



LESSONS FROM THE FUATILIA MAJI PROJECT IN MOROGORO REGION, TANZANIA

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Executive summary

The [Fuatilia Maji project](#) (FM) aims at empowering rural communities to actively participate in the sustainable provision of clean water for domestic consumption through mobile technology use in community based tracking of access to, functionality, and quality of public water sources. In order to examine the added value of this project to the water monitors and perceived local changes among rural residents and duty bearers in Morogoro, Region, Tanzania, field activities were conducted between November and December 2021. Moreover, information on the challenges encountered by the water monitors while executing their functions on the project and corresponding recommendations were captured using semi-structured questionnaire surveys. A total of 17 community monitors were interviewed from the villages of Lugono, Matale, Vikenge, Mgudeni and Vitonga in Morogoro region in Tanzania. Additionally, 28 student monitors involved in FM were interviewed.

The findings generally revealed considerable benefits of the Fuatilia Maji project in skills and knowledge improvement and attitudinal change, for both the student and community monitors. However, more gains were observed for the student monitors than the community monitors.

About 96% and 82% of the student monitors cited very much gain in data collection skills using mobile phones and water quality testing respectively. Similarly, 93% of the community monitors highlighted considerable improvement in the way they tested water. A large proportion (about 92%) of the students sharpened their advocacy skills to a great extent. Further, an equal proportion of student monitors, that is 86% in each case, indicated improvement in both leadership and presentation skills. Also, 70% of the community monitors indicated considerable improvement in their presentation skills.

The overall attitudinal changes were higher for the student monitors in comparison to the community monitors. A large majority (between 92% and 100%) of student monitors revealed feeling greatly empowered and self-confident, respected by fellow citizens and duty bearers and greatly interested in community work as a result of their involvement on the FM project. Between 73% and 80% of the community monitors highlighted increased respect from fellow citizens and duty bearers, developing new ideas as well as gaining more interest in community work.

The most significant changes in the use, treatment and management of water sources in the communities were registered among the duty bearers especially at the village level as perceived by the community monitors. About 73% and 53% of the community monitors respectively reported improvement in the way these Village Duty Bearers (VDB) treated water and also a heightened advocacy for water services among duty bearers (DB). Almost half (53%) of the community monitors also indicated an increase in knowledge about water quality and functionality among citizens yet they observed that this did not yield much behavioral change in the way the citizens collected and treated water.

Generally less challenges were encountered by both student and community monitors. Internet connectivity and absence of water sample tests were the challenges common to both groups. The community monitors additionally indicated that they struggled to understand some data collection instructions in English while collecting data.

Emerging from the findings therefore is the need for recurrent trainings not only among the monitors but the entire citizenry in order to foster sustainable behavioral change in the use, treatment and management of water sources. There is also a need for collaboration between the monitors and technical personnel. The project should also explore trainer of trainers initiatives with community monitors at the lead. In these initiatives, linkages between technical personnel and community/student monitors should be formed for better monitoring of water resources. Moreover, monitors need to be briefed clearly on how to use the preferred language settings, so the data collection can be done entirely in Swahili especially for the community monitors on the Fuatilia Maji project.

List of acronyms

CBM	Community based monitoring
CS	Citizen science
DB	Duty bearers
FM	Fuatilia Maji
IOB	Institute of Development Policy

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1.0 Introduction

Water is undeniably a vital resource needed for survival of all life forms. More than half of the earth's surface is occupied by water (Holden, 2019), yet only about 1% of this resource is usable, either as ground or surface water (Massawe et al., 2019). Rural communities in most developing countries are disproportionately water scarce, with contaminated water sources in most instances (Ngomuo & Msoka, 2018). Sustainable access and provision of safe water enhances economic development and improved health (Hovden et al., 2020).

The population in Tanzania, especially those in rural areas, suffer immense water shortages (Mkonda, 2015). Almost half of the population lacks access to an improved water source (figure 1) (World Bank, 2017). Moreover, Tanzania's rural landscape still trails in its water coverage with a registered improvement of only 48% in water coverage between 1990 to 2016 (World Bank, 2017).

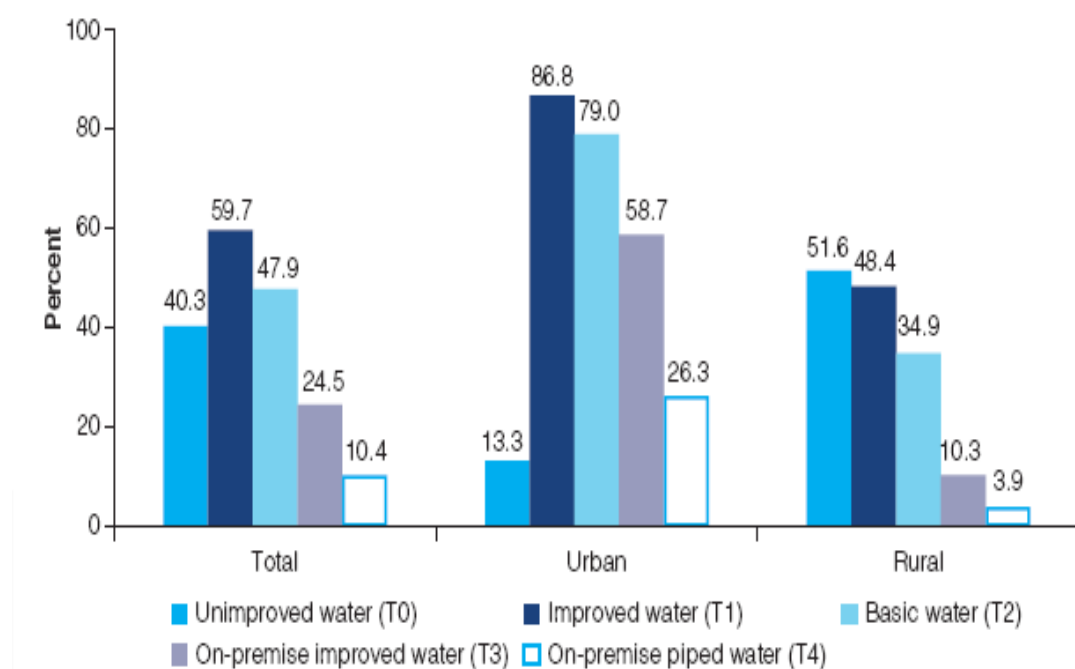
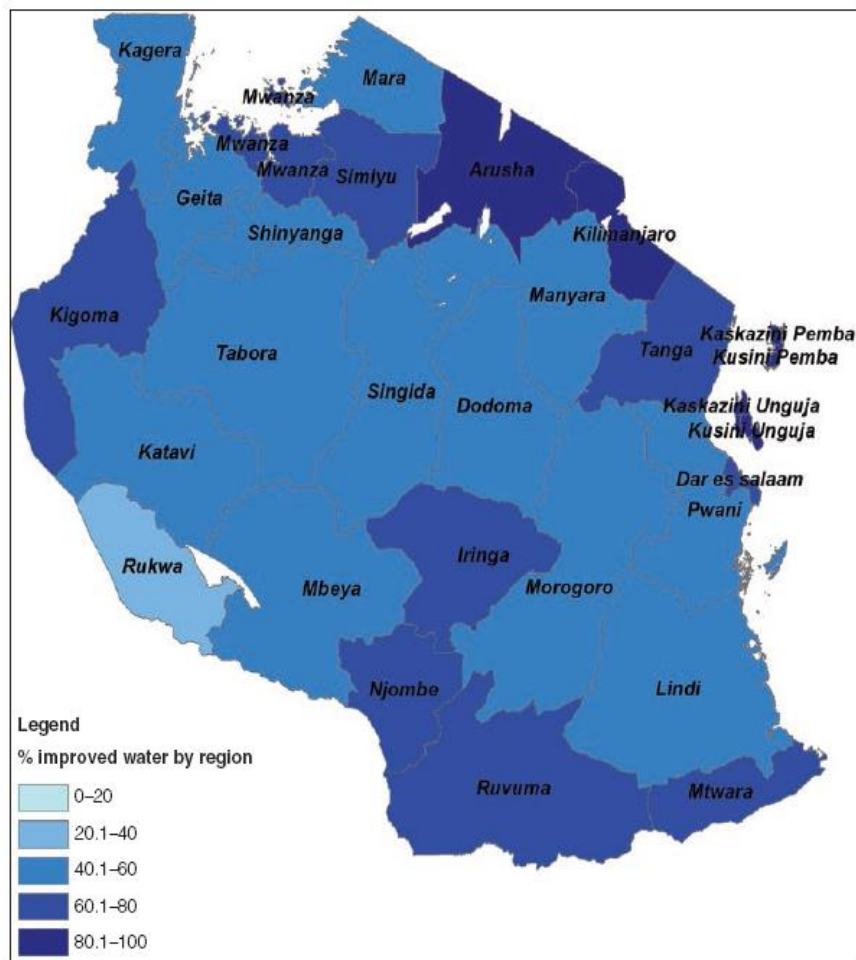


Figure 1: National, urban and rural water access by tier of service in Tanzania

*Source: World Bank, 2017, p. 18

Further, Tanzania is marred by regional inequality in water access (figure 2) (World Bank, 2017).



The acute water shortages coupled with poor sanitation and hygiene account for 12% of the mortality rate in Tanzania (Guerra & Ledesma, 2015). Sufficient and adequate water provision is however attainable with proper management of the numerous water sources in the country (Mkonda, 2015)

Figure 2: Regional access to improved water sources in Tanzania

**Source: World Bank, 2017, p.19*

The Tanzanian government spearheaded the provision of clean domestic water for all her citizens since the country attained its independence (Kaliba, 2002). However, a policy change in the early 2000s ushered in the need for community participation in the monitoring and management of water

sources, with the Ministry of Water (MoW), the overall governing institution responsible for water supply and water services in Tanzania, settling for a regulatory/ facilitatory role (Kaliba, 2002; Umeodum et al., 2021).

Community involvement/ participation would be achieved at all governance tiers through a bottom up approach. At the village level, a gender inclusive village water committee is set up to supervise/oversee the use and management of water sources on behalf of other community members (Kaliba, 2002). The technical personnel at the district then offers training to the selected village water committee whereas the water department at the regional level ensures implementation of the water policy and adherence to the rules and regulations. At the national level the ministry of water is responsible for resource allocation and large scale management of water projects (Kaliba, 2002). This institutionalized and decentralized system in water resource provision highlights the significance of Community Based Monitoring of water resources in Tanzania.

1.1 About Community Based Monitoring (CBM) of Water resources

CBM involves community tracking of quality, availability and usability of water resources (Carlson & Cohen, 2018), by combining scientific rigor and social concern (Flores-Díaz et al., 2018). Through CBM, local ownership and accountability in provision and management of public goods is promoted (Dewachter & Holvoet, 2017). Voluntary community participation is emphasized in this initiative, with minimal intervention of experts, either from research and academic, government or civil society institutions (Carlson & Cohen, 2018).

It is based on the premise that communities seek to understand and actively engage in the protection of their water sources from threats that may arise (Kanu et al., 2016), including; pollution, degradation and climate change, among others. Moreover, given the proximity of the community members to the public goods/ resources, they are better placed to timely provide and interpret resource related information thus increasing efficiency in the monitoring and evaluation process. Also, involving citizens in the water monitoring process avails them with the much needed relevant information for better decision making about their water sources.

Though locally centered, the justification for CBM initiatives may vary, including; informing decision making, enhancing local information access, awareness raising and community empowerment, filling monitoring gaps and fostering compliance to resource use laws (Kanu et al.,

2016). These motivations are time variant and may differ based on socio-economic factors of the individuals, households and communities like age, gender, level of education and social status.

Globally, adoption of CBM initiatives has intensified (Carlson & Cohen, 2018). Some of the reasons for the increased shift to CBM initiatives include; supplementing and support to the expert monitoring, increased community interest in and concern for natural resource and environmental health and increased access to affordable and easy to use technologies for water monitoring (Carlson & Cohen, 2018). In this report we expound on the lessons learnt / experiences from the Fuatilia Maji Project, a Community-Based water monitoring initiative.

1.2 Introducing the Fuatilia Maji project

In Morogoro region of Tanzania, lies the ‘[Fuatilia Maji](#)’ project (FM), a CBM initiative which is co-financed by VLIR-UOS and jointly managed by the Institute of Development Policy (IOB), University of Antwerp and Mzumbe University in Tanzania. It supports synergies between students and staff of IOB and Mzumbe University and local rural communities and duty bearers (IOB, 2019). FM was birthed after a needs assessment in the rural communities surrounding Mzumbe University revealed a gap in provision of timely and detailed information on the quality of rural water resources (IOB, 2019). For these rural communities, access to safe water is prioritized over education and infrastructural development, given its significance to livelihoods (IOB, 2019).



Image 1: Students from Mzumbe university and community monitors after a training on water related issues for conducting the needs assessment

“Fuatilia” is a Swahili word that means ‘follow up’ and “Maji” denotes water. Hence this action research project entails digital monitoring/follow up of availability, quality and usability of water sources in Morogoro region of Tanzania. FM aims at empowering rural communities to actively participate in the sustainable provision of clean water for domestic consumption (IOB, 2019). Through a monitoring system with warning flags, that is; red, orange and green (Image 2) implying water unsafe for both drinking and bathing, water unsafe for drinking but can be used for bathing and water safe for both drinking and bathing respectively, the communities are able to collect data on the quality of the water sources (Daily news reporter in Morogoro, 2021). In this project, mobile technology is used in community based tracking of access to, functionality and quality of public water sources (IOB, 2019). This information is then publicly shared on the [mwater portal](#) to be freely accessed by all citizens for informed Community Based Monitoring of the village water sources. The duty bearers are however notified by a text message with the link above to the results collected from the field activities in Tanzania.

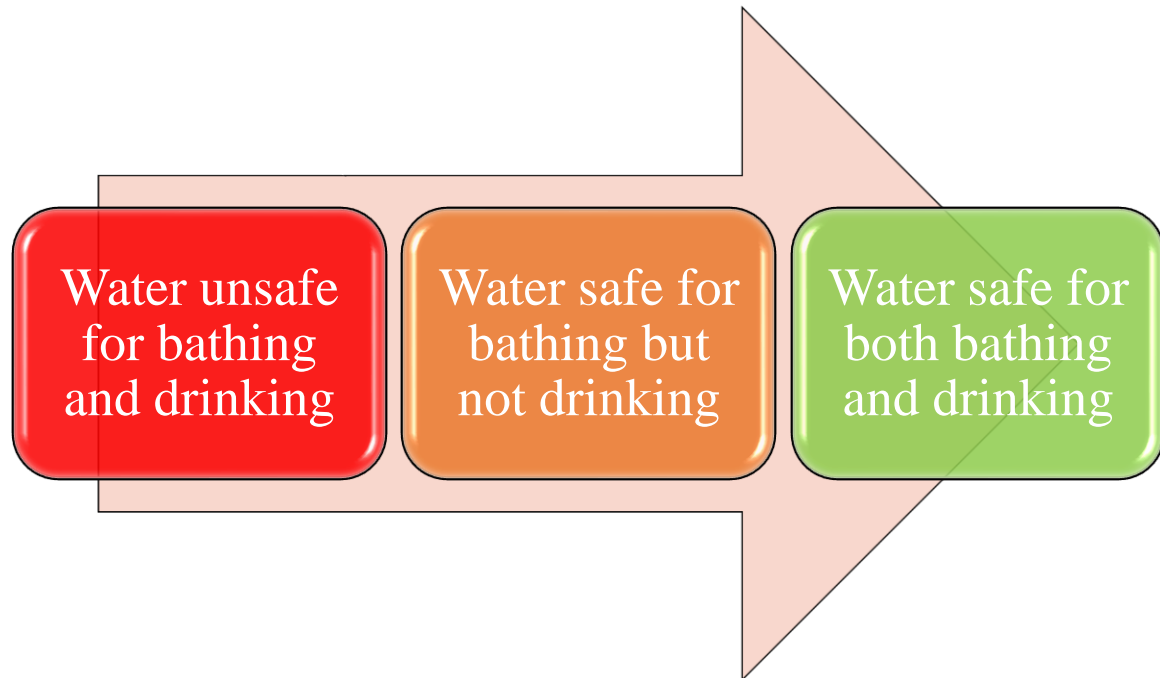


Image 2: Water quality progression based on the developed warning monitoring system

**Source: Authors' illustration*



Image 3: Water point flagged green implying water safe for drinking and bathing



Image 4: Water point flagged orange implying water safe for bathing but unsafe for drinking



Image 5: Water point flagged red implying water unsafe for both drinking and bathing

There is evidence that Community Based Monitoring Initiatives are beneficial to the stakeholders involved. However, for the Fuatilia Maji project such evidence was lacking so far. Therefore data was collected with the aim of exploring the contribution of the project in terms of skills, knowledge and attitudes to those involved in monitoring water sources in the communities. The findings are

also intended to document the perceived local changes since commencement of the Fuatilia Maji project and give insights in the potential of ICT enhanced resource monitoring to offer new information or faster ways to share information from the water source itself to the duty bearers and citizens.

2.0 Methods

Data collection for this report was conducted between 17th November 2021 and 18th December 2021 in Morogoro region, Tanzania. Information on the added value of involvement of student and community monitors on the Fuatilia Maji project was captured using a semi-structured questionnaire survey by interviewing both students and community monitors. Perceptions of the impact of the Fuatilia Maji project on the local communities were captured as well. A total of 17 community monitors were interviewed from the villages of Lugono, Matale, Vikenge, Mgudeni and Vitonga in Morogoro region in Tanzania. Additionally, 28 student monitors involved in FM were interviewed.

3.0 Results

3.1 Respondent characteristics

The results show a nearly balanced proportion of males (54%) and females (46%) in the student monitor sample, majority of whom had attained at least a Bachelor's degree (figure 3).

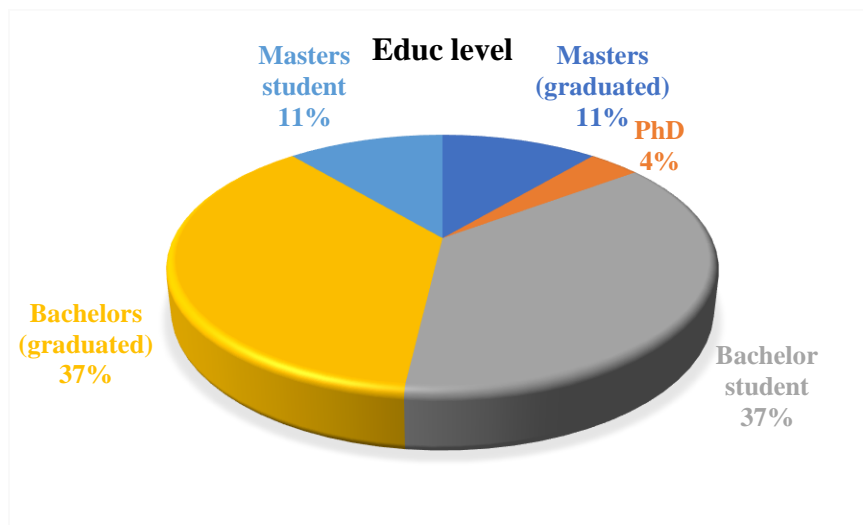


Figure 3: Education level of student monitors

On the contrary, majority of the community monitors sampled were male (71%), despite the explicit requirement of seeking a gender balance in the community monitor team set up¹. Unlike the student monitors of whom most had at least attained tertiary education, most of the community monitors had attained at most an ordinary secondary level education as shown in figure 4 below.

¹ At least one woman was to be selected per cohort of 3 community monitors.

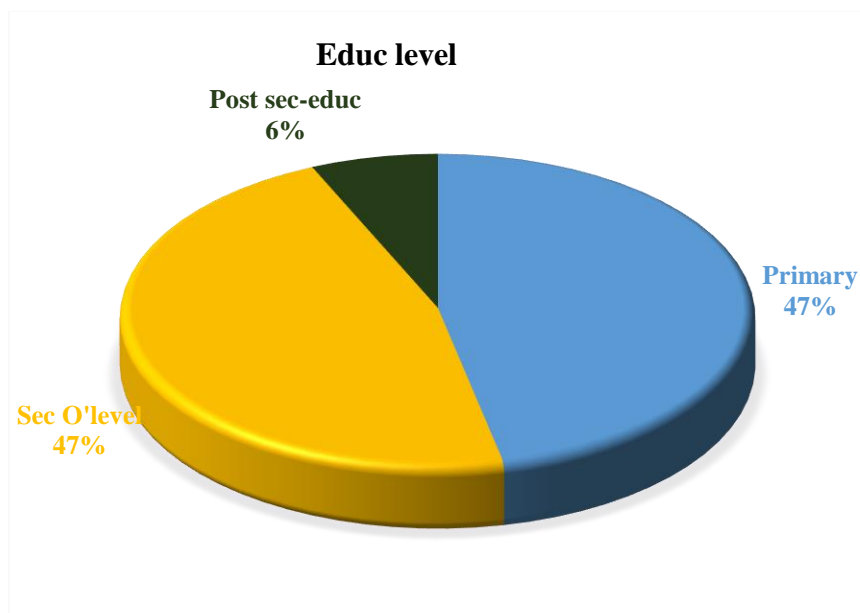


Figure 4: Education level of community monitors

3.2 Added value of the Fuatilia Maji project to student and community monitors

The students and community monitors on the project were involved in several recurrent trainings and on ground activities including among others; digital data collection, training on water related issues, dissemination of findings at village meetings and, engagement in water linked dialogues with duty bearers and other village members/citizens. Moreover, the majority of them indicated attending these training activities at least twice. Therefore the perceived gains in terms of skills, knowledge and attitudes discussed in the results below mainly emanate from the above mentioned trainings, activities and interactions with duty bearers and citizens.



Image 6: Training of students and community monitors in Tanzania



Image 7: Presentation of water testing results to community members in Vitonga village, Morogoro Region, Tanzania

Generally, the proportion of considerable benefits in relation to skill improvement, deepened knowledge and attitudinal change, of the Fuatilia Maji project were high for both the student and community monitors with most responses lying between the “much” and “very much” response

choice options of the Likert scale. Overall however, more gains from engaging in the Fuatilia Maji project were observed for the student monitors than the community monitors.

3.2.1 Technical skills gained

The student monitors greatly gained all the technical skills from the Fuatilia Maji project in comparison to the community monitors (figures 5 & 6). However, collecting data on mobile phones and water quality testing were the most obtained skills among the student monitors (figure 5) with 96% and 82% of them respectively citing to have gained very much in these two skills. The Fuatilia Maji project presented an opportunity for students to match the theory gained in class with practical field experience. This could be the reason for the heightened acquisition of technical skills by the student monitors as highlighted by one of the students involved.

“The added value is the capability to appropriately do the household mapping which plays an important role in obtaining a sample from which data is to be collected, nourishing speaking skills and note taking when carrying out an interview with citizens and efficiently using the qualtrics (the offline survey), and water testing which aims at determining whether water is safe or not that was done practically during the training.”



Image 8 :Community monitors testing the quality of water



Image 9: Water quality assessment using water sample colour change

Alternatively, majority of community monitors benefitted the most from the techniques of determining water quality (figure 6). About 93% of them revealed considerable improvement in the way they tested water.

Both community and student monitors were least acquainted with monitoring of water sources. For water sources in communities, monitoring is an integrated effort requiring the participation of local communities and their leaders, who the respondents reported not to be cooperative at times. Moreover, monitoring is far from a one-time event that has a bearing on resources.

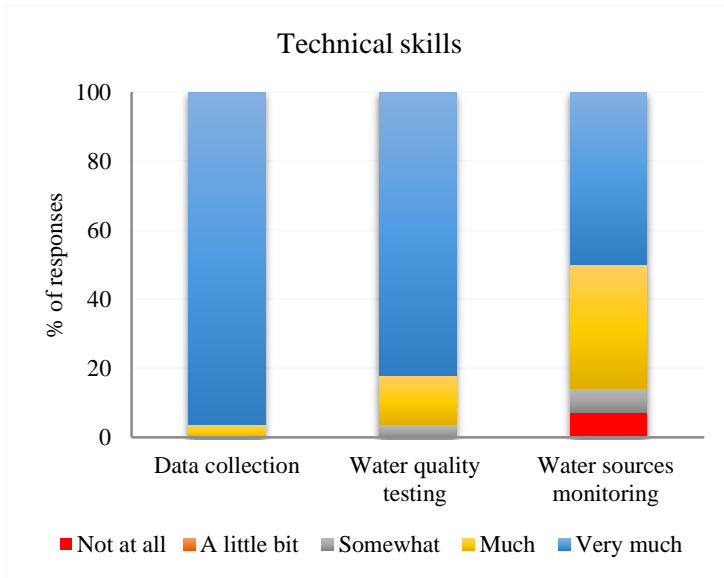


Figure 5: Technical skills gained by student monitors

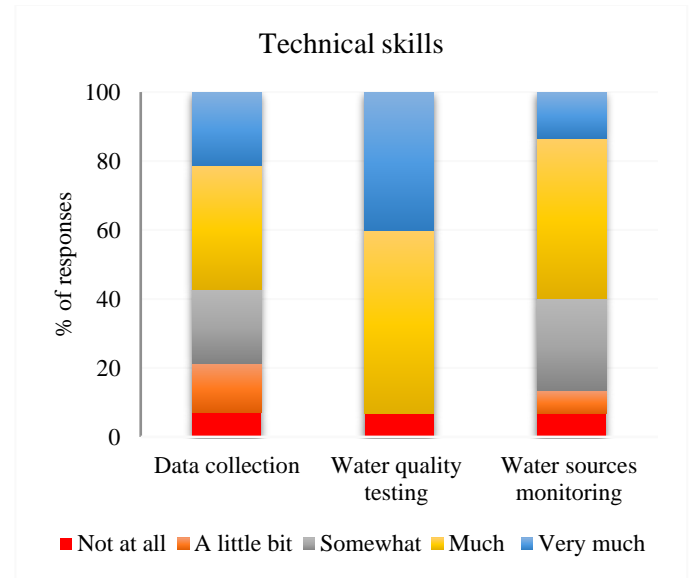


Figure 6: Technical skills gained by community monitors²

3.2.2 Personal skills gained

The Fuatilia Maji project greatly impacted the personal skills of student monitors more than the community monitors (figure 7&8). Much as all the personal skills namely; leadership, presentation and advocacy were greatly improved, a large proportion (about 92%) of the students sharpened their advocacy skills to a great extent. Further, an equal proportion of student monitors, that is 86% in each case, indicated great improvement in both leadership and presentation skills.

The community monitors on the project greatly strengthened their presentation skills more than the leadership and advocacy skills, with close to 70% indicating a considerable improvement in this skill. They registered lower improvements in leadership and advocacy, even in comparison to the student monitors. Perhaps the Fuatilia Maji project meagerly affected these skills since they could have already been exposed to leadership and advocacy roles within the community. Nonetheless the proportion of the community monitors who reported at least much improvements in leadership (60%) and advocacy (53%) skills cannot be ignored as is clear from the quote below.

² For figure 6, only 82%, 88% and 88% of the participants responded to the questions for each of the technical skills, respectively.

“It made me more competent about other issues like leadership skills.”

“I am able as I can test water and give results and speak with confidence informing people even the government.”



Image 10: Community and student monitors conducting a prevention talk in Morogoro, region, Tanzania

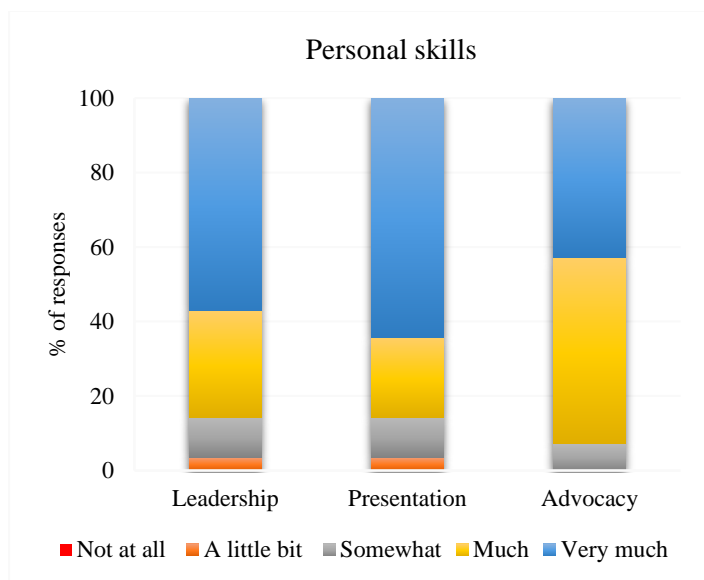


Figure 7: Personal skills gained by student monitors

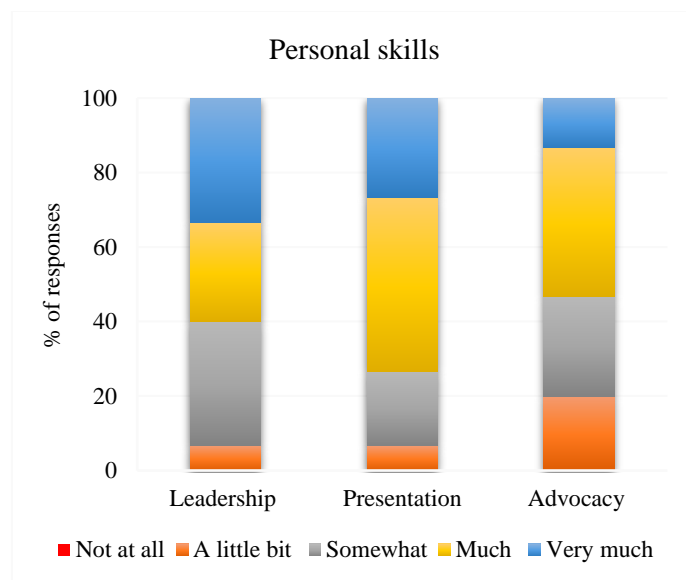


Figure 8: Personal skills gained by community monitors³

3.2.3 Deepened knowledge

A large majority of both student and community monitors deepened their knowledge on all aspects of water, water treatment and management of water sources as shown in figures 9 and 10 below. Expectedly, the trend was higher among student than community monitors (figure 9 & 10). On the one hand the field experience with Fuatilia Maji provided an opportunity for student monitors to practically apply and actualize classroom knowledge on water monitoring. Moreover, for the student monitors, the Fuatilia Maji project also offered a chance to contextualize water source monitoring through the experience of rural life. This might be beneficial for students to devise informed policy recommendations with regards to water management as highlighted by one of the students.

“Absolutely, there are some added values to my personality and I am learning a lot of things on how the villagers treat, communicate and deal with water issues. I also got to know their willingness on vaccination and reaction on covid-19 pandemic topics. The added value to the students is that it impacts students with the new knowledge on how to monitor, discuss, communicate, teach and treat water sources as well as knowledge on data collection.”

³ For figure 8, 88% of the participants responded to the questions on personal skills gained.



Image 11: A student monitor and community monitor capturing results from a water quality assessment

On the other hand, being members of the communities where the project was implemented and already having lived experience on monitoring and management of their water sources, the community monitors registered lower gains in terms of deepened knowledge.

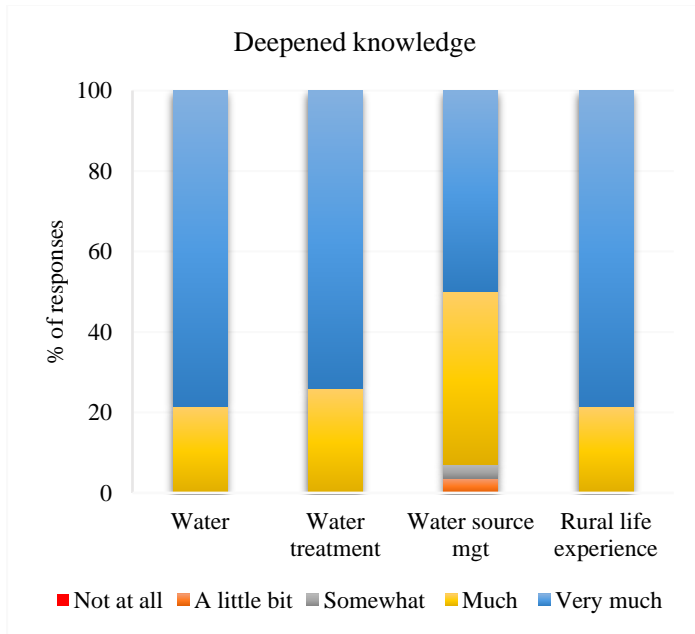


Figure 9: Knowledge deepened by student monitors

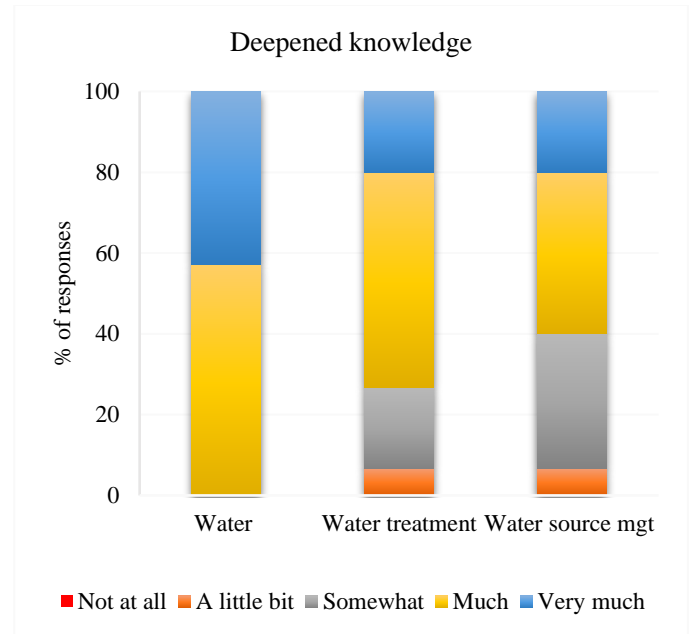


Figure 10: Knowledge deepened by community monitors⁴

3.2.4 Attitudinal change among student and community monitors

The overall attitudinal change on the Fuatilia Maji project was higher for the student monitors in comparison to the community monitors.

A large majority of student monitors (100%) indicated that their participation on the project invoked a higher self-confidence (figure 11). This could also be correlated with the greater respect which the students commanded from their fellow citizens (FC) and duty bearers (DB) (figure 11). Moreover, majority (96%) of the student monitors developed a higher interest in involvement in community work (figure 11). This result relates to an earlier submission in figure 9 where the students mentioned deepening their knowledge on the lives of rural citizens. The assertiveness, empowerment and respect gained coupled with their immersion in the rural life could have renewed their appreciation and interest in involvement in community work to perhaps contribute

⁴ For figure 10, only 82%, 88% and 88% of the participants responded to the questions for each of the attributes for which knowledge was deepened, respectively.

in transforming lives of rural communities through monitoring the provision, use and management of public goods (figure 11).

The community monitors rather felt a deeper respect from fellow citizens, duty bearers and an increased interest in engaging in community work while participating on the Fuatilia Maji project (figure 12). They also indicated honing new ideas whilst on the project (figure 12). Further, a considerable percentage of them revealed enhancing their self-confidence and being empowered from participating on the Fuatilia Maji project.

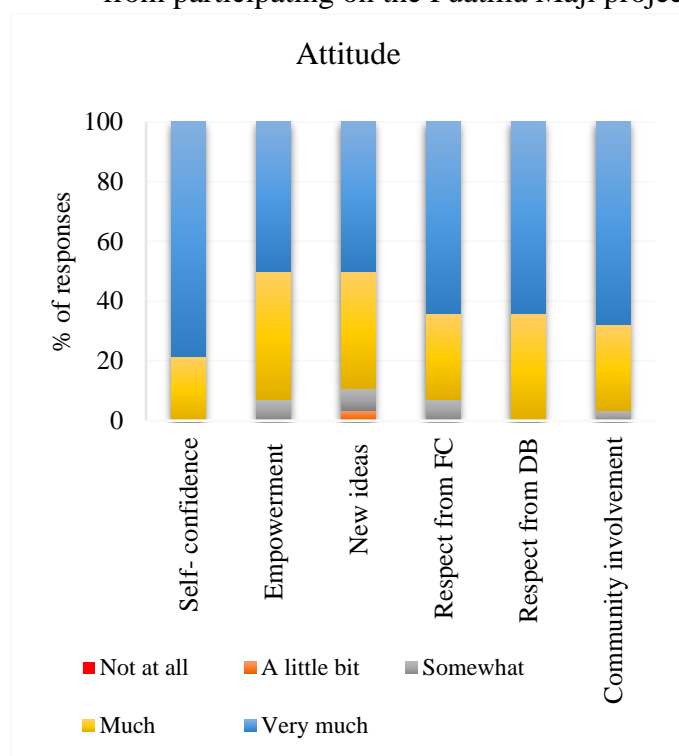


Figure 11: Attitudinal change among student monitors

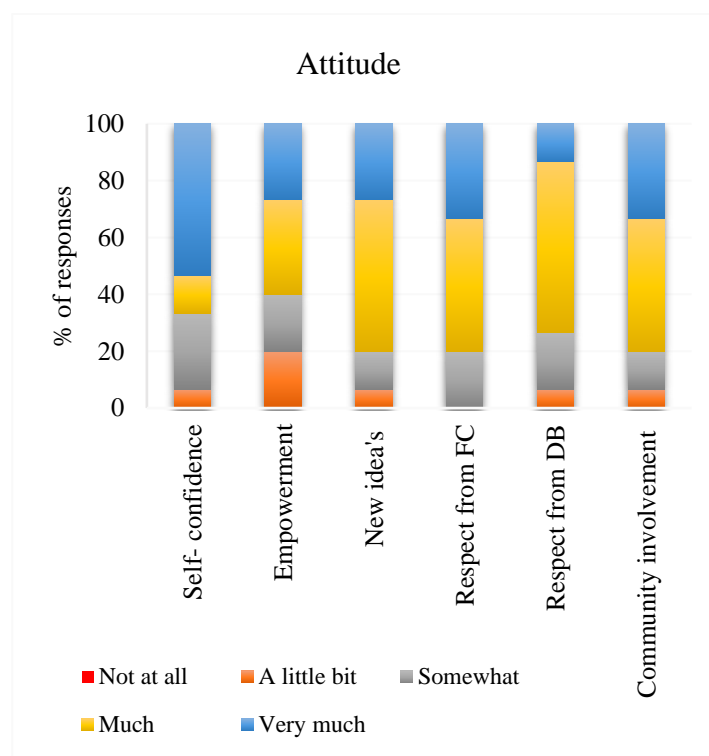


Figure 12: Attitudinal change among community monitors⁵

3.3 Perceived impact of the Fuatilia Maji project on the communities

The results below highlight the local changes in regards to water, water use, water treatment and management of water sources as perceived by the community monitors. From the findings, it seems the most significant changes were registered among the duty bearers (figure 13). There was

⁵ For figure 12, 88% of the participants responded to the questions on attitude/ feelings developed.

an overall increase in knowledge on the significance of clean water among the village level duty bearers (VDB) as indicated by 67% of the community monitors (figure 13). This correlated with an improvement in the way these VDBs treated water and also a heightened advocacy for water services among duty bearers (DB) cited by 73% and 53% of the community monitors respectively (figure 13). The Fuatilia Maji project also lent some legitimacy to the work of the community monitors, half (53%) of whom highlighted increased cooperation between them and the villagers (figure 13). However, about 86% of the community monitors reported meagre improvement in technical back stopping despite the observed change among duty bearers.

About 53% of the community monitors reported an increase in community/citizen awareness on quality and functionality of water sources although they noted that this did not translate into a corresponding behavioral change in the way the citizens collected and treated water (figure 13).

“People have received enough education on water, the challenge becomes implementation.”

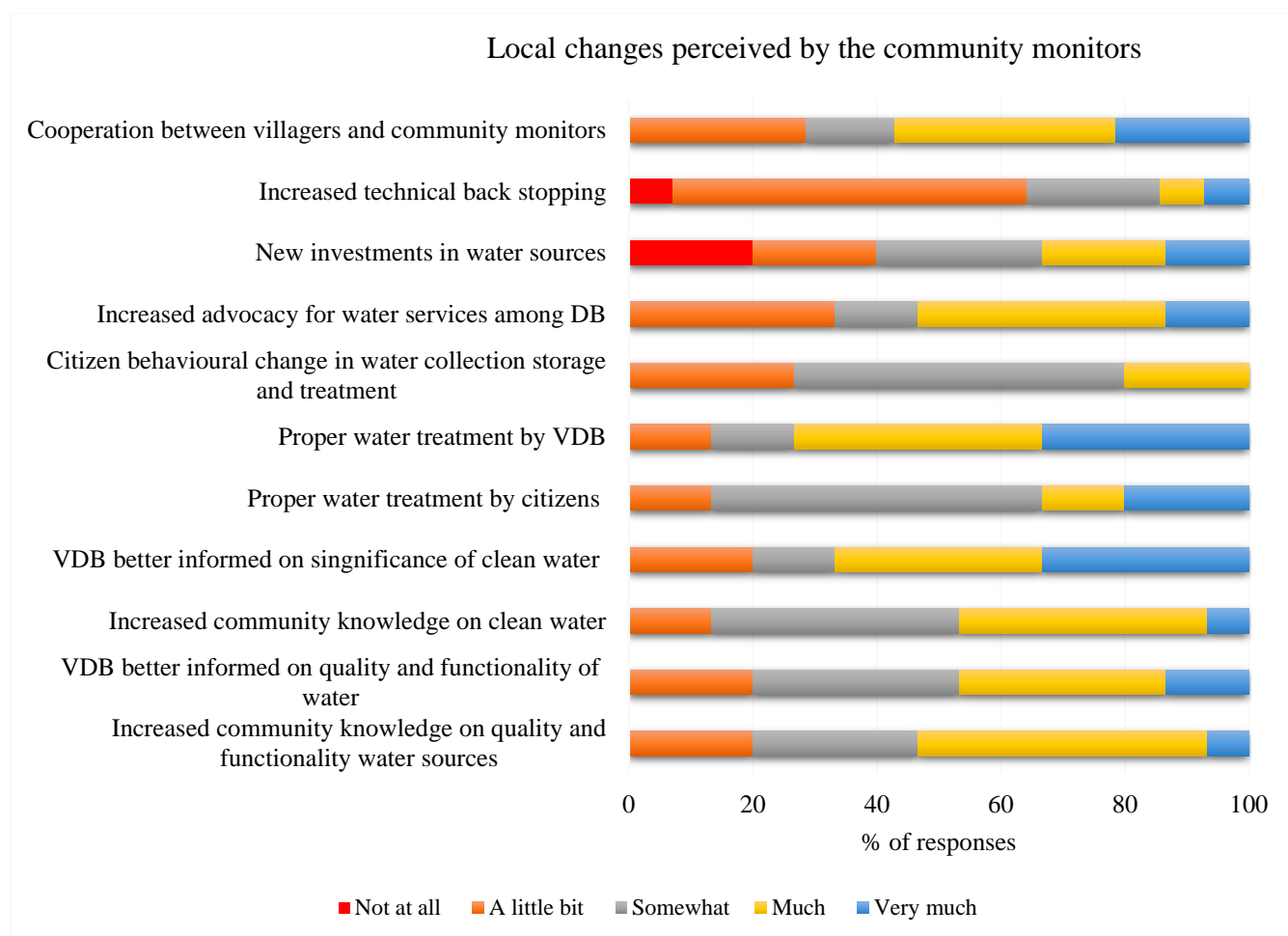


Figure 13: Perceived local changes on water issues ⁶

3.4 Challenges faced by student and community monitors and proposed improvements

3.4.1 Technical challenges encountered on the Fuatilia Maji project

Generally, few technical challenges were encountered by both student and community monitors while conducting field activities on the FM project (figure 14 &15). For both groups, the main challenges were associated with poor internet connectivity and failure to access water sample tests. These findings are consistent with the fact that an approximated 86% of rural people in Tanzania lack internet connectivity (Mothobi & Rademan, 2017). Moreover, rural Tanzania is largely water

⁶ For figure 13, between 82% and 88% of the participants responded to the questions regarding the impact of the project on local communities.

scarce with limited access to an improved water source for nearly half of the rural dwellers (Mkonda, 2015; World Bank, 2017) which also impacted on the student monitors as highlighted in the quote below.

“Water was not available to some points so we had to take a longer time to do the test. Also some areas are so remote and mountainous so reaching all water points need a bit more days. And also weather condition changes so it’s good if we are prepared for all weather as for my team we worked even in rain and it’s not good for health.”

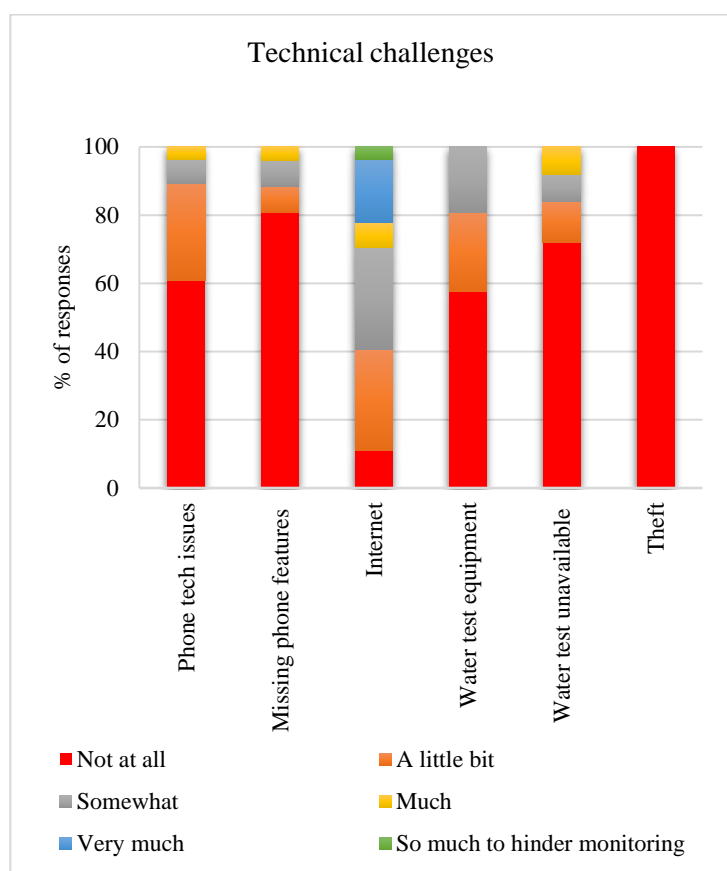


Figure 14: Technical challenges encountered by student monitors

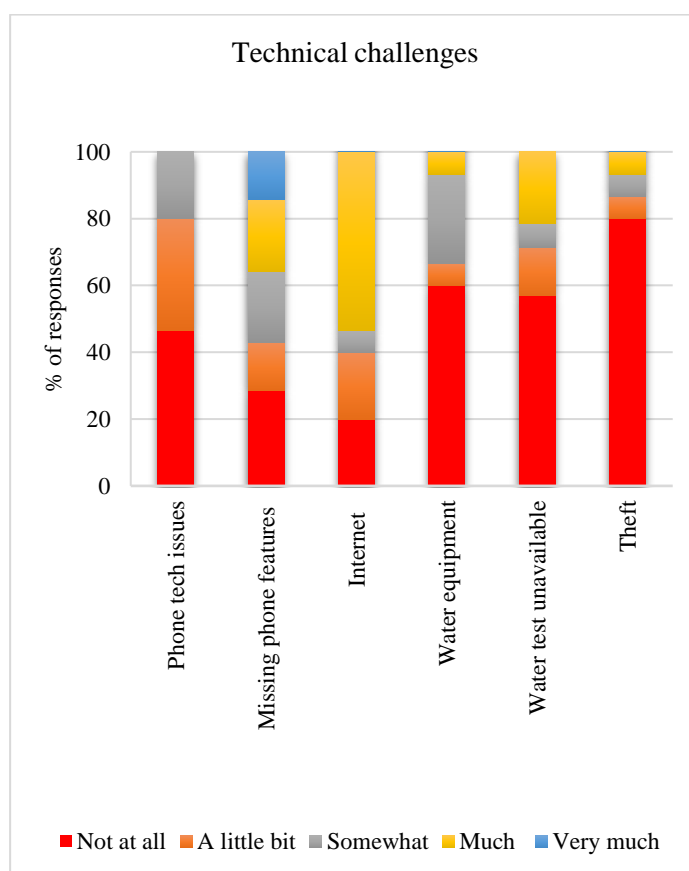


Figure 15: Technical challenges encountered by community monitors

3.4.2 Capacity challenges encountered while on the FM project

Likewise, overall, both student and community monitors barely encountered any capacity challenges while on the FM project except concerns raised by about 19% of the student monitors over minimal participation/ collaboration of citizens in water testing (figure 17).

“Sometimes we lack enough cooperation directly from the community also we miss some of the information due to fear among the community.”

About 40% of the community monitors expressed difficulties in understanding instructions/responding to questions in the English language (figure 18). Even though the questions which needed to be filled in by the monitors as well as the instruction video were available in Swahili, there still seemed to be some difficulties with language issues.. The latter could be linked to the app 's English default set up or possibly some general English instructions. As highlighted earlier in section 3.1, majority of the community monitors had lower education qualifications with an ordinary secondary level certificate as the highest attained education level. Moreover, though English is widely spoken in Tanzania, it is less popular especially in the rural communities where the community monitors live and oversee the management of water sources. Monitors could benefit from being briefed clearly on how to use the preferred language settings, so the data collection can be done entirely in Swahili especially for the community monitors on the Fuatilia Maji project.

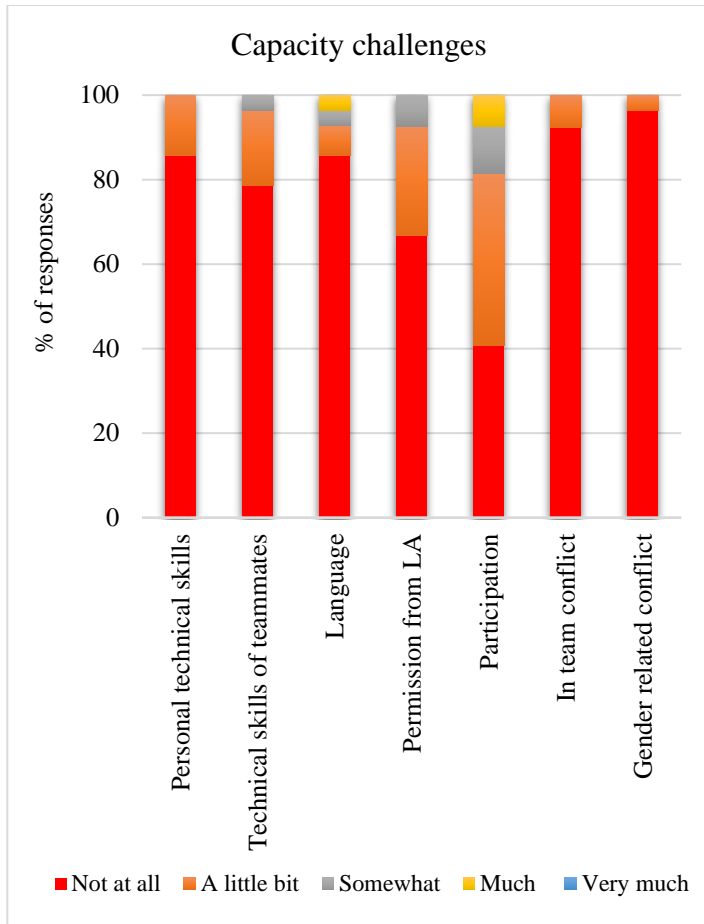


Figure 16: Capacity challenges encountered by student monitors

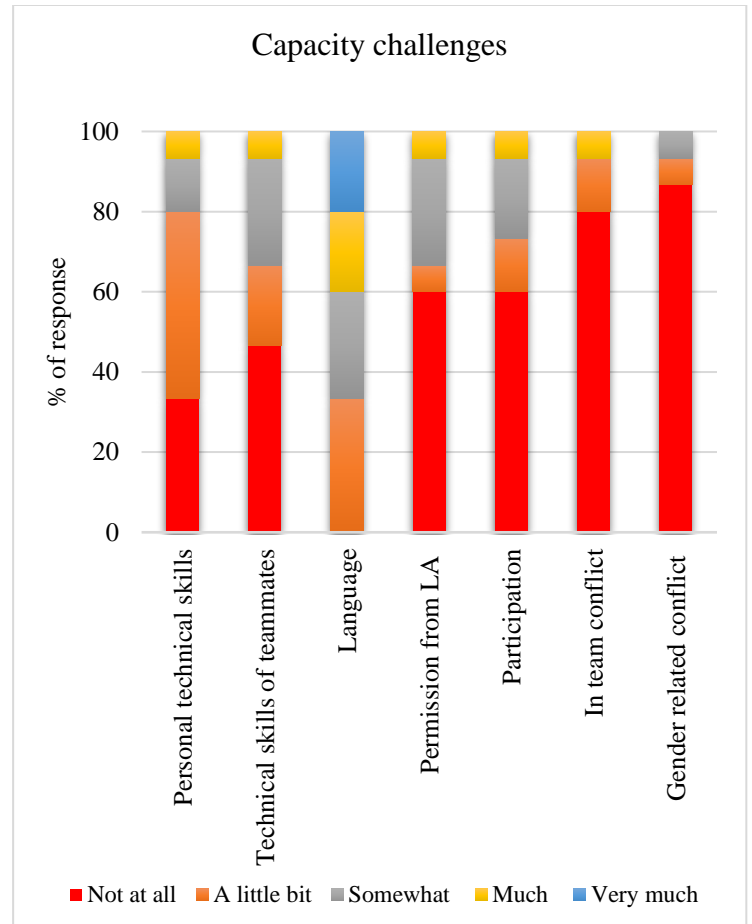


Figure 17: Capacity challenges encountered by community monitors

3.4.3 Suggested improvements on the Fuatilia Maji project

Similar suggestions to enhance their roles as monitors on the FM projects were offered by the student and community monitors. Both groups proposed regular refresher trainings on water related issues; provision of clothing like t-shirts for easy identification and recognition as monitors and field accessories like hats; umbrellas to guard against extreme weather conditions; increasing time allotted to water testing and; provision of user friendly android phones/tablets (figure 18 & 19). The student monitors also proposed an extended collaboration beyond the data collection (figure 18) whereas the community monitors requested for additional testing kits to increase the frequency with which they monitored water sources (figure 19).

“The project should increase the skills more times in order to make community monitor more competent about water issues.”

“The project should provide T-shirt during water testing in order to reduce contradiction among the community.”

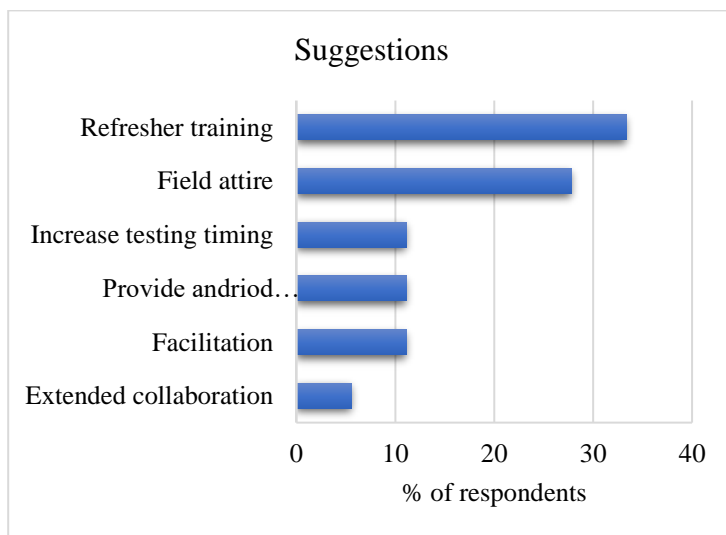


Figure 18: Suggested improvements by student monitors

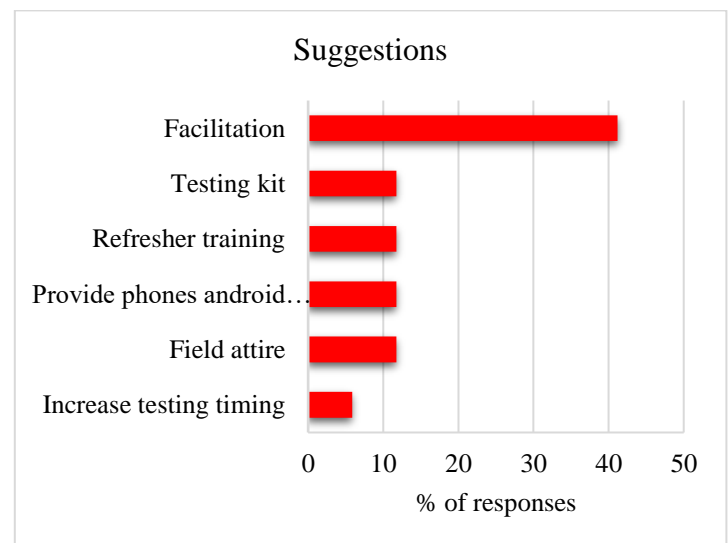


Figure 19: Suggested improvements by community monitors

4.0 Conclusions and Recommendations

The Fuatilia Maji project has registered significant contributions to the stakeholders involved. These benefits range from skills acquisition to empowerment of the student and community monitors, and to palpable changes in local community life, especially in relation to the use, treatment and management of water resources in the Morogoro region of Tanzania. As a result of the Fuatilia Maji project, a major proportion of the monitors, both the student and community monitors, reported to have attained significant improvements in their technical and personal skills, and to have deepened their knowledge on all-things-safe-water. The monitors improved upon their data collection, water quality testing and water source monitoring skills, as well as, their leadership, presentation and advocacy skills. A comparison of the two groups of monitors revealed that the student monitors seemed to have registered greater gains in these skills than the community monitors. A similar observation can be reached with the knowledge acquired on water, water treatment and water source management. The student monitors seemed to have experienced much more deepening of their knowledge on these water aspects in comparison to the community monitors. On the one hand, the experience of the student monitors on the Fuatilia Maji project could have been because they capitalized on the project activities as an opportunity to valorize their theoretical knowledge gained in class. To them, taking part in the project activities could have offered tremendous exposure to much valued practical knowledge. The student monitors especially appreciated the rural life experience while participating on the project and this enhanced their interest in continued involvement in community work. This highlights the significance of field exposure through internships, recess terms and the student mobility window. On the other hand, the community monitors' extensive training, given most had participated at least twice, coupled with their continued involvement in local activities, prior to the Fuatilia Maji project and even outside the scope of ongoing project activities, potentially narrowed their space for exposure to new knowledge and skills. In order to foster tremendous gains accruing to the community monitors, trainer of trainers programs can be planned. None-the-less, both groups acknowledge non-trivial gains in skills and knowledge in regards to water, its use and water source management in the region. Moreover, the monitors contended that they felt empowered from their involvement on the Fuatilia Maji project activities which elevated their status in the community. The community monitors also asserted that the Fuatilia Maji project has brought about several positive local changes in relation to water treatment and water source management. For instance, it was observed

that the project sparked an improvement in water treatment and increased advocacy for water services among local duty bearers. Moreover because of the project, the community monitors cited improved cooperation between them and the local community members. Further, there was an overall increase in knowledge about all water related issues among the citizens and duty bearers. However, because of novelty in the use of mobile phone technology for data collection especially in a remote setting of Tanzania, the monitors cited connectivity and phone usability challenges.

5.0 References

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