initiative, artisans and animators activities. Local NGOs in the surveyed districts are giving less priority to hygiene and sanitation issues as well as they didn't have any entry point to the project. Local NGOs survives on tenders to carry out certain activities in their jurisdiction in the district and that with sanitation and hygiene activities apart from garbage collection; there is no any door open for them to chip in. Shortages of fund was said to be a big challenge as district authorities do not allocate funds for supporting the local NGOs participation in executing hygiene and sanitation activities in the district. According to few respondents, traditional beliefs and cultures make people hesitant or reluctant in adopting the approach. Some people do not see importance of latrines and others cannot accept sharing latrines with their children and in-laws.

> *"Some people do not see the importance of having latrines due to their cultural beliefs or environment in which they live (near forest). They are not convinced on the importance of latrines and they find it easier to defecate in the forest. Some of the beliefs oppose collection of family faeces in one place (latrine) as they can be easily bewitched hence they are comfortable to defecate in a bush*". Key Respondent, Mambali.

Concerns were also raised that sanitation centres are not the only way of improving latrines construction and use. Experience from implementation of MTUMBA approach adopted by CARE in Mvomero and Kilosa districts indicate that it is possible to create demand for latrines without construction of Sanitation Centre:

"…The cost of building sanitation centres is very high…….to reduce the costs we use MTUMBA approach (without building sanitation centres) to improve the sanitation and hygiene situation in Mvomero and Kilosa districts yet the outcomes are there". Respondent from the national level.

4.0 CONCLUSION AND RECOMMENDATION

Globally, pilot implementation studies have been accepted as an effective means to guide project design, planning, promotion of community participation, implementation and monitoring and evaluation to guide scale up of the intervention. In the MTUMBA approach, the community was prepared and then supported by NGOs (DMDD, HAPA and SEMA) and worked together and achieved positive results on sanitation and hygiene improvement in Mambali, Masieda and Mtoa wards. The pilot MTUMBA implementation in the wards has been used to test innovative community-based approaches for improved latrine construction from locally available materials and technologies. Community participation was initiated and promoted in the project planning, preparation and implementation of the pilot activities on sanitation and hygiene in the piloted wards.

The MTUMBA pilots in the three wards were designed to test low-cost appropriate sanitation technologies and also to promote demand for better sanitation and hygiene practices. The pilots have raised awareness among Local Government Authorities (LGAs) about the relevance of improved sanitation and hygiene and willingness to integrate the MTUMBA approach in the Comprehensive Council Health Plan (CCHP). The pilots have also highlighted a policy weakness that need to be addressed as the current bylaws makes the promotion of improved latrine difficult as it does not specify on acceptable latrine quality. There is need for a sanitation and hygiene policy to provide for the full range of interventions (access to sanitation technology, promotion of hygienic behaviors and the enabling environment for sanitation and hygiene technologies) which will enable households to improve their health status. Bylaws need to be particularly useful in providing incentives for improved sanitation and hygiene promotion to take a more prominent role over "traditional" latrine.

Our household surveys, in-depth interviews, focus-group discussions with the community and LGA officials and desk review showed that, with committed leadership, it is worthwhile using the MTUMBA approach as it is effective in promoting hygiene, sanitation and community promotion of latrine construction and use. Overall, latrine coverage in the surveyed areas went from 36.3% in 2007 to 68% in 2011. The percentage of improved latrines increased from 0% in 2007 to 21.4% in 2011 which is higher than the national average of 12%. The commonest sanitation facilities found in the sampled households were the pit latrines which were present in an overall of 1,083 (90%) of the surveyed households. A total of 120 (10%) of surveyed households were found to have no any form of latrine. Traditional pit latrines constituted 64.3% of all latrines constructed in the surveyed households.

In the surveyed households where the MTUMBA advocacy materials have been well used, they have enhanced the work of the artisans and animators and were popular with the

households as they retain many of the messages portrayed in the tools. We found that the quality of the participation can be increased by the production of household tool kit with few well-designed hygiene and sanitation steps. Our experiences in the study districts have shown that uptake of MTUMBA approach for hygiene and sanitation promotion depends on the selection, training and support provided to animators and artisans as well as the investment for the sanitation centre. The MTUMBA is a new and empowering approach towards the provision of hygiene and sanitation services and infrastructure, from our findings; we have a number of recommendations to make that have serious policy implications for other such programmes.

1. MTUMBA is a software led approach where inherent potential and social capital of the community is harnessed and the animators and artisans plays a facilitating role and the hardware introduced later after the community is made aware and start demanding for improved sanitation facilities to bridge the gap.
2. Trained, empowered and motivated artisans and animators are important triggers and igniters of sanitation behavior changes and they are the ones behind the increase in demands and construction of improved latrines.
3. The role of water, sanitation and hygiene partners (DMDD, SEMA and HAPA) in assisting communities and the participatory analysis of village sanitation situation and the facilitation in action planning and taking action was key in the community increase in awareness and demands for open defecation free environment and latrine construction and use and in particular the adoption of improved latrines.
4. MTUMBA needs multi-sectoral collaboration; key district departments need to be effectively involved. Evidence based guideline is needed on latrine options relating to the local context, considering community preference, construction materials, ease of use, willingness and ability to pay.
5. Involving the local government authority (LGA) departments responsible for community development, education, water, hygiene and sanitation from the beginning is important for sustainability as the programme is integrated in the comprehensive council plan the local government officials feel happy to be credited with the success and their ownership of the programme grows faster.

Our findings have revealed that, currently MTUMBA activities are loosely incorporated in LGA activities. An innovative approach to customize MTUMBA hygiene and sanitation activities by strongly link MoHSW with MoW (RWSSP staged 'Household water and sanitation project Cycle): the two ministries with other stakeholders and water, sanitation and hygiene partners must network and have collective actions on:

1. Baseline data collection, analysis, interpretation and decision making on MTUMBA improvement
2. Collective and participatory planning, implementation, supervision and monitoring and evaluation of MTUMBA activities.

3. The MTUMBA implementing team need to develop a uniform comprehensive behaviour change training guides to be used for scale up which:
    i. identifies key messages and sets them in an attractive, influential format
    ii. identifies key audiences (*segmentation*) and identifies strategic ways to reach them (*communication channels)*
    iii. is part of a 6 strand (*6 points of contact)*, reinforcing communication approach which might include the following possible contact points (*reinforcing the same messages)*:
        - ☞ identifies key messages and sets them in an attractive, influential format
        - ☞ identifies key audiences (*segmentation*) and identifies strategic ways to reach them (*communication channels)*
        - ☞ reinforcement of messages:
            - ✓ Multi-media, radio, TV, Phone-in
            - ✓ House-to-house by animators, health workers, with respected local leaders – promoting improved behaviours and improved technologies
            - ✓ Religious leaders (*Mosque, Church – religious gatherings)*
            - ✓ Schools and school children (*School health clubs, child-to-child)*
            - ✓ Womens' and youth groups, local associations – village health clubs
            - ✓ Private sector promotional billboards, posters, leaflets, branded products – franchise for soap sales and other sanitary ware
            - ✓ Campaign (WASH)
            - ✓ Enforcement (could be linked with animators and health workers going house to house)

MTUMBA promotional materials should be made accurate to the local situation and should focus on key behaviours:

i. Safe management of all excreta in the living environment (particularly child faeces).
ii. Hand washing with soap or some suitable '*scouring*' agent at **4** critical times (after defecation, after cleaning a child's bottom, before preparing food and before eating)
iii. Safe drinking water chain (from a protected source, via a protected vessel, into protected storage with safe extraction).
iv. Point of use water treatment and safe storage
v. Safe food preparation and storage

The piloted MTUMBA approach have exemplified good potential on promoting sanitation behaviors and hygiene which are key to achieving health gains from improved sanitation and hygiene. MTUMBA approach is amicable for scale up as it promotes skills, technologies and practices for healthy living defined as (i) safe disposal of feces by construction and use of improved latrines, (ii) safe collection, treatment and storage of drinking water; (iii) demonstration of latrine and other sanitation technologies; and (iv) training and

empowerment of animators and artisans by transferring hygiene and sanitation technologies to the local situation in the community.

The MTUMBA approach is very appropriate for the National Sanitation Campaign as it combines the advantages of PHAST, PRA and CLTS as well as addressed the weaknesses identified from each. The MTUMBA approach is now a powerful tool for application:

i. To create awareness, sensitize and trigger the community on behavioral changes towards adoption of improved sanitation and hygiene practices and technologies.

ii. To sensitize LGAs to take leadership and integrate the promotion and implementation of improved sanitation and hygiene practices and technologies in their plans.

iii. To mobilize communities to form water, sanitation and hygiene technology demonstration centres charged with the duties of ensuring smooth and effective transfer of technology to a local situation.

iv. To mobilize communities to select artisans and animators charged with the duties of running the water, sanitation and hygiene technology demonstration centre, promotion of sanitation and hygiene technologies in the community as well as providing technical support in the provision of water sources, construction of improved latrines as well as in improving the existing latrines.

v. To provide technical advice and support to households, schools, and institutions and in public and in private places on sanitation and hygiene practices and technologies.

vi. To realize health gains in reducing morbidity and mortality by improving sanitation and hygiene and promotion of household water treatment and safe storage in an integrated manner.

The integration of MTUMBA approach as a key methodology into the government structures through the national sanitation campaign is an important step towards evidence based implementation of an approach locally developed, tested and optimized to the Tanzanian local situation and context in improving and bringing about the desired community sanitation and hygiene behavioural changes. It is recommended that, **donor funding to support MTUMBA activities need to be channelled through LGAs**.

5.0 LIMITATIONS OF THE MTUMBA APPROACH

A number of issues have emerged that can be considered as limitations of the MTUMBA approach.

1. The success of the MTUMBA approach is largely dependent on the quality and skills of the partners (DMDD, HAPA and SEMA) who triggers and helps on community selection and training of the animators and artisans. The animators and artisans in turns are the facilitators who ignite the communities' participation and eventually

empower them to choose the type of improved latrine they can afford. The lack of good quality MTUMBA approach facilitators, who are the most important tool of this approach, could be a major limitation.

2. The selection and construction of latrine options depends on the geographical area, ethnic group and the level of education. This is a limitation as one needs to promote certain latrine option need to have enough information of the community and whether that one is acceptable to them.
3. A greater challenge is attitudinal change within the local government departments. Such institutions must undergo an attitudinal transformation for a more enabling internal environment that collaborates and work together on program planning, implementation and monitoring and evaluation.
4. Similarly, MTUMBA approach requires the Health Department in collaboration with water, hygiene and sanitation partners to invest in staff capacity building at the grassroots level. Such training and capacity building of a large number of artisans and animators can be time consuming and resource demanding, with openness to learning from NGOs and communities and therefore many government departments are unwilling to do so. Many institutions also still believe that the solution lies in just building infrastructure. If this mind-set does not change, it could be a major limitation to further roll out.
5. Another limitation that has been observed is the weakness of the Artisan Groups formed in villages so far, none of which have any sufficient financial, technological or facilitation capacity to take the approach forward as a programme. Unless these Artisan Groups are strengthened systematically to emerge as strong community organizations, the risk of losing the momentum will remain.
6. Another limitation, which might crop up at any time, is the mindset of rural communities to demand free or subsidized latrine materials and construction. People might begin to feel that they should wait and avail the opportunity of free supplies or subsidy instead of investing their own time and money. This could slow down the speed of the programme.
7. The strength and uniqueness of the MTUMBA approach are its innovations in latrine options and technology, community mobilization, scaling up, institutional capacity building and programme management by partners (DMDD, SEMA and HAPA). If the programme continues to expand substantially, one limitation could be partner's ability to cope with and adapt to growing challenges and to provide continuing professional institutional support.

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4.5 Appendices

Appendix 1: Demographic and socio-economic characteristics of respondents

Region	**Tabora**	**Manyara**	**Singida**	**Total**
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
Sex	**398**	**403**	**402**	**1,203**
Male	219 (55.03%)	255 (63.28%)	164 (40.80%)	638 (53.03%)
Female	179 (44.97%)	148 (36.72%)	238 (59.20%)	565 (46.97%)
Age groups in years				
19-34	180 (45.23%)	146 (36.23%)	166 (41.29%)	492 (40.90%)
35-44	126 (31.66%)	138 (34.24%)	108 (26.87%)	372 (30.92%)
45-54	61 (15.33%)	68 (16.87%)	59 (14.68%)	188 (15.63%)
55+	31 (7.79%)	51 (12.66%)	69 (17.16%)	151 (12.55%)
Mean age + SD	**37.8±11.9**	**38.9±12.8**	**40.1±14.4**	**39.0±13.1**
Marital status				
Single	26 (6.53%)	34 (8.44%)	18 (4.48%)	78 (6.48%)
Married	334 (83.92%)	327 (81.34%)	327 (81.34%)	1,013 (84.21%)
Separated	5 (1.26%)	5 (1.24%)	2 (0.50%	12 (1.00%)
Divorced	7 (1.76%)	0 (0.00%)	9 (2.24%)	16 (1.33%)
Widowed	19 (4.77%)	11 (2.73%)	18 (4.48%)	48 (3.99%)
Cohabiting	7 (1.76%)	1 (0.25%)	28 (6.97%)	36 (2.99%)
Literacy level				
Literate	204 (51.26%)	271 (67.25%)	273 (67.91%)	748 (62.18%)
Illiterate	194 (48.74%)	132 (32.75%)	129 (32.09%)	455 (37.82%)
Level of education				
No formal education	200 (50.25%)	138 (34.24%)	138 (34.33%)	476 (39.57%)
Primary education	189 (47.49)	237 (58.81%)	248 (61.69%)	674 (56.03%)
Secondary education	7 (1.76%)	26 (6.45%)	14 (3.48%)	47 (3.91%)
Above secondary education	1 (0.25%)	1 (0.25%)	0 (0.00%)	2 (0.17%)
Adult education	1 (0.25%)	1 (0.25%)	2 (0.50%)	4 (0.33%)
Economic activity				
Agriculture	267 (67.09%)	90 (22.33%)	325 (80.85%)	682 (56.69%)
Animal keeping	17 (4.27%)	8 (1.99%)	2 (0.50%)	27 (2.24%)
Agriculture and animal keeping	103 (25.88%)	292 (72.46%)	53 (13.18%)	448 (37.24%)
Petty business	9 (2.26%)	9 (2.23%)	15 (3.73%)	33 (2.74%)
Employed	1 (0.25%)	3 (0.74%)	1 (0.25%)	5 (0.42%)
Self-employment	1 (0.25%)	1 (0.25%)	4 (1.00%)	6 (0.5%)
Others	0 (0.00%)	0 (0.00%)	2 (0.50%)	2 (0.17%)
Mean Household size				
Adults				
Male	1.9	2.8	2.5	2.4
Female	1.9	2.5	2.2	2.2
Children				
Girls	1.5	1.3	0.7	1.2
Boys	1.5	0.9	0.7	1.0
Total Mean Household size	6.6	7.4	6.2	6.7

Appendix 2: Socio-economic characteristics of respondents

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
Ownership of Assets				
House	380 (95.48%)	382 (94.79%)	391 (97.26%)	1,153 (95.84%)
Radio	266 (66.83%)	194 (48.14%)	240 (59.70%)	700 (58.19%)
TV	9 (2.26%)	7 (1.74%)	13 (3.23%)	29 (2.41%)
Motorcycle	26 (6.53%)	4 (0.99%)	20 (4.98%)	50 (4.16%)
Bicycle	313 (78.64%)	131 (32.51%)	233 (57.96%)	677 (56.28%)
Car	9 (2.26%)	17 (4.22%)	4 (1.00%)	30 (2.49%)
Cell phone	189 (47.49%)	170 (42.18%)	143 (35.57%)	502 (41.73%)
Solar system	18 (4.52%)	16 (3.97%)	10 (2.49%)	44 (3.66%)
Number of households owning Livestock				
Sheep	56 (14.07%)	251 (62.28%)	98 (24.38%)	405 (33.67%)
Goats	223 (56.03%)	301 (74.69%)	132 (32.84%)	656 (54.53%)
Cows	208 (52.26%)	291 (72.21%)	178 (44.28%)	677 (56.28%)
Chicken	275 (69.10%)	304 (75.43%)	204 (50.75%)	783 (65.09%)
Duck	37 (9.30%)	28 (6.95%)	38 (9.45%)	103 (8.56%)
Donkey	11 (2.76%)	203 (50.37%)	2 (0.50%)	216 (17.96%)
Pigs	3 (0.75%)	144 (35.73%)	1 (0.25%)	148 (12.30%)
Source of energy for cooking				
Solar electricity	1 (0.25%)	1 (0.25%)	0 (0.00%)	2 (0.17%)
Kerosene	2 (0.50%)	2 (0.50%)	0 (0.00%)	4 (0.33%)
Charcoal	78 (19.60%)	15 (3.72%)	9 (2.24%)	102 (8.48%)
Firewood	315 (79.15%)	383 (95.04%)	391 (97.26%)	1,089 (90.52%)
Gas	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Roofing material				
Corrugated iron sheet	81 (20.35%)	101 (25.06%)	76 (18.91%)	258 (21.45%)
Thatched grass	317 (79.65%)	58 (14.39%)	30 (7.46%)	405 (33.67%)
Mud/earth	0 (0.00%)	244 (60.55%)	295 (73.38%)	539 (44.80%)
Main Source of water				
Tap/Piped water	90 (22.61%)	82 (20.35%)	160 (39.80%)	332 (27.60%)
Protected wells	117 (29.40%)	82 (20.35%)	7 (1.74%)	206 (17.12%)
Protected springs	3 (0.75%)	5 (1.24%)	1 (0.25%)	9 (0.75%)
Unprotected wells	144 (36.18%)	92 (22.83%)	6 (1.49%)	242 (20.12%)
Unprotected springs	29 (7.29%)	14 (3.47%)	1 (0.25%)	44 (3.66%)
Rivers/streams/lakes/ponds	14 (3.52%)	127 (31.51%)	226 (56.22%)	367 (30.51%)
Ownership of Water Sources				
Self	16 (4.02%)	2 (0.50%)	4 (1.00%)	22 (1.83%)
Community/village	373 (93.72%)	392 (97.27%)	387 (96.27%)	1,152 (95.76%)
Other household	4 (1.01%)	1 (0.25%)	0 (0.00%)	5 (0.42%)

Appendix 3: Knowledge about MTUMBA

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
Awareness about MTUMBA				
Heard about MTUMBA	250 (62.81%)	365 (90.57%)	352 (87.56%)	967 (80.38%)
Have not heard about MTUMBA	148 (37.19%)	38 (9.43%)	50 (12.44%)	236 (19.62%)
Source of knowledge about MTUMBA				
Village meeting	133 (33.42%)	287 (71.22%)	199 (49.50%)	619 (51.45%)
Attended training on participatory approaches to improve environmental sanitation	14 (3.52%)	145 (35.98%)	15 (3.73%)	174 (14.46%)
Fliers, brochures, posters	3 (0.75%)	108 (26.80%)	10 (2.49%)	121 (10.06%)
Animators and artisans	43 (10.80%)	158 (39.21%)	35 (8.71%)	236 (19.62%)
Radio	2 (0.50%)	113 (28.04%)	16 (3.98%)	131 (10.89%)
TV	8 (2.01%)	25 (6.20%)	3 (0.75%)	36 (2.99%)
Sanitation centre	37 (9.30%)	152 (37.72%)	107 (26.62%)	296 (24.61%)
Religious leaders	6 (1.51%)	111 (27.54%)	16 (3.98%)	133 (11.06%)
Village leaders	104 (26.13%)	172 (42.68%)	71 (17.66%)	347 (28.84%)
Attended meeting on improved latrine construction				
Attended	164 (41.21%)	333 (82.63%)	204 (50.75%)	701 (58.27%)
Have not attended	234 (58.79%)	70 (17.37%)	198 (49.25%)	502 (41.73%)
Facilitators of meetings on improved latrine construction				
District facilitator	25 (15.24%)	162 (48.65%)	11 (5.39%)	198 (28.25%)
Ward facilitator	57 (34.776%)	57 (17.12%)	44 (21.57%)	158 (22.54%)
Village facilitator	79 (48.17%)	108 (32.43%)	54 (26.47%)	241 (34.38%)
NGO	3 (1.83%)	1 (0.30%)	90 (44.12%)	94 13.41%)

Appendix 4: Latrines in the surveyed households

4.1 Types of latrines observed in the surveyed households

Type of Latrine	Mambali	Masieda	Mtoa	Total
1. VIP	5 (1.6%)	26 (6.5%)	2 (0.5%)	33 (3.1%)
2. Improved Pit latrine	69 (22.2%)	64 (16.1%)	17 (4.5%)	150 (13.9%)
3. Traditional pit latrine	60 (19.3%)	303 (76.1%)	333 (89.0%)	696 (64.3%)
4. Pour flush-direct to pit	5 (1.6%)	2(0.5%)	0(0.0%)	7(0.7%)
5. Pour flush-offset to pit	10(3.2%)	0 (0.0%)	2(0.5%)	12(1.1%)
6. Water closet with septic tank system	9(2.9%)	0(0.0%)	19(5.1%)	28(2.6%)
Total	**311**	**398**	**374**	**1,083**

4.2 Odds ratios on latrine construction

	Own latrine	OR	95%CI	p-value	Total
Literacy level					
Illiterate	375(82.4)	1			455
Literate	708(94.7)	3.8	[2.5 – 5.6]	0.0	748
Education level					
Not formal/Adult education/Do not Read and Write	397(83.1)	1			478
At least Primary education	686(94.6)	3.6	[2.4 – 5.4]	0.0	725
Roofing materials					
Thatched grass	325(80.1)	1			406
Earth/mud	512(95.0)	4.7	[3.0 – 7.5]	0.0	539
Corrugated iron sheets	246(95.3)	5.1	[2.7 – 9.6]	0.0	258
Total	**1,083(90.0)**				**1,203**

4.3 Number of households with children, disabled and old persons

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
	N=398	N=403	N=402	N=1,203
Young children, disabled person & old persons present	109 (27.39%)	31 (7.69%)	111 (27.61%)	251 (20.86%)
Young children, disabled person & old persons absent	289 (72.61%)	372 (92.31%)	291 (72.39%)	952 (79.14%)

4.4 Latrine construction with consideration of needs of special groups

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
	N=398	N=403	N=402	N=1,203
Constructed in consideration of needs of special groups	4 (1.01%)	18 (4.47%)	7 (1.74%)	29 (2.41%)
Constructed without consideration of needs of special groups	314 (78.89%)	326 (80.89%)	359 (89.30%)	999 (83.04%)
Don't know needs of special group	80 (20.10%)	59 (14.64%)	36 (8.96%)	175 (14.55%)

4.5 Reasons for latrine construction without considering needs of special groups

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
	N=398	N=403	N=402	N=1,203
Poverty/it is expensive	93 (23.37%)	18 (4.47%)	106 (26.37%)	217 (18.04%)
Lack of knowledge/understanding on disabled latrine	34 (8.54%)	45 (11.17%)	105 (26.12%)	111 (27.61%)
Absence of disabled in the household	45 (11.31%)	130 (32.26%)	111 (27.61%)	286 (23.77%)

Appendix 5.1: Latrine construction after the MTUMBA sanitation approach

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
	N=398	N=403	N=402	N=1,203
Constructed improved latrine	56 (14.07%)	211 (52.36%)	18 (4.48%)	285 (23.69%)
Modified/improved the existing latrine	154 (38.69%)	125 (31.02%)	40 (9.95%)	319 (26.52%)
No changes (continue with old latrine or not constructed latrine	188 (47.24%)	67 (16.63%)	344 (85.57%)	599 (49.79%)

Appendix 5.2: Impetus to construct new or improve the existing latrine

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
	N=398	N=403	N=402	N=1,203
Personal efforts/initiatives	115 (28.89%)	32 (9.52%)	31 (7.71%)	178 (14.80%)
Participatory approach (MTUMBA)	85 (21.36%)	282 (69.98%)	27 (6.77%)	394 (32.75%)
Neighbours advise	1 (0.25%)	2 (0.50%)	0 (0.00%)	3 (0.25%)
Bylaws	2 (0.50%)	15 (3.72%)	0 (0.00%)	17 (0.14%)

Appendix 5.3: Full/collapsed latrines

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
	N=398	**N=403**	**N=402**	**N=1,203**
Latrine is full/collapsed	74 (18.59%)	71 (17.62%)	114 (28.36%)	259 (21.53%)
Latrine is being used	324 (81.41%)	332 (82.38%)	288 (71.64%)	944 (78.47%)

Appendix 5.4: Measures taken in response to full/collapsed latrine toilet in the household

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
	N=398	**N=403**	**N=402**	**N=1,203**
Construction of a new latrine	39 (52.70%)	48 (67.61%)	94 (82.46%)	181 (69.88%)
Maintenance of the existing latrine	31 (41.89%)	22 (30.99%)	4 (3.51%)	57 (22.01%)
Using neighbours latrine	3 (4.05%)	0 (0.00%)	12 (10.53%)	15 (5.79%)
Others (open defecation in the bush/termite mounds)	1 (1.35%)	1 (1.41%)	4 (3.51%)	6 (2.32%)

Appendix 6.1: Respondents views on behavior change after MTUMBA approach

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
	N=398	N=403	N=402	N=1,203
Noted behaviour change after MTUMBA	288 (72.36%)	328 (81.39%)	347 (86.32%)	963 (80.05%)
Have not seen behaviour changes after MTUMBA	110 (27.64%)	75 (18.61%)	55 (13.68%)	240 (19.95%)

Appendix 6.2: Respondents views on the sources of sanitation and hygiene behavior changes observed

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
	N=398	N=403	N=402	N=1,203
Personal initiatives (modernity/civilization)	129 (44.79%)	17 (5.18%)	156 (44.96%)	302 (31.36%)
Participatory approach (MTUMBA)	141 (48.96%)	294 (89.63%)	176 (50.72%)	611 (63.45%)
Neighbours advise	8 (2.78%)	0 (0.00%)	1 (0.29%)	9 (0.93%)
Bylaws	6 (2.08%)	15 (4.57%)	5 (1.44%)	26 (2.70%)
Health education, Health workers, Radio news	4 (1.39%)	2 (0.61%)	9 (2.59%)	15 1.56%)

Appendix 6.3: Respondents views on the sources of sanitation and hygiene behavior changes observed

Region	Tabora	Manyara	Singida	Total
District	Nzega	Mbulu	Iramba	
Ward	Mambali	Masieda	Mtoa	
	N=398	**N=403**	**N=402**	**N=1,203**
Respondents seen changes	180 (45.23%)	310 (76.92%)	300 (74.63%)	790 (65.67%)
Respondents have not seen changes	157 (39.45%)	76 (18.86%)	97 (24.13%)	330 (27.43%)
Respondents who don't know	61 (15.33%)	17 (4.22%)	5 (1.24%)	83 (6.90%)

Appendix 7: Costs of latrine options in Mambali ward

Types of latrine		Requirements (Artisans estimate of costs)				
	Pit digging & construction	Floor	Superstructure	Roof	Door	Total (Tshs)
1. VIP	70,000	30,500	158,500	73,000	0	262,000
2. Improved Pit Latrine 1 (thatched roof, pit made of cement-earth bricks)	70,000	24,300	70,500	15,900	0	110,700
3. Improved Pit Latrine 2 (thatched roof, pit made of burnt bricks)	83,500	24,300	70,500	15,900	0	110,700
4. Improved Pit Latrine 2 (roof of corrugated iron sheet, pit made of cement bricks)	35,000	24,300	50,000	50,000	0	124,300
5. Improved Pit Latrine 2 (roof of corrugated iron sheet, pit made of dry bonds)	35,000	24,300	40,000	70,000	0	134,300
6. Improved Pit Latrine 1 (thatched roof, pit made of wattle (*kihenge*)	10,500	24,300	5,500	15,900	0	45,700
7. Institutional latrine	532,000	60,000	177,000	101,000	0	338,000
8. Urinal	28,000	52,000	100,500	88,000	0	240,500
9. Baloo	0	11,500	5,000	3,500	0	20,000
10. Pour flush latrine	65,100	11,500	102,500	55,000	0	169,000
11. Disabled and elderly latrine	42,000	42,000	285,500	55,500	0	383,000
12. Kilimo kwanza latrine	217,000	90,000	667,000	89,500	0	846,500

Appendix 8: Costs of latrine options in Masieda ward

Types of latrine	Requirements (Artisans estimate of costs)					
	Floor	**Superstructure**	**Roof**	**Door**	**Pit digging, construction**	**Total (Tshs)**
1. VIP latrine	76,000	87,500	31,500	50,000	45,000	290,000
2. Institutional improved pit latrine	75,000	252,000	36,000	100,000	36,000	499,000
3. Traditional improved pit latrine						
i. Tembe	41,000	34,500	23,000	1,000	30,000	129,500
ii. Songe	32,000	50,000	28,000	1,000	24,000	135,000
iii. Kambi	39,000	66,500	28,000	50,000	27,000	210,500
4. Special groups	32,000	65,000	28,000	50,000	24,000	199,000