



**Final Evaluation Report to Test and Deploy the Mobile Training and Support (MOTS)
Service for Community Health Workers in Bo and Kambia, Sierra Leone**

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PREFACE

At the time that this report was being finalized, the Mobile Training and Support (MOTS) service was being replicated in Rwanda to address the EBOLA outbreak in the border region near the Democratic Republic of the Congo (DRC). As of February 11, 2020 the World Health Organization (WHO) had documented 3,432 Ebola cases in the DRC, of which 2,253 cases died, resulting in a case fatality ratio of 66 percent. The outbreak in the DRC makes it the second deadliest outbreak (with the 2014-2016 West Africa epidemic being the first) and continues to raise concerns about the potential of the virus to cross international borders. To address this concern, the EBOLA vaccine Deployment, Acceptance & Compliance (EBODAC) consortium, which was designed to respond to the West Africa outbreak in Sierra Leone, received permission in 2019 to expand its activities into the border region of the DRC.

After 3 weeks of content preparation in coordination with [Rwanda's Umurinzi Ebola Vaccine Program](#), EBODAC began the expansion of the MOTS training activities and Ebola vaccination trials in December 2019. As of April 22, 2020, 1,456 CHWs had already completed the MOTS IVR trainings on the Umurinzi Ebola Vaccination Program, accounting for 87 percent of the CHWs that were targeted in Rwanda. Many of the lessons documented in this report from the experiences in Sierra Leone were already being used to inform the expansion activities in Rwanda.

Also, the emergence of the COVID-19 coronavirus in late 2019 has introduced another relevant application of MOTS due to the critical need to inform CHWs of health and medical protocols related to the virus without bringing them together for in-person trainings. As of April 21, 2020, the WHO estimated almost 2.4 million cases of COVID-19 with 163,000 deaths. The role of community health workers (CHWs) and the need for up-to-date in-the-moment trainings for CHWs has never been so critical in order to ensure their safety and the safety and health of the communities they serve. While the digital rails are being laid globally at break-neck speed, rural and remote frontline workers, such as CHWs, still need access to information that they can receive on feature phones given the low-tech environment many of them live and the low, but growing, penetration of smart phones. MOTS, which is based on Interactive Voice Response (IVR), is one such low-tech training methodologies that can be used at a time such as this. We hope this report can serve as important source of lessons learned regarding the use of IVR training for CHWs, both for replications of this technology for use within EBODAC initiatives as well as those responding to other infectious and contagious diseases and illness such as COVID-19.

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TABLE OF CONTENTS

LIST OF TABLES AND FIGURES.....	4
LIST OF ACRONYMS.....	5
DEFINITION OF KEY TERMS.....	6
ACKNOWLEDGEMENTS.....	7
EXECUTIVE SUMMARY	8
CHAPTER 1: INTRODUCTION AND BACKGROUND	11
1.1 Sierra Leone Country Profile.....	11
1.2 Kambia District Profile	12
1.3 About Mobile Training and Support (MOTS).....	13
1.4 Purpose of Report.....	14
CHAPTER 2: METHODS.....	15
2.1 Evaluation Objectives	15
2.2 Research Area and Participants.....	15
2.3 Data Collection Methods	17
2.4 Data Analysis and Reporting.....	17
2.5 Limitations of the Research	18
CHAPTER 3: RESULTS.....	19
3.1 Socio-demographic Characteristics	19
3.2 CHW Responsibilities and Support	21
3.3 CHW Training Engagement.....	22
3.3 MOTS Quiz Results.....	26
3.4 MOTS and Outcomes Survey Data: Results by Question	28
3.5 CHW Community Engagement	33
3.6 Attitudes towards CHW Work	35
3.7 MOTS Costs.....	36
CHAPTER 4: DISCUSSION AND RECOMMENDATIONS.....	36
APPENDICES	41
Appendix I: MOTS Module Quiz Questions	41
A. Module 1 – Vaccination.....	41
B. Module 2 – Outbreak Response.....	44
Appendix II: Additional Analysis	48
C. Baseline Results (Enumerator-survey)	48
D. Training Received by the CHWs in Last Two Months: Enumerator-facilitated Survey Results.....	53
E. CHW MOTS Pre and post Test Results – Matched Sample CHWs.....	54
F. Vaccination Results – Full and Matched Sample Results	56
G. Outbreak Response Results – Full and Matched Sample Results	60

LIST OF TABLES AND FIGURES

Table 1: Sample communities and sample sizes	16
Table 2: Socio-demographic characteristics of respondents	19
Table 3: CHW income sources by category group	20
Table 4: Food security among the respondents	20
Table 5: Out-of-pocket expenses not reimbursed by the MoHS	22
Table 6: Training participation and training methodologies	23
Table 7: Participation in MOTS	25
Table 8: Predictors of training engagement	26
Table 9: MOTS knowledge quiz results (Matched sample).....	27
Table 10: Vaccination module results	30
Table 11: Outbreak Response module results	31
Table 12: Predictors of knowledge change	33
Table 13: Community engagement.....	33
Table 14: Predictors of confidence communicating with community.....	34
Table 15: CHW attitudes	35
Table 16: Predictors of CHW attitudes	35
Figure 1: Map of Sierra Leone	11
Figure 2: Kambia District	12
Figure 3: MOTS concept and workflow.....	14
Figure 4: MOTS Sample Framework	17
Figure 5: CHW primary income sources.....	19
Figure 6: Poverty penetration	20
Figure 7: Total HHs assigned to the CHW vs proportion visited	21
Figure 8: Worry about income lost while attending in person training	22
Figure 9: MOTS refresher training module progress per treatment group	23
Figure 10: Mode of training received by CHW.....	24
Figure 11: Satisfaction with training	24
Figure 12: MOTS quiz results	27
Figure 13: Knowledge trends for Vaccination module	28
Figure 14: Knowledge trends for Outbreak Response module.....	28

LIST OF ACRONYMS

CHW	Community Health Workers
DiD	Difference in Difference
DHMT	District Health Management Team
EBODAC	EBOLA vaccine Deployment, Acceptance & Compliance
FGD	Focused Group Discussion
GF	Grameen Foundation
HH	Household
IMI	Innovative Medicines Initiative
KII	Key Informant Interview
IDP	Internally-Displaced Persons
IVR	Interactive Voice Response
MoHS	Ministry of Health and Sanitation
MOTS	Mobile Training and Support
PHU	Peripheral Health Unit
Q	Question
SLL	Sierra Leone Leones

DEFINITION OF KEY TERMS

Term	Definition
Community Health Worker (CHW)	CHWs are part-time frontline health workers for the Ministry of Health and Sanitation of Sierra Leone. They are often provided a stipend to compensate them for their work. CHWs are normally trained but have no formal or professional degree or certificate in Health.
EBODAC	The EBOLA vaccine Deployment, Acceptance & Compliance (EBODAC) project is a public-private partnership of London School of Hygiene and Tropical Medicine, Janssen Pharmaceutical N.V., World Vision and Grameen Foundation funded by Innovative Medicines Initiative (IMI).
Enumerator-facilitated surveys vs MOTS quizzes	There are two research methodologies referenced in this report. Enumerator-facilitated surveys (or outcome surveys) were used prior to and post-implementation. These surveys were conducted by enumerators using SurveyCTO. The surveys used adapted versions of the MOTS quiz questions to assess knowledge change. MOTS quizzes are part of the MOTS program. A MOTS pre-test quiz is conducted prior to a CHW listening to the education module. Post-test quizzes are conducted after the completion of each MOTS session.
Mobile Training and Support (MOTS)	MOTS service is an Interactive Voice Response (IVR)-based training methodology used by the EBODAC consortium to provide refresher trainings on vaccinations and disease surveillance to a large group of remotely-located CHWs. MOTS also includes IVR-based pre and post-test quizzes to assess knowledge change related to the education modules. The MOTS system was developed by Grameen Foundation in partnership with the EBODAC consortium members.
Peripheral Health Units (PHU)	PHUs are the delivery point for primary health care in Sierra Leone.
PHU In-charge	Oversee the PHU and are responsible for CHW training(s) and support.

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EXECUTIVE SUMMARY

Between 2014 and 2016, West Africa was struck by the largest outbreak of Ebola in the history of humanity. The EBOLA vaccine Deployment, Acceptance & Compliance ([EBODAC](#)) project, a public-private partnership of London School of Hygiene and Tropical Medicine, Janssen Pharmaceutica N.V., World Vision and Grameen Foundation, was launched with the goal to develop strategies and tools to promote the acceptance and uptake of new candidate Ebola vaccines. In addition, EBODAC developed an Interactive Voice Response (IVR)-based Mobile Training and Support (MOTS) service as an innovative way to provide refresher trainings on vaccinations and disease surveillance to a large group of remotely located community health workers (CHWs), with a special focus on Ebola.

This report covers the results from a quasi-experimental, multi-method pre- and post-test assessment conducted with CHWs located in Kambia District, Sierra Leone to assess the effectiveness of MOTS. The curriculum used for MOTS was adapted from the Ministry of Health and Sanitation's (MoHS) education on vaccinations and community outbreak responses. The Vaccination module focused on the importance of vaccines and receiving them at the correct time; the Outbreak Response module focused on identifying diseases such as Ebola and the protocols necessary to protect people and the community. In addition to IVR-based refresher messages, MOTS also assessed knowledge change with IVR-based pre- and post-test quizzes.

The MOTS assessment aimed to answer two key questions:

- To what degree does MOTS improve knowledge and behavior of CHWs related to vaccinations and outbreak response (compared to a comparison group)? The hypothesis: MOTS improves knowledge/behaviors of CHWS compared to CHWs who receive no mobile training.
- To what degree does the order of the refresher modules (Vaccination followed by the Outbreak Response module, or vice-versa) matter on knowledge and behavior change? The hypothesis: Participation in MOTS sessions back-to-back can lead to user fatigue, resulting in reduced effectiveness of the second refresher module in which a CHW participates. A prior evaluation in the Bo district hypothesized that this might be the case.¹

To answer these two questions, the quasi-experimental study consisted of two treatment groups and one comparison group. One group was assigned the Vaccination refresher module first followed by the Outbreak Response refresher module (Treatment 1); another received the Outbreak Response refresher module first followed by the Vaccination refresher module (Treatment 2). The comparison group (Comparison) did not receive any of the modules until the endline assessment was completed. A total of 811 CHWs were enrolled for the refresher training and out of this, a sample of 375 CHWs were randomly selected and evenly divided among the two treatment and the one comparison group for the quasi-experimental study. These 375 CHWs were interviewed in person by enumerators using SurveyCTO (known hereafter as the outcomes survey). In addition, pre- and post-test IVR quiz data, which are part of the MOTS system (known hereafter as the MOTS quiz), were compared to the results of SurveyCTO results to evaluate consistency in the results for the two assessment methodologies. Qualitative interviews with CHWs, project staff and health staff were also included.

¹Mc Kenna P, Babughirana G, Amponsah M, Egoeh SG, Banura E, Kanwagi R, & Gray B. (2019). Mobile training and support (MOTS) service-using technology to increase Ebola preparedness of remotely-located community health workers (CHWs) in Sierra Leone. *mHealth*, 5, 35. <https://doi.org/10.21037/mhealth.2019.09.03>

The research suggests the following results and recommendations, according to the two key research questions:

To what degree does MOTS improve knowledge and behavior of CHWs related to vaccinations and outbreaks (compared to a comparison group)?

There were slight improvements in knowledge for both modules, but improvements were not dramatic. For knowledge change, a target of 80 percent is used by Grameen Foundation. As a result of education, at least 80 percent of beneficiaries should “know” key information. As the results showed from the outcomes survey, all but one of the vaccination knowledge questions achieved the target, but knowledge levels were also relatively high at baseline. Approximately eight out of the 14 outbreak response questions were slightly or far below the 80 percent target and 7 of them experienced decreases (or no change) between baseline and endline, suggesting some confusion with module objectives or priorities. Both treatment groups outperformed the Comparison group regarding an increased frequency in communicating with communities regarding outbreak response. Only Treatment Group 2 outperformed the Comparison group on higher frequency of communicating with communications on vaccinations.

To what degree does the order of the module (vaccination and outbreaks) matter on knowledge and behavior change?

The Outbreak Response module did not perform as well as the Vaccination module regardless of whether it was the first or second module for a CHW. In addition, baseline knowledge was much lower for the Outbreak Response than the Vaccination module, suggesting that prior in-person trainings conducted by the MoHS through classroom training may not have been effective at imparting knowledge or the lessons were not retained. The objectives of the Outbreak Response module should be reconsidered—both for MOTS and MoHS in-person trainings.

Recommendations

Overall, it is recommended that sessions designed for MOTS should aim to achieve fewer learning objectives that build on one another. Given the limited attention and digital literacy skills of CHWs, the modules should aim to change/refresh critical-to-know learning objectives that should be reinforced throughout the module. The Outbreak Response module, in particular, covers ten notifiable conditions; this may have resulted in too many module objectives, resulting in poor outcomes for the entire module, and Ebola knowledge outcomes in particular. Given not all CHWs completed the IVR trainings, incentives for completion should be considered, including those that help overcome technical difficulties such as lack of charging capabilities and incentives for active participation, such as recognition for correct responses to quizzes. Given reasons for non-participation included not understanding how to navigate the system using one’s mobile phone, CHWs should receive training that requires them to personally practice using the system. While trainings were completed with CHWs on the system, not all CHWs may have personally practiced during the demonstrations.

In addition to these key findings and recommendations, the research also revealed that the MOTS quizzes and the outcomes survey data presented mixed findings. Results from the MOTS system

suggested correct knowledge regarding most indicators was below 70 percent while results for the outcome survey often had scores above 70 percent for most of the questions at baseline and endline. This suggests that participation in the IVR quizzes did not accurately reflect real knowledge among the CHWs. Furthermore, the gender of the CHW was also found to be influential on whether the trainings were completed and whether knowledge improved—men were less likely to complete the trainings but more likely to have correct knowledge compared to women. Future iterations and functionality assessments of the MOTS trainings should consider how men and women CHWs engage with the MOTS system differently to ensure women have equal outcomes and benefits.

The costing assessment completed on MOTS estimated that the cost for maintaining a MOTS refresher training approach is approximately \$12 per each of the 16,000 CHWs nationwide in Sierra Leone and costs approximately 50 percent less than in-person refresher trainings. While IVR should never fully replace in-person trainings, MOTS enables a dramatically more efficient and widespread community health outreach, builds engagement with decentralized health workers and can provide a critical safeguard in the case of health emergencies.

In conclusion, the results from this study show marginal improvements in knowledge, with male CHWs being most associated with knowledge change. The results also point to specific and actionable areas for improvement, most notably the IVR quiz questions as well as the content that underpins the Outbreak Response module. These improvements are needed to ensure MOTS can serve as a cost-effective, alternative virtual training tool for reaching rural CHWs with critical information to support the health of their communities. For diseases like Ebola and the recent emergence of COVID-19, technologies like MOTS could be a potential alternative training and information-sharing methodology for CHWs that can be rapidly and virtually deployed to any CHW that has a mobile feature or smart phone.

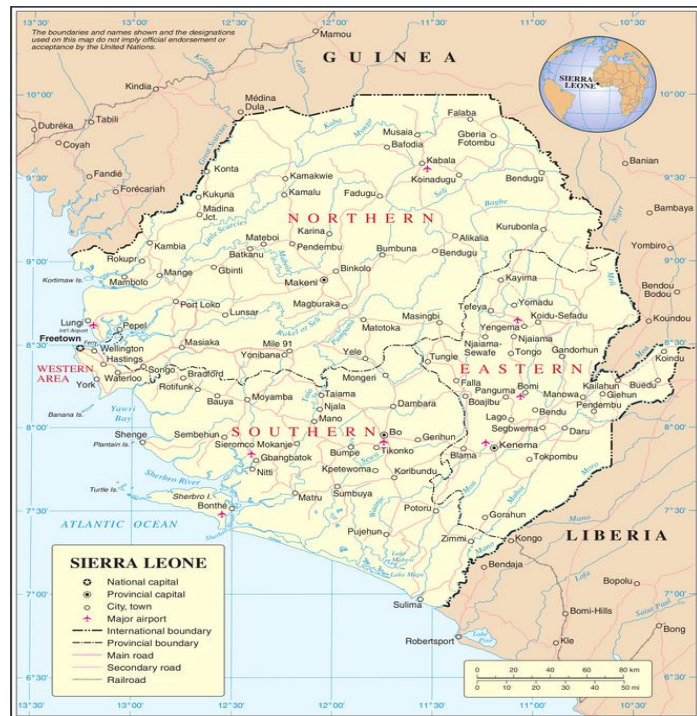
CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 Sierra Leone Country Profile

Sierra Leone, officially known as the Republic of Sierra Leone and informally as Salone, is a country on the southwest coast of West Africa. It is bordered by Liberia to the southeast and Guinea to the northeast. Sierra Leone has a population of 7,075,641 per the 2015 census.² The capital and largest city is Freetown. Sierra Leone has four administrative regions that are subdivided into sixteen districts. Sierra Leone has had an uninterrupted democratic government since 1998.

The country has sixteen ethnic groups, each with their own language and customs. The two largest and most influential ethnic groups are the Temne and Mende. Comprising a small minority (about 2 percent) are the Krio people, who are descendants of freed African-American and West Indian slaves. Although English is the official language used in schools and government administration, Krio, an English-based creole, is the most widely spoken

Figure 1: Map of Sierra Leone



Source: Nations Online

language across Sierra Leone. Spoken by 98 percent of the population, Krio unites all the ethnic groups in the country in trade and social interaction.³ Seventy (70) percent of its population lived in poverty in 2018.⁴

Sierra Leone is a member of many international organisations, including the United Nations, the African Union, the Economic Community of West African States (ECOWAS), the Mano River Union, the Commonwealth of Nations, the African Development Bank and the Organisation of Islamic Cooperation.

Health in Sierra Leone remains a challenge. Like many African Countries, medical care in Sierra Leone is not readily accessible, with doctors and hospitals out of reach for many villagers. While free health care may be provided in some villages, the medical staff is poorly paid and sometimes charge for their services, taking advantage of the fact that the villagers are not aware of their right to free medical care.⁵

² Sierra Leone 2015 Population and Housing Census Report. Statistics Sierra Leone.

³ Ibid.

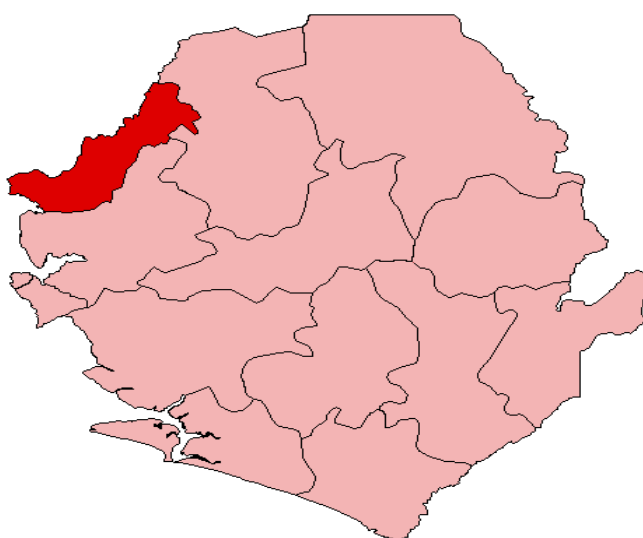
⁴ Sierra Leone Population below poverty line (Percent). "https://www.indexmundi.com/g/g.aspx?c=sl&v=69" 30 June 2018. Retrieved 02 March 2020.

⁵ Anne Jung (December 2012). "Wealth, but no health". D+C Development and Cooperation/ dandc.eu. Retrieved 28 February 2020.

According to 2010 estimates, Sierra Leone has the fifth highest maternal mortality rate in the world.⁶ According to UNICEF report, 86 percent of women in Sierra Leone have undergone female genital mutilation.⁷ As of 2014, Sierra Leone was estimated as having the eleventh highest infant mortality rate in the world.⁸ Obstetric fistula, which occurs because of prolonged and obstructed labour and often requires a caesarean section, is commonplace due to limited number of doctors. This condition often drives women into poverty and isolation.⁹

Sierra Leone commonly suffers from epidemic outbreaks of diseases, including yellow fever, cholera, lassa fever and meningitis. Yellow fever and malaria are endemic to Sierra Leone. In 2014, there was an outbreak of the Ebola virus in West Africa. As of 16 March 2016, approximately 14,000 cases of Ebola were recorded in Sierra Leone, resulting in 4,000 deaths.¹⁰

Figure 2: Kambia District



1.2 Kambia District Profile

Kambia District is located in the Northern Province of Sierra Leone. Its capital and largest city is the town of Kambia. As of the 2015 census, the District had a population of 343,686.¹¹ Kambia District borders the Republic of Guinea to the north, Port Loko District to the south and Bombali District to the east. The district provides an important trade route to or from the Sierra Leonean capital Freetown to the Guinean capital Conakry. The district occupies a total area of 3,108 km (1,200 sq mi) and is divided into seven chiefdoms.

Kambia district is overwhelmingly Muslim (over 70%) and ethnically diverse. The Susu are the predominant ethnic group followed by the Temne, Limba, Fula and Mandingo.

Kambia District is home to several international health operations, including the International Medical Corps who arrived in 2001, Kambia Appeal, a United Kingdom-based non-profit organization that has operated in Kambia since 1992, and Doctors without Borders, a French medical non-profit agency that operates across the world in poverty-stricken areas.

All the Kambian chiefdoms have medical centres or posts with the only referral hospital located in Kambia town, the district headquarters. There are few transport services to facilitate access to the

⁶ Country Comparison: Maternal Mortality Rate (2010). The World Factbook Central Intelligence Agency.

⁷ UNICEF Global Database: Female genital mutilation data for Sierra Leone, February 2020

⁸ Country Comparison: Maternal Mortality Rate (2010). The World Factbook Central Intelligence Agency.

⁹ Gagnon, Alys. "A woman covered in urine taught this Sydney mum a lesson about dignity". www.kidspot.com.au.

¹⁰ WHO. 2016. Ebola Situation Report. <https://apps.who.int/ebola/current-situation/ebola-situation-report-16-march-2016>

¹¹ Sierra Leone 2015 Population and Housing Census Report. Statistics Sierra Leone.

referral hospital. Consequently, Kambia has the highest death rate compared to other districts in the country, especially infant and maternal mortality.¹²

There are thirteen secondary schools in the district; three of the thirteen secondary schools, together with the hospital, were all burnt down in February 1999 during intensive fighting in the district. The remaining ten were systematically vandalised resulting in their complete ruin. Later, as the district was affected by the war more than most other areas of Sierra Leone, it also hosted a large number of Internally Displaced Persons (IDPs).

1.3 About Mobile Training and Support (MOTS)

Between 2014 and 2016, West Africa was struck by the largest outbreak of Ebola in the history of humanity. Over 11,000 cases of Ebola were registered across Guinea, Liberia and Sierra Leone, with about 4,000 deaths in Sierra Leone.¹³ Many international bodies sought ways to fight the epidemic. As part of the European Community's efforts to address the advancement of Ebola, the Innovative Medicines Initiative (IMI) responded with a call for innovative projects. The EBOLA vaccine Deployment, Acceptance & Compliance (EBODAC) project, a public-private partnership, was funded out of IMI.

The EBODAC consortium is composed of London School of Hygiene and Tropical Medicine, Janssen Pharmaceutical N.V., World Vision and Grameen Foundation. EBODAC's goal was to develop strategies and tools to promote the acceptance and uptake of new candidate Ebola vaccines being tested in the [EBOVAC-Salone](#) Ebola vaccination trial. EBODAC had a remit to build local knowledge and capacity in preparation for the potential future use of licensed Ebola vaccines. As part of this latter mandate, EBODAC developed a Mobile Training and Support (MOTS) service that was piloted with Community Health Workers (CHWs) in Bo district, Southern Sierra Leone in 2018 and later resulted in the full implementation in Kambia District in 2019.¹⁴ MOTS is based on Interactive Voice Response (IVR) technology and is designed to deliver audio-based refresher trainings on the topics of vaccines and outbreak response including Ebola disease surveillance procedures.

The EBODAC consortium forged a partnership with the Sierra Leonean Ministry of Health & Sanitation (MoHS) to adapt existing training modules on Vaccinations and Outbreak Responses for the MOTS platform. The content designed for MOTS was developed and reviewed by the Sierra Leone CHW Hub and the Expanded Programme on Immunisation (EPI) to align the content messages with the current CHW and EPI recommended practices. The content was then translated into the local languages (Mende and Krio for the Bo pilot and Krio, Temne, Susu, Limba for Kambia scale-up), pre and post-test quizzes for each unit were designed and then made available to CHWs via IVR. Each unit is a maximum of 5 minutes of listening time. The two module descriptions are described below:

- i. Module 1: Vaccination - The overarching goal of the Module 1 is to build CHWs' capacity to support national vaccination programs by promoting vaccination. Learning objectives are to

¹² Sierra Leone Demographic and Health Survey 2008. Retrieved on 24 February 2020.

¹³ WHO. 2016. Ebola Situation Report. <https://apps.who.int/ebola/current-situation/ebola-situation-report-16-march-2016>

¹⁴ Mc Kenna, P., Babughirana, G., Amponsah, M., Egoeh, S. G., Banura, E., Kanwagi, R., & Gray, B. (2019). Mobile training and support (MOTS) service-using technology to increase Ebola preparedness of remotely-located community health workers (CHWs) in Sierra Leone. *mHealth*, 5, 35. <https://doi.org/10.21037/mhealth.2019.09.03>

ensure CHWs understand the basics of vaccination: why vaccinating, who, when and where, and are able to share this information with the community.

- ii. **Module 2: Outbreak Response** - The overarching goal of the Module 2 is to build CHWs' capacity to contribute to the country disease surveillance system and to respond to outbreaks of emerging infectious diseases. Learning objectives include: understanding the importance of community-based surveillance, identifying potential outbreaks, knowing how to report, knowing how to identify notifiable conditions (such as newborn death, maternal death, neonatal tetanus, clustered deaths, polio, cholera, guinea worm, Ebola, yellow fever).

Various levels of the MoHS, such as Peripheral Health Units (PHU) In-charges can monitor module and quiz completion, quiz results, and listening patterns to assess the performance of the modules and the CHWs. Figure 3 below shows the architectural illustration of MOTS concept and work flow.

Figure 3: MOTS concept and workflow



1. 4 Purpose of Report

This report describes the CHW outcomes from a quasi-experimental research assessment implemented among CHWs in Kambia District as well as results drawn from the MOTS IVR quizzes to determine whether MOTS improved CHW knowledge and behaviour as a result of their participation in two modules delivered through MOTS: a Vaccination Module and an Outbreak Response module (that focused on Ebola). These outcomes will be viewed in light of the costing exercise that was completed during the same time period and completed in 2019. The results from this evaluation will influence changes to MOTS and the curriculum prior to scaling this approach to other districts in Sierra Leone and beyond.

CHAPTER 2: METHODS

2.1 Evaluation Objectives

Prior to the Kambia implementation and assessment, IVR-based pre- and post-test quizzes with participating CHWs as well as a series of operational interviews that assessed the usability of the system were conducted in Bo District. Key findings from these assessments¹⁵ suggested that there were some changes in knowledge among participants, particularly in the first module on Vaccinations, but less knowledge change regarding the second module on Outbreak Response. Per the IVR quiz questions, 75.4 percent of CHWs had correct knowledge regarding the Vaccinations module while 57.0 percent did with the Outbreak Response module. This raised an important question about the likelihood of participant fatigue after participating in the modules back-to-back.

Also, not all questions received equal improvement; some questions experienced a decrease in knowledge instead of an increase, suggesting either CHWs were guessing at the answers during the pre and post-test quizzes or that there was increased confusion as a result of the education. Consequently, the MOTS team made changes to the IVR questions prior to the Kambia roll-out, reducing the number of answer options and also added the answer option “I don’t know” to assist in a better/more accurate research survey experience. The final MOTS surveys for each module are included in Appendix 1; enumerator surveys can be found [elsewhere](#).

The MOTS assessment in Kambia, therefore, aimed to answer two key questions to advance the learning of the effectiveness of MOTS as a refresher training methodology:

- To what degree does MOTS improve knowledge and behavior of CHWs related to vaccinations and outbreak response (compared to a comparison group)? *The hypothesis: MOTS improves knowledge/behaviors of CHWs compared to CHWs who receive no mobile training.*
- To what degree does the order of the modules (Vaccination followed by the Outbreak Response module, or vice-versa) matter on knowledge and behavior change? *The hypothesis: Participation in MOTS sessions back-to-back can lead to user fatigue, resulting in reduced effectiveness of the second module in which a CHW participates.*

Finally, these outcomes results will be assessed in light of the ongoing costs of implementation for the MoHS for the MOTS IVR trainings compared to no refresher trainings at all and the trade-offs of MOTS compared to in-person refresher trainings.

2.2 Research Area and Participants

Study Participants

This assessment was conducted in Kambia district, Sierra Leone. Primary study participants included randomly-selected CHWs from targeted chiefdoms in Kambia District. CHWs from the comparison group occupied the chiefdoms of Mambolo and Samu while those from treatment groups were from Bramia, Magbema, Tonko Limba, Gbinle Bixing and Masungbala chiefdoms.

¹⁵ Mc Kenna P, Babughirana G, Amponsah M, Egoeh SG, Banura E, Kanwagi R, & Gray B. (2019). Mobile training and support (MOTS) service-using technology to increase Ebola preparedness of remotely-located community health workers (CHWs) in Sierra Leone. *mHealth*, 5, 35. <https://doi.org/10.21037/mhealth.2019.09.03>

Prior to the project, CHWs were screened for their participation in MOTS in a functionality assessment¹⁶ that mimicked the one documented in Bo¹⁷ where CHW ownership of functional mobile phones and connectivity was assessed. From the list of qualifying CHWs, CHWs were chosen to participate in the evaluation. To facilitate supervision of data collection, the location of the CHWs determined what Treatment Group a CHW was placed in. Those in hard to reach areas were purposively placed in the comparison areas. This minimised spill-over effect and a feeling of being left-out by other CHWs. Table 1 outlines the number of CHWs per Chiefdom and their allocation for the treatment and comparison groups. CHWs interviewed at baseline are the same ones interviewed at endline. At baseline, a total of 378 treatment and comparison CHWs were visited and consented to complete the baseline questionnaire. At endline, a total of 375 treatment and comparison CHWs were found for the interviews; three CHWs could not be traced for different reasons.

Table 1: Sample communities and sample sizes

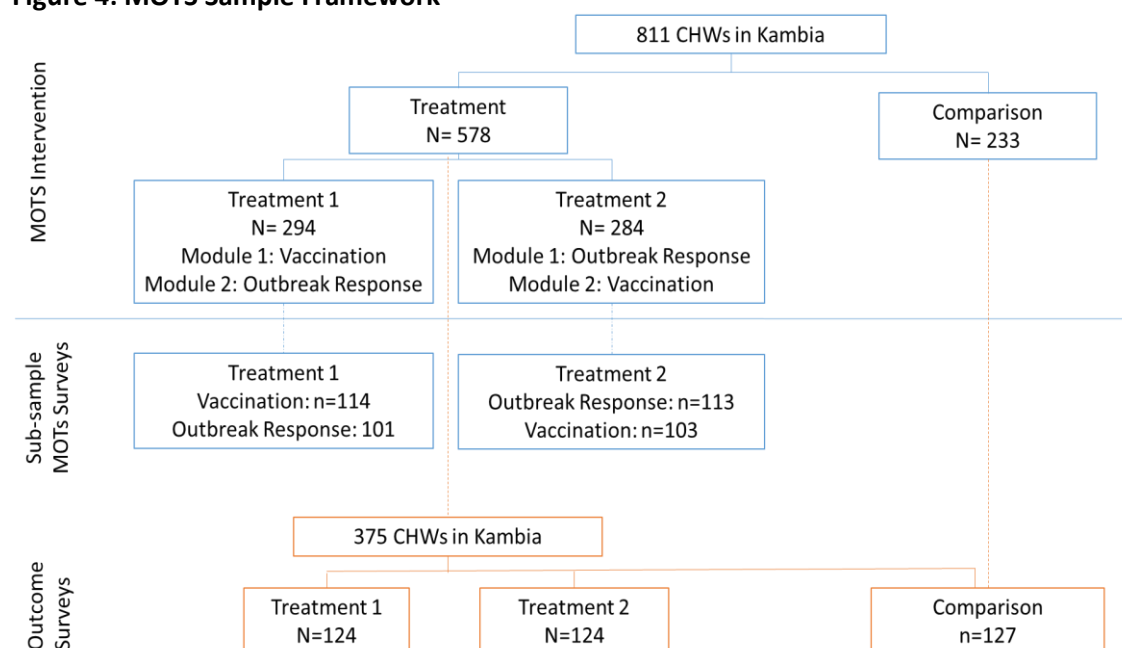
Group	Chiefdom	Count of chiefdom	Total
Comparison	Mambolo	43	127
	Samu	84	
Treatment1	Bramaia	47	124
	Magbema1	13	
	Tonko Limba	64	
Treatment2	Gbinle Dixing	42	124
	Magbema2	46	
	Masungbala	36	
Grand Total		375	

All CHWs participating in MOTS sessions also participate in the MOTS quizzes. Figure 4 outlines the total sample of CHWs that participated in MOTS, the MOTS quizzes and the quasi-experimental study. To compare MOTS quiz data to the enumerator-facilitated (outcomes) surveys, a sub-sample of CHWs that both participated in MOTS and the outcomes surveys (considered the match sample) are compared throughout this report. The full sample of MOTS quiz data and the percent of correct responses are included in Appendix 2F and 2G. The reason for the difference in the denominator for the MOTS quizzes and the outcomes surveys is due to the fact that not all CHWS completed sessions and therefore did not participate in the associated MOTS quizzes. Therefore, out of 124 Treatment 1 CHWs who participated in the outcomes survey, we have 114 of those CHWs that completed MOTS quizzes from the Vaccination Module and 101 from the Outbreak Response module.

¹⁶ Kamara F, Egoeh SG, Amponsah M. 2019. Communication strategy and tools for optimizing the impact of Ebola vaccination deployment. Ebodac Consortium.

¹⁷ Babughirana G, Amponsah M, Banura E, Egoeh SG, Barrie MS, et al. (2018) Assessment of the Readiness of Community Health Workers to Participate in a Mobile Training and Support Services Innovation: Results of a Functionality Assessment in Bo District, Sierra Leone 2018. *Am J Compt Sci Inform Technol* Vol.6 No.3:28

Figure 4: MOTS Sample Framework



2.3 Data Collection Methods

Prior to implementation in Kambia, approval for the research protocol was obtained from the Government of Sierra Leone Ethics and Scientific Review Committee, Directorate of Policy, Planning & Information. Research approvals and protocols are found [elsewhere](#).

Six enumerators were trained to collect the quantitative data from the selected CHWs. A digital data gathering platform, SurveyCTO, was used for data collection and this minimized errors that are often experienced with paper-based data collection. Research instruments are provided [elsewhere](#).

In-depth interviews were conducted with key informants in the DHMT while five focus group discussions (FGDs) were conducted with In-charges and Level-One staff. KIIs were conducted using semi-structured guides for an interview with people who were thought to have informed perspectives on the project. Findings from the FGDs and KIIs have been used to supplement and provide a narrative to the quantitative findings.

2.4 Data Analysis and Reporting

Data was processed in Excel and exported to Statistical Package for Social Scientists (SPSS) for analysis where frequency tables and charts were produced and incorporated into the report. Triangulation of the various quantitative and qualitative methods was used to gain a detailed and balanced perspective of the program. Difference-in-difference (DiD) analysis was conducted to compare the average change in outcomes for the treatment group (T) between baseline and endline to the average change over time for the comparison (C) group between baseline and endline $((T_{\text{endline}} - T_{\text{baseline}}) - (C_{\text{endline}} - C_{\text{baseline}}))$.

Regression analyses on the survey data using SPSS were used primarily to help identify factors that were influencing knowledge, attitude, or behavior change among the CHWs. Analysis included a binary

logistical regression under the assumptions of the Ordinary Least Square (OLS) method. A forecast model could not be created due to the non-availability of the longitudinal data. However, a cross-sectional regression analysis was conducted to identify the significant factors affecting the dependent variables. The significance of the relationships was tested at 95 percent level of significance against the p-value of 0.05, which were then noted with the subsequent beta value and the Nagelkerke R² was used to identify the strength of the fit of the regression.

A knowledge index for the regression analyses was created to assess factors that influenced knowledge improvement. The Knowledge Index was created by coding all knowledge questions to 1 or 0 (1=correct answer, 0=incorrect answer) and then summing the scores to all questions (maximum score was 11). The highest knowledge quartile was determined as those above eight correct answers. Those 8 and below were considered below the threshold. CHWs were then coded as 1 (Highly knowledgeable) or 0 (Not highly knowledgeable).

2.5 Limitations of the Research

During the implementation of the MOTS IVR quizzes, CHWs frequently skipped answering questions, these have been categorized as “missing”, limiting our understanding of the real knowledge change.

Given this study relies on a quasi-experimental design and not a randomized control trial, any changes experienced by the CHWs cannot fully be attributed to the MOTS intervention and can only be suggestive of change. The comparison group was located in completely different chiefdoms than the treatment groups and variability in this group could be driven by different access to information, support services, technology, among others.

CHAPTER 3: RESULTS

3.1 Socio-demographic Characteristics

The CHWs in both Treatment and Comparison groups have similar social characteristics. The typical CHW is male, 38 years old, has a secondary education.

Table 2: Socio-demographic characteristics of respondents

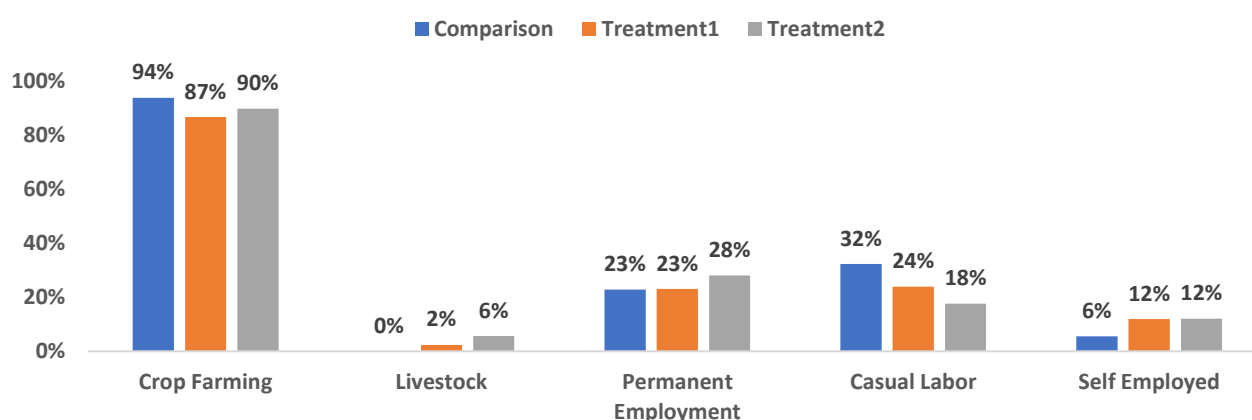
Baseline				
	C (n=127)	T1 (n=124)	T2 (n=124)	Total (n=375)
Gender				
Male	84.3	79.8	91.9	85.3
Female	15.7	20.2	8.1	14.7
Attended Secondary School	74.8	68.8	72.2	73.1

C= Comparison Group; T1=Treatment Group 1; T2=Treatment Group 2

Income and income sources

Data on income was only collected at baseline as it was not expected to change between the baseline and endline surveys. The full table of baseline results are provided in Appendix 2C. As was also observed in the functionality assessment¹⁸, the majority (90%) of the CHWs practice crop farming as their major source of earning. Further details can be seen in the figure below.

Figure 5: CHW primary income sources



Only the differences in reporting livestock and casual labor as income sources were statistically significant among the three groups.

Other than their CHW allowance, a CHW earns approximately 209,321 Leones (SLL)¹⁹ on average per month. According to the MoHS in Sierra Leone, CHWs earn a wage of 150,000 SLL per month as a token for the work they are doing. This implies that on average, a CHW earns 359,321 SLL per month (38.95 USD). The table below outlines the percentages of CHWs whose income falls into three primary categories. Most CHWs live on less than 200,000 SLL per month.

¹⁸Mc Kenna, P., Babughirana, G., Amponsah, M., Egoeh, S. G., Banura, E., Kanwagi, R., & Gray, B. (2019). Mobile training and support (MOTS) service-using technology to increase Ebola preparedness of remotely-located community health workers (CHWs) in Sierra Leone. *mHealth*, 5, 35. <https://doi.org/10.21037/mhealth.2019.09.03>

¹⁹ 1 USD=9,225 SLL

Table 3: CHW income sources by category group

	Baseline		
	Less than 200,000 SLL	200,000 – 400,000 SLL	More than 400,000 SLL
Comparison	48%	41%	11%
Treatment1	60%	29%	11%
Treatment2	51%	30%	18%
Total	53%	34%	13%

Food security

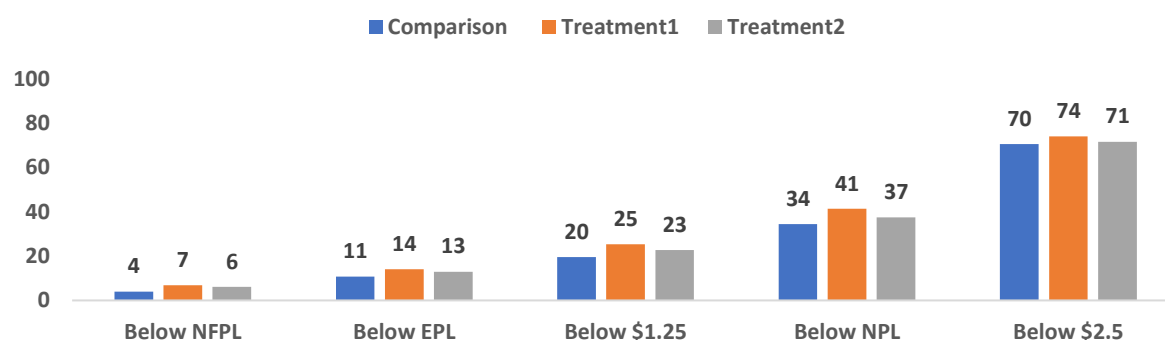
Food security was measured to assess vulnerability and the likely nutritional status of the CHWs and their children. CHWs were asked to describe the food consumed by their households in the last year using one of the four statements presented below in the Table 4. Only the response to the first statement “enough of the kinds of food we wanted to eat” was classified as being “food secure.” Most CHWs are food insecure (90 percent). There was no statistical difference among the three groups and no visible change between baseline and endline (data not shown).

Table 4: Food security among the respondents

	Baseline				Classification
	C	T1	T2	Total	
Enough and the kinds of food we wanted to eat.	9%	10%	11%	10%	Food secure
Enough but not always the kinds of food we wanted to eat.	53%	42%	39%	45%	Food insecure without hunger
Sometimes not enough food to eat, was sometimes hungry.	39%	47%	47%	44%	Food insecure with moderate hunger
Often not enough to eat, was often hungry.	0%	1%	2%	1%	Food insecure with severe hunger

Poverty Probability Index (PPI)

The PPI is a poverty measurement tool that is statistically-sound, yet simple to use. The answers to 10 questions about a household’s characteristics and asset ownership are scored to compute the likelihood that the household is living below the poverty line. For all groups, approximately 70 percent of them live below the \$2.50 international poverty line, a third of them under the national poverty line (NPL), about a quarter of them below the \$1.25 international poverty line and less than 15 percent below the extreme poverty line.

Figure 6: Poverty penetration

3.2 CHW Responsibilities and Support

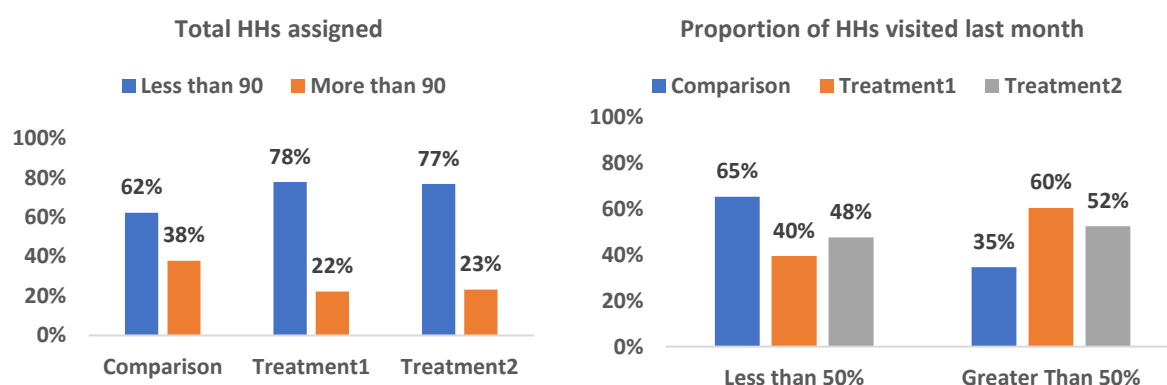
Number of households assigned to CHW

About 62 percent of Comparison, 78 percent of Treatment 1 and 77 percent of Treatment 2 CHWs are responsible for less than 90 households (HHs). The number of households that CHWs reportedly served ranged from three to 1,300 households with an average of 116, 73 and 83 households per CHW in Comparison, Treatment 1 and 2, respectively. The overall average for combined groups was 92 HHs per CHW. At baseline, the comparison group was statistically significantly likely to have more than 90 HHs compared to the two treatment groups.

Weekly household visits

According to the national CHW policy (2016),²⁰ CHWs are required to conduct routine quarterly visits for the households in their catchment areas. Results in the survey suggest that in a typical week, the majority of the CHWs in all the groups spend about 10 hours a week on CHW work. This is approximately 1.5 hours per day excluding Sundays. The average hours reportedly spent are 11.8 hours for the Comparison group, 10.6 hours for Treatment 1 and 10.6 hours for Treatment 2.

Figure 7: Total HHs assigned to the CHW vs proportion visited



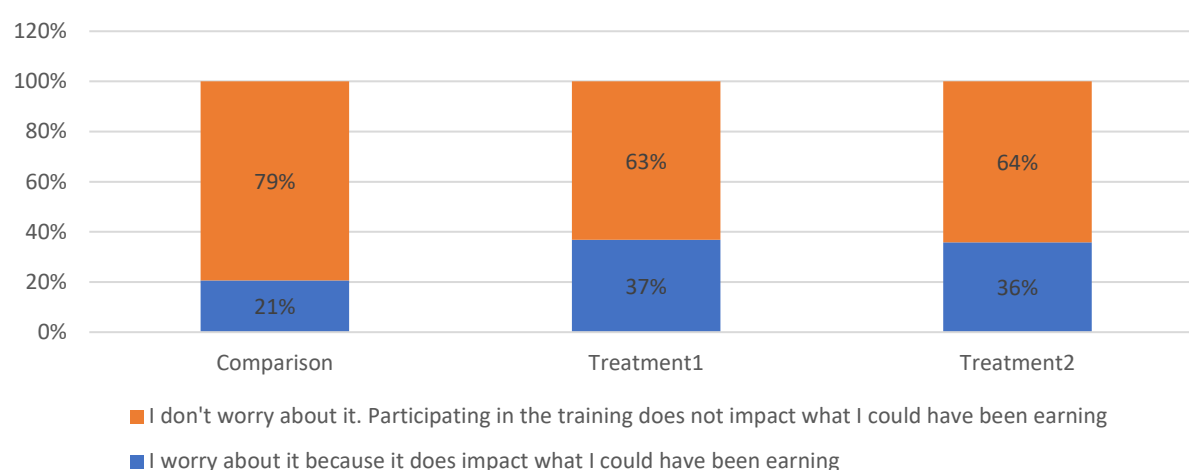
Time spent by CHW at trainings

At baseline, CHWs reportedly spent 14 hours away from home for an in-person CHW training that was conducted within the three months prior to the survey (15.2, 17.3, 12.8 hours for the comparison, Treatment 1 and Treatment 2 groups, respectively). While away for the trainings, some CHWs expressed their worry for the lost income in order to attend trainings (Figure 8). The differences between both individual Treatment groups and the Comparison group are statistically significant.

²⁰ Policy for Community Health Workers in Sierra Leone.

<http://chwcentral.org/policy-community-health-workers-sierra-leone>

Figure 8: Worry about income lost while attending in person training



Financial compensation

The MOTS team understands from the MoHS that CHWs are given a monthly wage of 150,000 SLL from the MoHS. However, this payment sometimes is delayed and paid in the form of arrears on quarterly basis. The baseline assessment indicated that 83, 91 and 100 percent of Treatment 1, Treatment 2 and the Comparison group, respectively, reported to have received compensation in form of a wage as payment for their CHW work. The differences among these three groups were all statistically significant.

Reimbursements for the training

Almost all CHWs (100% Comparison (C), 98% Treatment 1 (T1) and 98% Treatment 2 (T2)) reported reimbursements from the MoHS for their expenses, especially for accommodation, travel and meals. Table 5 below outlines the different out-of-pocket expenses that were incurred by CHWs at a personal level and were not compensated by the MOHS.

Table 5: Out-of-pocket expenses not reimbursed by the MoHS

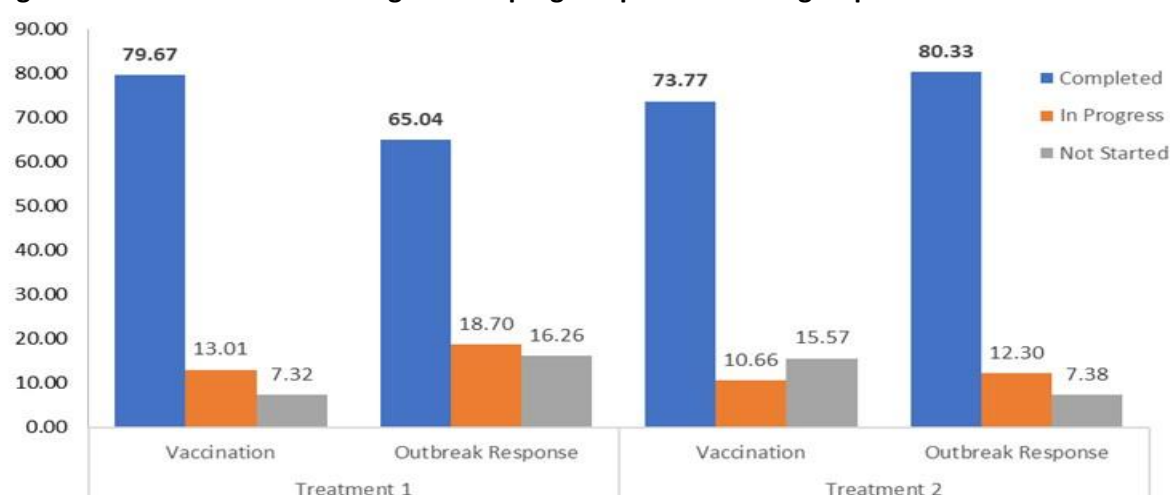
Expense	Baseline			
	C	T 1	T 2	Total
Transport(SLL)	25,216	17,542	20,655	21,115
Transport(USD)	2.77	1.93	2.27	2.32
Meals(SLL)	7,087	6,674	7,621	7,210
Meals(USD)	0.78	0.73	0.84	0.79
Accommodation(SLL)	-	6,500	31,000	20,111
Accommodation(US	-	0.72	3.41	2.21
Childcare (SLL)	23,102	28,848	27,176	25,931
Childcare (USD)	2.54	3.17	2.99	2.85
Others(SLL)	7,667	6,094	9,640	8,076
Others(USD)	0.84	0.67	1.06	0.89

3.3 CHW Training Engagement

CHWs in Treatment 1 received the Vaccination module first while Treatment 2 received the Outbreak Response module first. CHWs in both treatment groups started receiving their first module on May

14, 2019 and the training was closed on July 21, 2019. Overall, at the end of training, the MOTS system indicated that 62 percent of Treatment 1 had completed training for both modules while 68 percent of Treatment 2 had completed training for both modules by the close date. Progress-wise, 93 percent of Treatment 1 and 84 percent of Treatment 2 completed or were in progress in the Vaccination module while 81 percent of Treatment 1 and 93 percent of Treatment 2 had completed or were in progress for the Outbreak Response module (Figure 9).

Figure 9: MOTS refresher training module progress per treatment group



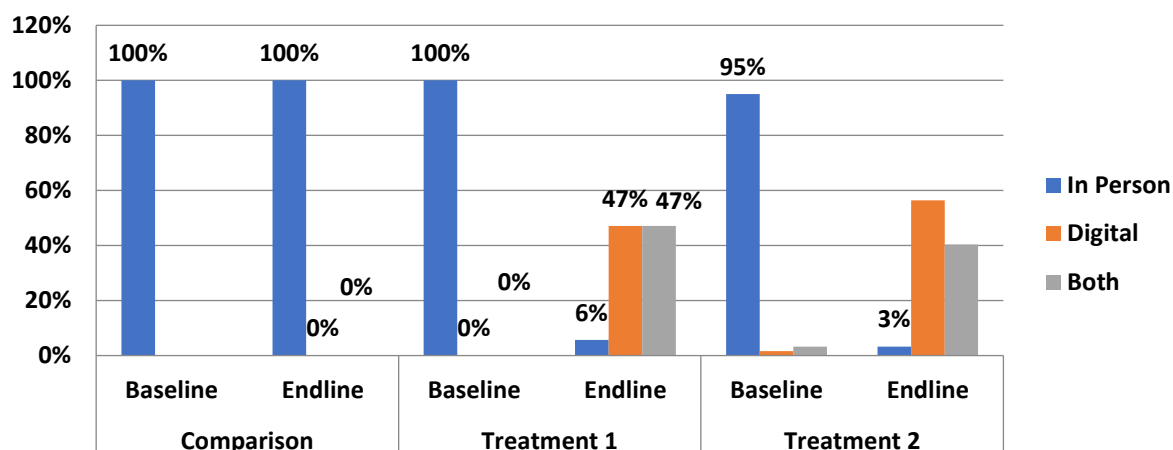
According to the enumerator-facilitated survey, the majority of all the CHWs in all groups reported at baseline to have received training in the prior 12 months. At the endline, the Comparison group reported participating less in training, resulting in the treatment groups outperforming the control group by 21 percentage-points (Table 6).

Table 6: Training participation and training methodologies

	Baseline			Endline			DiD		
	C	T 1	T2	C	T 1	T2	T1vT2	T1 v C	T2 v C
Received training	99.2%	97.7%	98.4%	80.3%	99.2%	100%	0.01%	21%	21%
Training methodology									
In-person	100.0%	100.0%	95.1%	100.0%	5.7%	3.2%	-2.5%	-94.3%	-91.9%
Digital	0.0%	0.0%	1.6%	0.0%	47.2%	56.5%	-7.7%	47.2%	54.8%
Both	0.0%	0.0%	3.3%	0.0%	47.2%	40.3%	10.1%	47.2%	37.0%

As would be expected, the Comparison group reported receiving these trainings through in-person trainings while those in Treatment 1 and 2 either reported to have received trainings through digital means or both in-person and digital (Table 6, Figure 10). The Treatment groups outperformed the Comparison group in digital training by approximately 47 percentage points for Treatment 1 and 55 percentage points for Treatment 2.

Figure 10: Mode of training received by CHW



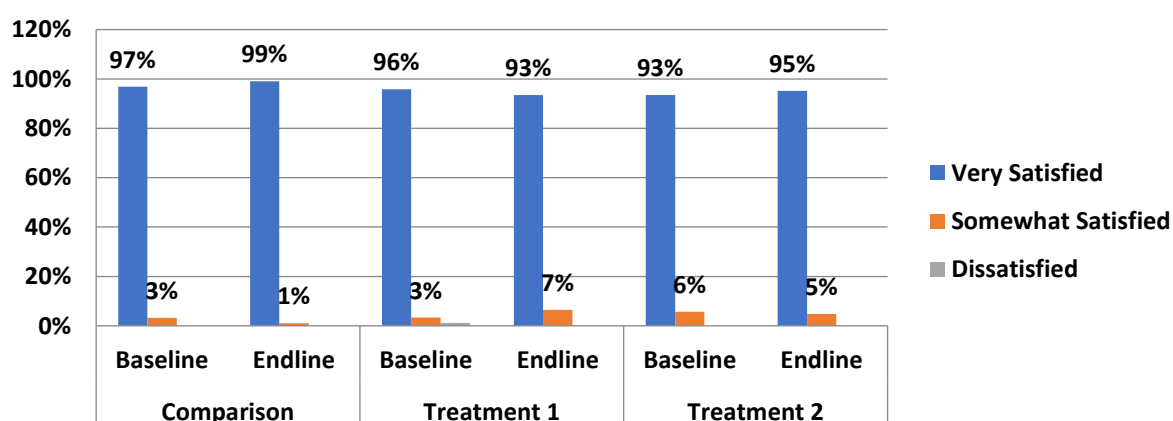
Regarding training topics received by the CHWs, there was an increase exhibited across all three groups on the following at endline:

- training of community-based surveillance of disease, births and deaths,
- functions and roles of the CHW,
- vaccinations,
- infectious diseases and outbreaks.

The MOTS trainings were focused on disease outbreaks and vaccinations; however, the Comparison Group also reported receiving training on these two topics, suggesting they may have received some sort of in-person training from the MoHS in the prior year. Details of the types of training and the difference-in-difference analysis for the types of training received can be found in the Appendix 2D.

None of the CHWs reported dissatisfaction with the trainings that they reported to have received (whether in digital or in-person formats) in the last one month.

Figure 11: Satisfaction with training



Although participation was high, the survey results found that not all CHWs reported that they completed all trainings (and one CHW in the Comparison group reported participating). Of those who

acknowledged participation in the module trainings, the majority felt the learning objectives were very or somewhat clear. There were more CHWS in Treatment 1 that did not participate in the MOTS training. While most of those who did not participate noted to have lost their phones or having poor connections, there were some that reported “other”.

Table 7: Participation in MOTS

		Endline		
		C	T1	T2
Participated in a mobile training on Vaccinations		0.8% (n=1)	93.5%	95.2%
Clarity of learning objectives of the Vaccination sessions				
Very clear		100.0%	95.7%	95.8%
Somewhat clear		0.0%	3.4%	4.2%
Not clear		0.0%	0.9%	0.0%
Participated in a mobile training on Outbreak Response		0.0%	94.4%	96.8%
Clarity of learning objectives of the Outbreak Response sessions				
Very Clear		0.0%	93.2%	96.7%
Somewhat Clear		0.0%	5.1%	3.3%
Not Clear		0.0%	1.7%	0.0%
Clarity of the questions posed in the MOTS quizzes				
Very Clear		100.0% (n=1)	90.6%	93.3%
Somewhat Clear		0.0%	8.5%	6.7%
Not Clear		0.0%	0.9%	0.0%
Did not participate in training		0.8% (n=1)	8.9%	5.6%
Reasons for not participating				
Lost my phone		0.0%	45.5%	57.1%
My connection was not good		0.0%	18.2%	42.9%
Others		100.0%	36.4%	0.0%

Qualitatively, in both the Kambia and Bo pilots, CHWS also reported poor connectivity, lack of charging facilities and being overwhelmed by other activities, such as their farming activities made completing the sessions difficult. During the Kambia implementation, most IVR sessions were pushed during the rainy season when many CHWs involved in agriculture were likely occupied with land preparation and planting. The In-charges reiterated these findings during the FGDs: the In-charges shared that they themselves faced difficulties monitoring CHW performance online due to the poor network connectivity. In-charges cited that sometimes getting a CHW on the phone would be very hard requiring them to physically track CHWs down to their residences. When In-charges were asked to state the number one request made by CHWs during the MOTS refresher training, the majority mentioned that CHWs could not operate their own phones. Some even asked the In-charges to show them what to press on their phone to operate the IVR system. In-charges also shared that they felt the CHWs thought that once they flashed the system, it would operate itself.

The regression analyses using the outcomes survey data provide further insights regarding participation in MOTS sessions. There was a relationship between the CHW noting their attendance in a training on vaccines and the gender of the CHW, a CHW’s satisfaction with the training, and the treatment group they belonged to; however, none of the CHW attitudes (covered in Table 15) were

associated with having participated in the Vaccination training. In summary, male CHWs, those who reported being very satisfied with the training, and those in Treatment 1 were less likely to participate in the vaccination training. These same factors were also associated with whether the CHW felt they understood the learning objectives of the training.

Being a male CHW and being very or somewhat satisfied with the training had a negative association with whether the CHW participated in the Outbreak Response training; however, being in Treatment 1 did not. These same factors were associated with whether they understood the learning objectives of the training. Similar to the Vaccination findings, CHW attitudes were not associated with either participating in the Outbreak Response training or understanding of the learning objectives.

Table 8: Predictors of training engagement

Significant Factors	Beta	Standard Error	Sig<0.05	Exp(Beta)
Predictors of attending Vaccination training on a phone in last two months				
Sex (Male)	-.696	.086	.000	.499
Very or somewhat satisfied with Training	-.806	.208	.000	.447
Participant Group (Treatment1)	-5.754	1.144	.000	.003
Predictors of having clarity on the learning objectives of the Vaccination training				
Sex (Male)	-.755	.087	.000	.470
Very satisfied with training	-.862	.211	.000	.422
Somewhat satisfied with training	-1.994	.573	.001	.136
Participant Group (Treatment1)	-5.716	1.142	.000	.003
Predictors attending Outbreak Response training on a phone in last two months				
Sex (Male)	-.688	.086	.000	.502
Satisfaction with Training (Very satisfied)	-.763	.206	.000	.466
Predictors of having clarity on the learning objectives of the Outbreak Response training				
Sex (Male)	-.755	.087	.000	.470
Very satisfied with training	-.873	.211	.000	.418
Somewhat satisfied with training	-1.507	.498	.002	.222

3.3 MOTS Quiz Results

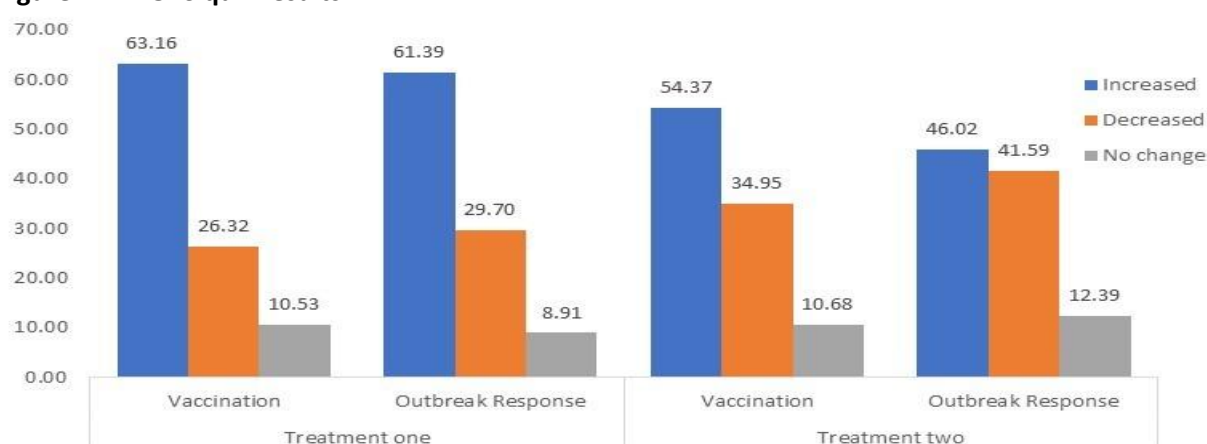
The table below outlines the data that was captured using the MOTS IVR pre and post-tests conducted prior to and after the completion of specific IVR sessions by Treatment 1 and Treatment 2. Modules in the table below are arranged in the order of which they were assigned to the group during the training. The data provided on MOTS in this analysis is based on the sub-sample of CHWs that both participated in the outcomes survey and the MOTS quizzes. The full sample of MOTS data is provided in Appendices 2F and 2G.

Generally, both groups showed an increase in the average percent of correct answers. Overall, the Vaccination module performed better than the Outbreak Response module. It was expected that the CHWs would achieve an average score of 80 percent achievement in knowledge by the post-test; however, neither treatment group exceeded 70 percent.

Table 9: MOTS knowledge quiz results (Matched sample)

Group	Module (% correct responses)	Pre-post	Post-test	Difference
Treatment 1	Vaccination (N=114)	54.42%	67.90%	13.48%
	Outbreak Response (N=101)	56.46%	67.12%	10.66%
Treatment 2	Outbreak Response (N=113)	55.49%	62.04%	6.55%
	Vaccination(N=103)	60.30%	67.52%	7.22%

The figure below provides a breakdown of the MOTS quiz results showing a percentage of CHWs who registered either an **increase**, **decrease** or **no change** at all for both pre and post-tests scores. The denominator for each percentage was calculated using the total number of CHWs that were assigned and attempted taking the training.

Figure 12: MOTS quiz results

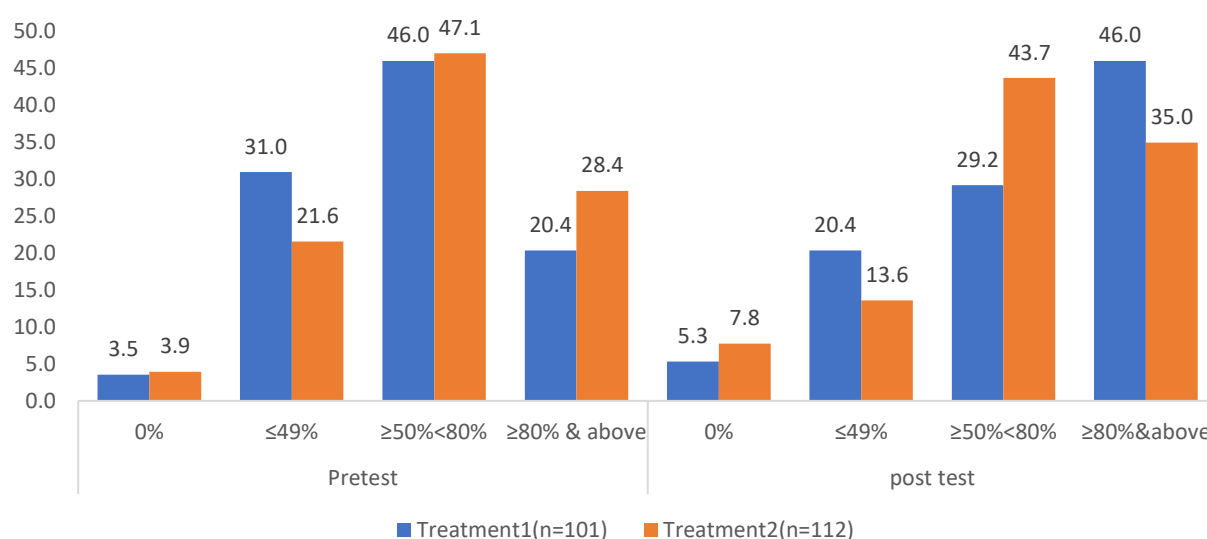
Compared to the Vaccination module for each group, the Outbreak Response module possessed the highest number of the CHWs who saw a decrease in the scores at post-test for both Treatment groups. Treatment 1 had higher scores than Treatment 2.

Additional analysis focused on performance of the CHWs being broken down into three categories: those who took the training and **scored 0 percent correct**, those who scored more than **0 but less than 50 percent correct**, those who scored **between 50 and 80 percent** and those who scored **80 percent correct and above**. CHWs who scored 80 percent above, their performance is considered to have met the target knowledge level.

Setting a bar at 80 percent and above, 20 percent of Treatment 1 and 28 percent of Treatment 2 CHWs scored 80 percent and above at the pre-test on Vaccination while 46 percent and 35 percent, Treatment 1 and 2, respectively, scored 80 percent and above at post-test. The number of CHWs scoring zero percent increased by the post-test as some who took the pre-test did not complete the training by the post-test. There are still CHWs who scored zero percent even after taking the refresher training, suggesting they did not acquire any new knowledge or simply skipped the questions, the latter the most likely answer given the probability of getting a correct answer even if by guessing to questions. Three CHWs (two who had completed the trainings and one CHW whose participation was still in-progress) took the training and scored zero percent both at pre and post-test.

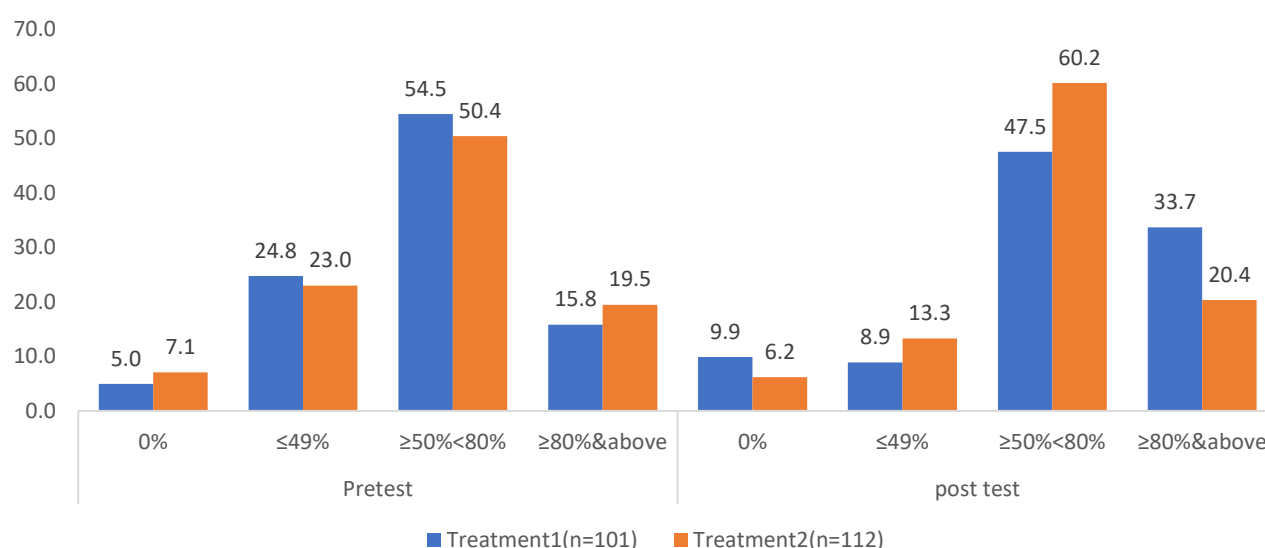
In summary, while there was progress made on knowledge improvements for the Vaccination module, the CHWS still fell below the 80 percent knowledge level target.

Figure 13: Knowledge trends for Vaccination module



Regarding knowledge change for the Outbreak Response module, there was not much difference between Treatment 1 and 2 groups. In contrast to the Vaccination module knowledge levels, the majority of the CHWs in both treatment groups scored in the range of 50 and less than 80 percent correct responses. Treatment 1 experienced the larger improvement of those achieving 80 percent and above correct responses.

Figure 14: Knowledge trends for Outbreak Response module



3.4 MOTS and Outcomes Survey Data: Results by Question

The MOTS quiz for the pre- and post-tests for both modules comprised of 20 questions. Only 12 to 14 of these 20 questions for the Vaccination and Outbreak Response modules, respectively, were included in the outcomes survey data collection. Questions in the outcomes survey entail the same content as those in MOTS though a few tweaks were made to fit the structure of the survey tools.

Table 10 outlines the results from the Vaccination module comparing the MOTS data to the outcomes survey data for the questions where there was use of the same questions. The data indicates that:

1. The knowledge levels at both baseline and endline from the outcomes survey data is greater than the knowledge levels depicted in the MOTS quiz data, in some cases varying 50 percentage points.
2. While the MOTS data indicates the average CHW was well-below the 80 percent target of correct responses to each question, the outcomes survey data indicates the average CHW met the target of 80 percent or came very close for most all questions. Question 2, which asks whether the CHW knows that vaccines can protect against some, but not all diseases, was the one indicator that did not meet the target. This is also the indicator where the difference-in-difference analysis shows that the comparison group performed better than both treatment groups and Treatment 2 performed better than Treatment 1.
3. The greatest gain for both treatment groups compared to the comparison group was on Q13, which corresponds to CHWs knowing that caregivers can go to both the PHU and outreach point for vaccinations.
4. Treatment 1 did not perform as well as Treatment 2 on seven of the 12 indicators.

Table 11 outlines the results from the Outbreak Response module comparing the MOTS quiz data to the outcomes survey data for the questions where there was use of the same questions. The data indicates that:

1. Similar to the Vaccination module data, the knowledge levels at both baseline and endline from the outcomes survey data for the Outbreak Response is greater than the knowledge levels depicted in the MOTS quiz data, in some cases varying up to 80 percentage points. However, the spread in the differences was not as consistent with the Outbreak Response module as it was for the Vaccination module. In some cases, results were only 8-10 percentage-points in difference.
2. Treatment 2 outperformed Treatment 1 on eight out of the 14 indicators, but not by much. There were only two indicators where the difference was about 10 percentage points. Treatment 1 outperformed Treatment 2 by 22 percentage points on indicator Q2 regarding the purpose of a disease surveillance system. Treatment 2 outperformed Treatment 1 on Q14 regarding a child with fever and other symptoms.
3. There were approximately seven indicators in the outcomes survey where the average correct response decreased or stayed the same between the baseline and endline.
4. Three areas deserve special attention due to the very low knowledge change that occurred and because they were more than 10 percentage points below the target: Q7 regarding identifying suspected cases of Ebola; Q9 which knows the PHU should be notified first if a notifiable condition is suspected; Q20 which similarly assesses the CHW's ability to identify a suspected case of Ebola.

The results from the full sample of MOTs quiz data demonstrated higher post-test averages than the matched sample on many indicators. While the full sample size was larger than the matched sample, the larger improvements at the post-test may not be fully explained by the larger sample size. However, similar to the matched sample, the full sample results were still below the outcomes survey results.

Table 10: Vaccination module results

	MOTS Quiz – Matched Sample					Outcomes Survey							
	Pre-test		Post-test		C	Baseline		C	Endline		DiD		
	T1	T2	T1	T2		T1	T2		T1	T2	T1vT2	T1vC	T2vC
Q1 – Knows CHWs should explain purpose of vaccinations when visiting households.	74%	81%	71%	75%	100%	100%	100%	100%	100%	100%	0%	0%	0%
Q2–Knows vaccines protect against some diseases but not all	42%	51%	52%	44%	85%	87%	79%	80%	71%	73%	-10%	-11%	-1%
Q4–Knows children should receive vaccines according to age, but vaccines exist for other age groups as well.	32%	51%	48%	44%	83%	79%	90%	80%	78%	83%	6%	2%	-4%
Q5–Knows a vaccine can be given even when a child has a minor illness, disability, malnutrition, or is late with vaccine schedule	37%	53%	44%	51%	86%	82%	81%	91%	85%	94%	-10%	-2%	8%
Q6–Knows a CHW should explain that pregnant mothers should be vaccinated against tetanus to protect herself and unborn child and help mother organize a visit to the clinic	56%	65%	69%	61%	97%	97%	97%	94%	96%	97%	-1%	2%	3%
Q8 – Knows that when meeting a parent who has not vaccinated their child due to malnutrition or illness, a CHW should reassure the parent for need for vaccinations, even when child is weak, and to help organize a visit to the clinic	54%	60%	66%	40%	96%	96%	95%	92%	98%	98%	-1%	6%	7%
Q9–Knows vaccines are necessary at birth	78%	71%	74%	76%	94%	88%	89%	94%	95%	98%	-2%	7%	9%
Q12–Knows that when meeting a parent who has not vaccinated their child due to missing vaccines at birth, a CHW should reassure the parent and to help organize a visit to the clinic	60%	64%	66%	73%	98%	97%	98%	94%	94%	98%	-3%	1%	4%
Q13 – Knows caregivers can go to both the PHU and the outreach point for vaccinations	44%	45%	55%	64%	80%	73%	77%	78%	83%	85%	2%	12%	10%
Q14-Knows caregivers do not have to pay for vaccinations	55%	58%	63%	72%	100%	99%	99%	99%	98%	99%	-1%	0%	1%

	MOTS Quiz – Matched Sample					Outcomes Survey							
	Pre-test		Post-test		Baseline			Endline			DiD		
Q15-Knows a CHW should check the under-five card for completion of vaccines at every routine visit	57%	55%	65%	58%	99%	99%	99%	99%	100%	100%	0%	1%	1%
Q17-Knows when meeting a parent who indicates they live too far from a PHU as a reason for not seeking vaccinations that the CHW should explain the parent can also visit the outreach point and help organize a visit and accompany the parent there	68%	67%	74%	75%	99%	92%	98%	94%	97%	98%	5%	10%	5%

Table 11: Outbreak Response module results

	MOTS Quiz – Matched Sample					Outcomes Survey							
	Pre-Test		Post-test		Baseline			Endline			DiD		
	T1	T2	T1	T2	C	T1	T2	C	T1	T2	T1vT2	T1vC	T2vC
Q1-Knows that community-based disease surveillance is monitoring and reporting unusual events, diseases and deaths	52%	52%	70%	69%	79%	88%	85%	63%	81%	76%	2%	9%	7%
Q2 – Knows community-based disease surveillance lets the health system detect potential outbreaks, allows them to take immediate action to control an outbreak and helps avoid suffering and death	42%	44%	52%	51%	65%	67%	77%	61%	81%	69%	22%	18%	-4%
Q6 –Knows that households that complain of acute watery diarrhea or cholera should report 3 or more watery stools in day	75%	66%	71%	65%	87%	89%	85%	85%	81%	80%	-3%	-6%	-3%
Q7- Knows that any person with a history of bleeding, fever, or a sudden death is a suspected case of Ebola	37%	65%	51%	61%	79%	81%	77%	57%	69%	69%	-4%	10%	14%
Q8 – Knows that a complaint of fever and a rash is a suspected case of measles	49%	53%	62%	62%	85%	91%	85%	98%	98%	98%	-6%	-6%	0%
Q9- Knows that if any of the 10 notifiable conditions[1] are suspected, a CHW should first notify the PHU	18%	29%	34%	40%	39%	28%	34%	51%	35%	35%	6%	-5%	-11%

Q12- Knows that all births, stillbirths, and any of the 10 notifiable conditions should be recorded in the surveillance monitor	35%	36%	44%	42%	61%	71%	69%	70%	77%	77%	-2%	-3%	-1%
Q13 – Knows a CHW should verify each birth and death so he/she can accurately fill in the surveillance register	69%	67%	59%	20%	100%	100%	100%	99%	100%	100%	0%	1%	1%
Q14 - Knows when a CHW encounters a child who has had a fever for a few days should seek additional information and determine if the child has had conditions like a rash, yellow eyes or bleeding to accurately refer, report, and register the condition	61%	48%	51%	41%	82%	77%	76%	87%	73%	83%	-11%	-9%	2%
Q16 – Knows a CHW should accurately monitor births and deaths and immediately report when becoming aware of a suspected case of a notifiable condition	45%	41%	55%	50%	60%	70%	78%	62%	77%	77%	8%	5%	-3%
Q17 – Knows that if a CHW were to discover to recent deaths in the same family, the CHW should delicately ask about the conditions of the deceased, ask about the family and village, and immediately report any cluster of similar deaths to the PHU	68%	60%	65%	60%	93%	91%	95%	97%	98%	98%	4%	3%	-1%
Q18- Knows that a child/person exhibiting a sudden weakness in a leg/limb and is limping should suspect a possible case of polio	62%	57%	61%	71%	96%	98%	98%	98%	99%	100%	-1%	-1%	0%
Q19 – Knows that a child who previously breastfed and has now stopped suddenly and is feeling stiff should suspect a possible case of neonatal tetanus	62%	60%	72%	67%	83%	92%	94%	96%	98%	94%	6%	-7%	-13%
Q20 – Knows that if three people have died in a community and all three had complained of high fever and bleeding from different body parts, a CHW should report clustered deaths and suspected Ebola	54%	39%	48%	49%	65%	65%	65%	59%	73%	69%	4%	14%	10%

Regression analyses were conducted to further assist in understanding the variables that influenced knowledge change (Table 12). The first analysis aimed to determine whether completion of the training influenced knowledge, given this is an assumed critical precursor for “refreshing” a CHW’s existing knowledge. A knowledge index was created, consisting of 11 questions pulled from both the Vaccination and Outbreak Response modules. The description of the creation of this index was covered in the Methods section. The analysis found that participation in both modules (or lack thereof) was not associated with higher knowledge scores. However, when assessing each module separately, there was an association between completing the vaccination module as well as if they completed both modules. Similarly, for the Outbreak Response knowledge, completion of the module was associated with improved knowledge, but completion of both modules was not associated with higher knowledge scores.

An additional analysis also found that being male and below the poverty line were associated with improved knowledge scores but food security was negatively associated with improved knowledge; however, whether they were in a treatment or comparison group, membership to a particular chiefdom and confidence levels were not associated with improved knowledge.

Table 12: Predictors of knowledge change

Significant Factors	Beta	Standard Error	Sig<0.05	Exp(Beta)
Predictors of knowledge change for the Vaccination module				
Completed Vaccination Module	1.698	.302	.000	5.462
Completed both the modules	1.476	.392	.000	4.375
Predictors of knowledge change for the Outbreak Response module				
Completed Outbreak Module	.496	.196	.011	1.643
Completed Both the modules	.511	.516	.323	1.667
Predictors of knowledge change (according to knowledge index)				
Male	.536	.116	.000	1.709
Family is food secure	-.920	.221	.000	.399
Below Poverty Line	1.137	.279	.000	3.118

3.5 CHW Community Engagement

Results at both baseline and endline suggest consistent CHW-community engagements regarding vaccinations and slightly less engagement regarding outbreak responses (Table 13). Besides Treatment 2, there were fewer CHWs reporting that they had communicated more with their communities regarding vaccinations. **Both treatment groups outperformed the comparison group regarding an increased frequency in communicating with communities regarding outbreak response. Only Treatment 2 outperformed the Comparison group on communicating more frequently on vaccinations.**

All CHWs reported feeling very or somewhat confident in talking about vaccinations and outbreaks to community members.

Table 13: Community engagement

Table 13: Community engagement									
Baseline				Endline			DiD		
	C	T1	T2	C	T1	T2	T1vT2	T1vC	T2vC

In past month, CHW has spoken to community members about vaccinations									
Yes	100.0%	100.0%	100.0%	100.0%	99.2%	100.0%	-0.8%	-0.8%	0.0%
Frequency that CHW spoke to community about vaccinations in past month compared to normally									
More	87.4%	86.3%	71.8%	79.5%	76.4%	86.3%	-24.4%	-2.0%	22.4%
Same	12.6%	12.9%	23.4%	15.7%	19.5%	12.9%	17.1%	3.5%	-13.6%
Less	0.0%	0.8%	4.8%	4.7%	4.1%	0.8%	7.3%	-1.5%	-8.8%
Confidence in speaking about vaccinations									
Very confident	96.1%	96.0%	96.0%	98.4%	97.6%	99.2%	-1.6%	-0.7%	0.9%
Somewhat confident	3.9%	4.0%	4.0%	1.6%	2.4%	0.8%	1.6%	0.7%	-0.9%
Not Confident	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	--	--	--
In past month, CHW has spoken to community members about outbreak response									
Yes	100.0%	99.2%	97.6%	99.2%	99.2%	97.6%	0.0%	0.8%	0.8%
Frequency that CHW spoke to community about outbreak response in past month compared to normally									
More	88.2%	79.8%	63.7%	81.7%	82.9%	86.0%	-19.2%	9.5%	28.7%
Same	11.8%	20.2%	29.0%	13.5%	15.4%	13.2%	11.1%	-6.4%	-17.5%
Less	0.0%	0.0%	7.3%	4.8%	1.6%	0.8%	8.1%	-3.1%	-11.2%
Confidence in speaking about outbreak response									
Very confident	97.6%	95.2%	93.5%	96.1%	95.2%	96.8%	-3.2%	1.6%	4.8%
Somewhat confident	2.4%	4.8%	6.5%	3.9%	4.8%	3.2%	3.2%	-1.6%	-4.8%
Not Confident	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.0%	0.0%	0.0%

Regression analyses show that being a male CHW or a member of either treatment group are positively associated with whether the CHW felt confident speaking to the community about vaccinations; however, a CHW reporting that they felt confident in their duties as a CHW was negatively associated with feeling confident. This means the more confident they felt in their duties as a CHW the less likely they felt confident speaking about vaccinations. The reason for this finding is not altogether clear. Unlike for the confidence with outbreaks, endline results and clarity on CHW duties were not associated with confidence communicating about vaccinations.

Feeling confident to speak to the community about outbreaks had similar patterns. In addition to the factors mentioned above, CHWs feeling like they are clear about their duties was also negatively associated with feeling confident communicating with the community regarding outbreaks.

Table 14: Predictors of confidence communicating with community

Significant Factors	Beta	Standard Error	Sig<0.05	Exp(Beta)
Factors associated with feeling confident communicating about vaccinations				
Sex (Male)	3.597	.246	.000	36.471
Treatment 1	1.930	.405	.000	6.892
Treatment 2	1.963	.377	.000	7.122
CHW is confident in duties	-2.979	.673	.000	.051
Factors associated with feeling confident communicating about outbreaks				
Sex (Male)	3.157	.200	.000	23.500
Treatment 1	1.925	.379	.000	6.854
Treatment 2	1.624	.316	.000	5.071
Survey (Endline)	.721	.300	.016	2.056

CHW has clarity on duties	-3.607	1.599	.024	.027
CHW is confident in duties	-5.130	.757	.000	.006

3.6 Attitudes towards CHW Work

The survey assessed CHW attitudes towards their jobs and found that CHWs generally had positive attitudes. Table 15 shows that for the most part, CHWs were satisfied with their role as a CHW and the support they receive. Both treatment groups outperformed the comparison group in their perception that they are provided with the resources they need to do their job. They also felt confident that they could share the right information with people in case of a disease outbreak. However, as the regression analyses presented above, these confidence levels may not directly translate to associated knowledge on how to respond to vaccination or outbreak response. The treatment groups outperformed the comparison group in their perception that they would trust information they would receive on their phone if there were an outbreak in the future.

Table 15: CHW attitudes

	Baseline			Endline			DiD		
	C	T1	T2	C	T1	T2	T1 v T2	T1vC	T2vC
CHW felt they had learned a lot of new things as a CHW	100%	100%	98%	98%	98%	100%	-4%	0%	4%
Felt aware of the duties/responsibilities of a CHW	100%	100%	100%	99%	100%	99%	1%	1%	0%
Agreed that they were provided with the resources they need to do their jobs as a CHW	95%	88%	82%	89%	93%	90%	-3%	11%	14%
Feels that s/he receives adequate support from her/his supervisor	99%	98%	94%	100%	100%	99%	-3%	1%	4%
Feels that s/he receives adequate training to help do job as a CHW	95%	92%	97%	95%	100%	95%	10%	8%	-2%
Is satisfied with ability to serve the health needs of her/his community	100%	98%	98%	100%	99%	100%	-1%	1%	2%
Confidence of sharing right information in case during a disease outbreak									
Very Confident	100%	98%	98%	98%	98%	97%	1%	2%	1%
Somewhat Confident	0%	2%	2%	2%	2%	3%	-1%	-2%	-1%
Likelihood of trusting information received on phone in case of a disease outbreak									
Would trust this information	98%	96%	97%	86%	98%	94%	5%	14%	9%
Would be skeptical	0%	4%	2%	13%	2%	6%	-6%	-15%	-9%
Would not trust this information	2%	0%	1%	2%	0%	0%	1%	0%	-1%

Regression analyses show that being male and a member of one or both treatment groups were associated with positive attitudes towards their role as a CHW.

Table 16: Predictors of CHW attitudes

Significant Factors	Beta	Standard Error	Sig<0.05
Receives adequate support from supervisor			
Sex (Male)	4.138	.319	.000
Treatment 1	3.883	1.010	.000
Treatment 2	3.366	.719	.000

Aware of duties as a CHW			
Sex (Male)	5.760	.708	.000
Treatment 1	3.711	1.012	.000
Confident talking about outbreaks	3.711	1.012	.000
Has learned a lot as a CHW			
Sex (Male)	4.500	.380	.000
Treatment 1	2.677	.597	.000
Treatment 2	3.313	.720	.000
Survey Type (Endline)	2.374	.740	.001

3.7 MOTS Costs

As part of the MOTS implementation, a costing study was commissioned to analyse

- the regular, ongoing cost to the MoHS of providing mobile-based refresher training to CHWs throughout Sierra Leone,
- the expected cost to MoHS of offering MOTS refresher training compared to that of the alternatives—in-person refresher training or no refresher training at all,
- the benefits of the mobile-based refresher training for the MOH (or another implementing organization), and
- the tradeoffs compared to in-person refresher training.

The full study and its associated methodology are described elsewhere.²¹ The high level findings are shared here as a way to illustrate a possible cost and benefit assessment of MOTS for the MoHS of Sierra Leone.

In investigating the costs and benefits of MOHS implementing mobile-based refresher training, based on the MOTS pilot project, the costing study found that:

- The cost for MoHS to provide mobile-based refresher training to all CHWs in a single district within one year would be about \$25,000, compared to \$52,000 for in-person refresher training—a savings of \$27,000;
- The annual cost for the MoHS to extend a mobile-based refresher training to all 16,000 CHWs nationwide is estimated to be around \$190,607, which amounts to approximately \$12 per year per CHW, and \$1.19 per household reached;
- The MoHS could put in place the foundation for mobile-based refresher training and CHW communication for a low, fixed annual fee (under \$14,000 for the technology infrastructure and translation and recording of the IVR audio content), and then disseminate education modules selectively according to available funds to cover the variable expenses;
- CHWs incur low opportunity cost when attending in-person training and incur low/no opportunity and airtime costs in accessing the mobile-based IVR refresher trainings, which are available according to their schedule and preferences.

CHAPTER 4: DISCUSSION AND RECOMMENDATIONS

This assessment was designed to determine the degree to which MOTS improved knowledge and behaviour of CHWs related to vaccinations and outbreaks and the degree to which the order in which

²¹ Reinsch M. 2019. Final Report: MOTS Costing Exercise. EBODAC Consortium.

a CHW participated in the Vaccination and Outbreak Responses modules influenced knowledge change. The latter research question was driven by a concern that CHW participation in a second module would result in lower knowledge change due to possible fatigue in participating in IVR-based education.

There were slight improvements in knowledge for both modules, but improvements were not dramatic. For knowledge change, a target of 80 percent is used by Grameen Foundation. As the results showed from the outcomes survey, all but one of the vaccination knowledge questions achieved the target, but knowledge levels were also quite high at baseline. Approximately eight out of the 14 outbreak response questions were slightly or far below the 80 percent target and seven of them experienced decreases (or no change) between baseline and endline, suggesting some confusion with module objectives or priorities. The questions related to identifying cases of Ebola experienced the least change, which given the objectives of EBODAC, are the most concerning.

After the Bo pilot, the MOTS team hypothesized that the poor performance of the Outbreak Response module was likely driven by user fatigue (it was the second module that CHWs received in the Bo pilot). However, data from the MOTS system for the Kambia intervention and outcomes assessment refute this hypothesis since **the MOTS Outbreak Response module did not perform as well as the Vaccination module regardless of whether it was the first or second module and did not appear to visibly improve knowledge.** Also, baseline knowledge was much lower for the Outbreak Response than the Vaccination module, suggesting that prior in-person trainings may not have been effective at imparting knowledge or the lessons were simply not retained.

Between 6 and 9 percent of the CHWs did not complete the MOTS training. This was seen both in the self-reporting and the lack of MOTS quiz data for some of the CHWs that were designated for the quasi-experimental study. The quantitative and qualitative data indicate technical difficulties (lost phones/charging issues/not fully understanding how to use their phone to navigate the system) contributed to the lack of participation, as well as gender differences (explored further below).

Recommendations:

- **Reconsider the objectives of the Outbreak Response module.** This module addresses ten notifiable conditions, of which Ebola is one. The amount of content being shared in this module may be too much for a CHW to absorb such that the quantity of content results in poor quality outcomes. If Ebola knowledge is a priority, what is critical to remember may need to be repeated more than once to ensure a prioritized learning objective is achieved. This recommendation applies to both in-person and IVR trainings.
- **Reconsider module priorities to ensure the most important objectives can be achieved.** Similar to the prior recommendation, given the difficulty for many CHWs in using the IVR system, sessions should be designed to achieve fewer learning objectives that build on one another. This is likely why the Vaccination module had better outcomes but it may have also been influenced by the fact that vaccination is one responsibility of a CHW that is re-emphasized in day-to-day operations whereas outbreaks and disease surveillance are less common issues confronted by a CHW.
- **Ensure CHWs receive training on the MOTS system that requires CHWs to practice use of the system prior to receiving any trainings.** While CHWs did participate in trainings where

groups of CHWs received a demonstration of MOTS and some CHWs practiced using the system, practice in use of the system may not have been consistent across all CHWs. While all CHWs during the functionality assessment felt confidence in navigating their phones, this confidence may not have translated well in using a new type of system such as MOTS.

- **Consider the incentives that CHWs have to participate in IVR trainings.** While training seems to matter to CHWs as part of their professional and personal development, challenges with the technology itself can be demotivating. Provision of solar charging units at PHUs or airtime credits for monitoring could be considered as ways to incentivize and overcome some of the challenges of using the system. CHWs were provided with certificates of completion of the MOTS training, but other professional incentives may need to be considered to ensure active participation (including positive recognition for correct answers to the quiz questions). Also, Treatment 1 often had poorer outcomes (in knowledge change) than Treatment 2; Treatment 1 CHWs also reported less financial compensation for their role as a CHW and higher poverty rates, which suggests the financial incentives may play heavily into participation in IVR trainings.

The results from the MOTS quizzes and the outcomes survey data presented mixed findings. Results from the MOTS system suggested correct knowledge regarding most indicators was below 70 percent while results for the outcome survey often had scores above 70 percent for most of the questions at baseline and endline. This suggests that **participation in the IVR quizzes did not accurately reflect real knowledge among the CHWs.** There are a few probable explanations:

1. Given there were difficulties in CHWs completing all modules as planned due to connectivity issues (despite the feasibility study suggesting that the participating CHWs had the required mobile phone devices and connectivity), it is likely that the IVR quizzes suffered the same challenge.
2. The IVR survey questions were too long and confusing for a CHW that was both listening to the question and required to find the appropriate numbers corresponding to the answer they wished to choose on their mobile phone. While the MOTS system gave the correct response after the CHW noted their answer, this reiteration of the correct response does not appear to have been sufficient for systematic knowledge change. These challenges of navigating the IVR system were foreseen in functionality assessments and were emphasized during the FGDs with the PHU in-charges.
3. There may have been too many IVR quiz questions per each session resulting in user fatigue of the quizzes. While the quiz questions were shortened and adjusted in between the Bo pilot and the Kambia implementation, these adjustments may not have been sufficient to result in accurate responses to the quiz questions. Other research suggests that it is not just the length of the survey but also the length of individual questions that lead to user fatigue with IVR surveys.²²

Recommendations:

- **Future use of the MOTS system should limit the number of questions per session to 1-2 questions and the questions should be simpler.** Despite an attempt to test CHW knowledge

²² Gibson DG, Farrenkopf BA, Pereira A, Labrique AB, Pariyo GW. The Development of an Interactive Voice Response Survey for Noncommunicable Disease Risk Factor Estimation: Technical Assessment and Cognitive Testing. *J Med Internet Res*. 2017;19(5):e112. Published 2017 May 5. doi:10.2196/jmir.7340

using vignettes, these did not work well in IVR format due to their complexity and the amount of time it took to listen to the vignette.

- **“All of the above” answer responses did not work well.** Additional cognitive testing of the IVR questions should be conducted once questions and answer options are simplified.

Gender of the CHW seems to matter across multiple outcomes. Approximately 85 percent of the CHWs that participated in this assessment were male. Being a male CHW was negatively associated with their participation in the IVR trainings and the clarity they had on the learning objectives; however, being a male CHW was positively associated with knowledge change, confidence and positive attitudes towards their job. This may be explained by the lower literacy rates and education participation rates among females compared to males in Sierra Leone.²³ A prior study conducted in Sierra Leone assessed gender norms as they relate to CHWs and found that women CHWs are not as common given the educational requirements to become a CHW and gender norms such as caretaking responsibilities, women’s limited voice and the “culture of selecting men to do work.”²⁴

Recommendations:

- Inability of women to participate in CHW trainings that require them to be away from their families is a well-documented constraint.²⁵ While MOTS is one way to respond to these constraints faced by women CHWs, **the module developers and the MOTS team should consider future functionality assessments to consider the differences in how male and female CHWs use the system.** While female CHWs are participating at greater rates than male CHWs, this is not resulting in equal knowledge outcomes. If women CHWs tend to have lower educational achievements, the trainings (whether in-person or through IVR) need to ensure they respond to these realities to ensure women have equitable and equal gains.

MOTS was designed to provide refresher training to CHWs in Sierra Leone, particularly regarding vaccinations and outbreak response. The MOTS system also allows CHW supervisors and others within the health system to track progress of CHW participation in the trainings as well as knowledge change. **The results from this study show marginal improvements in knowledge, with male CHWs being most associated with knowledge change. The results also point to specific and actionable areas for improvement, most notably the IVR quiz questions as well as the content that underpins the Outbreak Response module.**

Prior research documents that female CHWs are noted to experience challenging cultural norms that discourage their participation in trainings. Given the on-demand and virtual availability of the MOTS trainings, MOTS could provide an alternative pathway for women to seek careers and/or volunteer positions within the health sector. Also, for diseases like Ebola and the recent emergence of COVID-

²³United Nations Girls Education Initiative: Sierra Leone Snapshot.
<http://www.ungei.org/infobycountry/sierraleone.html>

²⁴ Steege R et al. 2018. Gender and Community Health Worker programmes in fragile and conflict-affected settings. Findings from Sierra Leone, the Democratic Republic of the Congo and Liberia. Brief published by ReBUILD and RiNGs.
<https://www.ringsgenderresearch.org/wp-content/uploads/2018/12/Gender-and-community-health-Sierra-Leone-DRC-Liberia.pdf>

²⁵ Steege R et al. 2018. How do gender relations affect the working lives of close to community health service providers? Empirical research, a review and conceptual framework. *Social Science & Medicine*, 209: 1-13.
<https://doi.org/10.1016/j.socscimed.2018.05.002>.

19, MOTS is also a potential alternative training and information methodology for CHWs that can be rapidly and virtually deployed to any CHW that has a mobile feature or smart phone.

The costing assessment estimates that the cost for maintaining a MOTS refresher training approach is approximately \$12 per each of the 16,000 CHWs nationwide in Sierra Leone and costs approximately 50 percent less than in-person refresher trainings. MOTS enables a dramatically more efficient and widespread community health outreach, builds engagement with decentralized health workers and can provide a critical safeguard in the case of health emergencies. While IVR training will never replace the benefits of in-person trainings and should not be the only means for building capacity of CHWs, it is believed that with the suggested improvements recommended in this report and the potential benefits of enhancing CHW performance appear to outweigh the marginal cost of implementing the mobile-based refresher system.

APPENDICES

Appendix I: MOTS Module Quiz Questions

A. Module 1 – Vaccination

Message or Quiz/replies – Module 1 - Vaccination	
1	<p>Quiz. A CHW should explain why vaccines are given when visiting households.</p> <p>Press 1 if true.</p> <p>Press 2 if false.</p>
2	<p>Quiz. Vaccines are given for the following reasons:</p> <p>Press 1 if vaccines protect against all possible diseases.</p> <p>Press 2 if vaccines protect against some dangerous diseases caused by germs, but not all of them.</p>
3	<p>Maria, a CHW, visits Fatmata and her 6 months old daughter, Hawa. After consulting her under-five card, Maria discovers that Hawa has not received her vaccinations at 10 and 14 weeks and asks why. Fatmata explained that Hawa was crying too much and her arm was swollen after receiving the first vaccines, so she did not return for further vaccinations. What should Maria do?</p> <p>Press 1 if Maria should move to another topic.</p> <p>Press 2 if Maria should explain that it is normal that children cry after getting the vaccine and that the site of injection can be a little red or swollen.</p> <p>Press 3 if Maria should reassure that the vaccines are safe and that it is normal that children cry after getting the vaccine and that the site of injection can be a little red or swollen, and in agreement with Fatmata, helps organize a visit to PHU so Hawa can receive the missed vaccinations.</p>
4	<p>Quiz. Who do you think should receive vaccines?</p> <p>Press 1 if only babies should receive vaccines.</p> <p>Press 2 if only older children and adults should receive vaccines.</p> <p>Press 3 if children should receive vaccines according to the current national vaccination program, but some vaccines exist for other ages.</p>
5	<p>Quiz. Which statement about vaccination is true?</p> <p>Press 1 if vaccine can be given even when a child has minor illness, disability, malnutrition, or is late with the vaccination schedule.</p> <p>Press 2 if vaccines should not be given when a child has minor illnesses.</p> <p>Press 3 if vaccines should not be given when a child has interrupted the vaccination schedule or is late.</p>
6	<p>Maria, a CHW, visits Aminata, a pregnant mother. While consulting the Maternal, newborn and child health card, Maria asks Aminata if she has received her tetanus vaccination. Aminata, said no because she believes that vaccinations are only for children. What should Maria do?</p> <p>Press 1 if Maria should explain the need for pregnant mothers to be vaccinated to protect herself and her future baby.</p> <p>Press 2 if Maria should explain the need for pregnant mothers to be vaccinated to protect herself and her future baby, and help organise a visit to PHU for Aminata to be vaccinated.</p> <p>Press 3 if Maria should move to another topic.</p>

7	<p>Maria, a CHW, visits Sallay and her 2 month old son, Vandy. After consulting her under-five card, Maria discovers Vandy has not received any vaccinations since his birth and asks why. Sallay says that she didn't think it was necessary vaccinating Vandy because she was vaccinated during pregnancy. What should Maria do?</p> <p>Press 1 if Maria should explain to Sallay the importance of vaccination for both pregnant mother and child.</p> <p>Press 2 if Maria should move on to another topic during her visit.</p> <p>Press 3 if Maria should explain to Sallay the importance of vaccination for both pregnant mother and child and discuss how a visit to PHU for vaccination of Vandy can be arranged as soon as possible.</p>
8	<p>Maria, a CHW, visits Alima and her 5 month old son, Dauda. After consulting her under-five card, Maria discovers Dauda has not received his vaccinations at 14 weeks and asks why. Alima explains Dauda looks tired and was afraid he may be sick or malnourished so vaccine won't be good for him. What should Maria do?</p> <p>Press 1 if Maria should explain to Alima that vaccines can generally be given when a child has a minor illness or malnutrition.</p> <p>Press 2 if Maria should move on to another topic during her visit.</p> <p>Press 3 if Maria should reassure Alima about the safety of vaccines even for a child who is weak and help organise a visit to PHU for vaccination of Dauda as soon as possible.</p>
9	<p>Quiz. Is it necessary to give vaccines at birth?</p> <p>Press 1 if yes.</p> <p>Press 2 if no.</p>
10	<p>Quiz. At which age child vaccination should be given?</p> <p>Press 1 if vaccines should only be given at birth.</p> <p>Press 2 if vaccines should only be given before one year.</p> <p>Press 3 if vaccines should be given at birth, and five more times as specified on the under-five card including a vaccine given after one year.</p>
11	<p>Quiz. Some vaccines are given after the first year of life.</p> <p>Press 1 if yes.</p> <p>Press 2 if no.</p>
12	<p>Maria, a CHW, visits Yaema and her 5-month old son, Abu. After consulting her under-five card, Maria discovers that Abu did not receive any vaccine since his birth and asks why. Since Abu missed his vaccinations at 6 weeks, Yaema believed it was too late to continue. What should Maria do?</p> <p>Press 1 if Maria should explain to Yaema that everyone can and should still continue with their vaccination schedule even if they have missed vaccinations.</p> <p>Press 2 if Maria should explain to Yaema that everyone can and should still continue with their vaccination schedule even if they have missed vaccinations and discuss a visit to the PHU for vaccination of Abu as soon as possible.</p> <p>Press 3 if Maria should move on to another topic during her visit.</p>
13	<p>Quiz. Where should caregivers go for vaccination?</p> <p>Press 1 if they should only go to PHU.</p> <p>Press 2 if they should only go to outreach point.</p> <p>Press 3 if they can go to both the PHU and the outreach point.</p>
14	<p>Quiz. Caregivers will have to pay for the vaccination of their babies</p>

	Press 1 if true. Press 2 if false.
15	Quiz. CHWs should check the under-five card for completion of vaccination schedules at every routine household visits? Press 1 if yes. Press 2 if no.
16	Maria, a CHW, visits Mariama and her 4 month old twins, Foday and Abdul. After consulting their under-five card , Maria discovers that Foday and Abdul have not received their vaccinations since birth and asks why. Mariama explains that she has no money to vaccinate her two children. What should Maria do? Press 1 if Maria should explain that vaccinations are provided for free. Press 2 if Maria should explain that vaccinations are provided for free and assist Mariama in bringing the twins to PHU for vaccination. Press 3 if Maria should move to another topic.
17	Maria, a CHW, visits Isatu and her 6 month old daughter Haja. After consulting her under-five card, Maria discovers that Haja has not received her vaccinations since birth and asks why. Isatu responds that the PHU is too far from her home to go for the vaccinations. What should Maria do? Press 1 if Maria should move to another topic. Press 2 if Maria should inform Isatu that she can also go to an outreach point nearby for vaccination. Press 3 if Maria should inform Isatu about the next date and location, and accompany her to the outreach point.
18	Quiz. What are the cards a CHW should check when visiting a household? Press 1 if CHWs should check only 2 cards: Family Health Card, and the Maternal newborn and child health card Press 2 if CHWs should check only under-five card Press 3 if CHWs should check all 3 cards: Family Health Card, Maternal newborn and child health card, and the under-five card
19	Quiz: CHW should check vaccination status of each child at household visits to assess health practice and help finding solutions if required. Press 1 if true. Press 2 if false.
20	Maria, a CHW, visits a family with a 4-months old baby girl, Adama. They have gone for the first set of vaccinations, but after that they have not completed the follow-up doses. He discussed this with the family. Please press which action is correct. Press 1 if Maria can move to another topic after the mother explained she wanted to take Adama for vaccination but she did not have the time because you are confident she will do it later. Press 2 if Maria can move to another topic after the mother explained she did not have money to pay for vaccination, and she is respectful of family decisions. Press 3 if Maria after having obtained the same replies: lack of time and fear of payment, then discusses how to find time for a PHU visit with family help and explains vaccinations are free of charge.
21	Thanks a lot for having taken the test. Press X if you want to quit or press X to move ahead with Unit 2 of module 1, so you will start to learn about vaccination.

B. Module 2 – Outbreak Response

Message or Quiz/replies – Module 2 – Outbreak response	
1	<p>You have listened to the messages. Now, let us go through questions again.</p> <p>What is community-based disease surveillance?</p> <ul style="list-style-type: none"> • Press 1 if community-based disease surveillance is monitoring deaths • Press 2 if community-based disease surveillance is being aware of any outbreak • Press 3 if community-based disease surveillance is monitoring and reporting unusual events, diseases and deaths • Press 4 if community-based disease surveillance is promptly reporting diseases
2	<p>Why do we need community-based surveillance?</p> <p>Press 1 if community-based disease surveillance lets us detect early potential outbreaks so we can control them.</p> <p>Press 2 if community-based disease surveillance allows health officials to take immediate action against potential outbreaks.</p> <p>Press 3 if community-based disease surveillance can avoid a lot of suffering and many deaths by helping to contain outbreaks.</p> <p>Press 4 if community-based disease surveillance lets us detect any potential outbreak, allows us to take immediate action to control an outbreak, and helps us to avoid suffering and deaths.</p>
3	<p>Sallay the CHW, learnt that 4 adults in her community have frequent and watery unusually green stools.</p> <p>Press 1 if Sallay should do nothing, as they will recover quickly.</p> <p>Press 2 if Sallay should report this immediately so that correct actions can be taken and an outbreak will be prevented and won't spread to vulnerable members of the community such as young children and elderly.</p>
4	<p>The CHW should be able to identify and report cases of cholera, yellow fever, Ebola and measles.</p> <p>Press 1 if yes, it is important to be able to identify and report cases of cholera, yellow fever, Ebola and measles because these diseases can spread rapidly and cause several deaths if no action is taken.</p> <p>Press 2 if no, there is no need to know details about cholera, yellow fever, Ebola and measles because these diseases are very common.</p>
5	<p>Sallay the CHW visited a village and saw two deaths with similar symptoms happened on the same day. Should Sallay the CHW report this to the health authorities or should she wait until a few more deaths happen to establish a cluster of deaths?</p> <p>Press 1 if Sallay should wait to report.</p> <p>Press 2 if Sallay should report immediately.</p>
6	<p>The PHU suspects that some households in your community have acute watery diarrhea or cholera. What symptoms should you look for and what complaints should the CHW listen to confirm?</p> <p>Press 1 if it is 3 or more watery stools in a day</p> <p>Press 2 if it is 3 or more watery stools in a day with blood in the stools or severe dehydration</p>

	Press 3 if it is 4 or more watery stools in a day and fever.
7	<p>The PHU suspects that some households in your community might have Ebola. What symptoms should the CHW look for and what complaints should the CHW listen to confirm?</p> <p>Press 1 if it is any person with fever and bleeding from any body part (mouth, nose, eyes, genitals), Press 2 if it is sudden death with a history of bleeding from any body part, Press 3 if a suspected Ebola case can be any person with history of bleeding and fever from any body part (mouth, nose, eyes, or genitals) and a sudden death.</p>
8	<p>Sallay, the CHW, visited the household of Isatu after learning that her five-year old daughter, Fanta has a fever and a rash since a few days ago. Sallay asked for additional information and to see Fanta to look at her condition.</p> <p>Press 1 if Sallay thinks that Fanta has suspected measles. Press 2 if Sallay thinks that Fanta has suspected Eloba. Press 3 if Sallay thinks that Fanta has yellow fever.</p>
9	<p>Now, could you please answer some questions? Of the three important actions, which you should do first when you encounter one of the 10 notifiable conditions?</p> <p>Press 1 if it is filling the surveillance register Press 2 if it is referring the patient Press 3 if it is informing the PHU.</p>
10	<p>Isatu, a CHW, visited a village named Bumpe after a flood. She meets with Baidu and learnt that her 2 years old daughter had frequent watery stools the day before but has already recovered. Two old men in Bumpe village had died 2 days before after severe diarrhea. What should Isatu the CHW do?</p> <p>Press 1 if Isatu should fill the surveillance register, and move to another topic as the little girl has recovered and the men who died were old. Press 2 if Isatu should make a note about a potential outbreak of acute watery diarrhea or cholera but wait for one more week to see if any additional cases occur as she does not want to disturb the PHU for no reason. Press 3 if Isatu should immediately look out for any new cases and refer them to the PHU. She should also fill the surveillance register and immediately report to the PHU about the 3 cases of acute watery diarrhea to enable health officials to take immediate action to prevent an outbreak of watery diarrhea or cholera from spreading.</p>
11	<p>Sallay, the CHW receives information that the 10-month old baby of Hawa, is suffering from fever. When Sallay reaches the house, she learnt that the baby has had fever for 3 days now. The baby also has a rash on the forehead and cheeks, but is alert and crying. He is able to take breast milk but no other foods.</p> <p>Press 1 if Sallay the CHW should fill the surveillance register, and move to another topic as the baby is able to take breast milk. Press 2 if Sallay the CHW should immediately refer the baby to the PHU, carefully fill the surveillance register and report to PHU about this potential case of measles.</p>

12	<p>Let's start with the quiz again. What should you record in the surveillance register?</p> <p>Press 1 if you should record all births in the community.</p> <p>Press 2 if you should record all stillbirths.</p> <p>Press 3 if you should record any of the 10 notifiable conditions that require immediate reporting.</p> <p>Press 4 if you should record all births, all stillbirths, and any of the 10 notifiable conditions.</p>
13	<p>Should you as the CHW personally verify each birth and death so you can accurately fill the surveillance register?</p> <p>Press 1 if you do not need to verify personally each birth and death.</p> <p>Press 2 if you do need to verify personally each birth and death.</p>
14	<p>Sallay, the CHW, visited the household of Isatu after she had learnt that her five-year old daughter has a fever that has lasted a few days. What should Sallay the CHW do when she reaches the household?</p> <p>Press 1 if Sallay the CHW should only console Isatu that the fever will quickly pass and that her daughter will be fine again.</p> <p>Press 2 if Sallay should ask for additional information and see the girl to find out if she has other conditions like rash, yellow eyes or bleeding from any body part to accurately refer, report and register the condition.</p> <p>Press 3 if Sallay should only report and register the high fever to the PHU.</p>
15	<p>Isatu, a CHW, received a call from her cousin living in a nearby household. The cousin told her she just gave birth. The line was not very good and Isatu did not hear well if her cousin is laughing or crying when announcing the event. What should Isatu do?</p> <p>Press 1 if Isatu should thank her cousin for calling, fill the surveillance register, and plan to visit in few weeks when she will have time to visit this household.</p> <p>Press 2 if Isatu should visit the household, talk to her cousin and ask to see the baby before filling the surveillance register.</p>
16	<p>What can the CHW do to help the health authorities respond to outbreaks in time and manage the health of the community?</p> <p>Press 1 if a CHW should monitor all births and deaths in the community</p> <p>Press 2 if a CHW should know about the 10 immediately notifiable conditions and immediately report when becoming aware of a suspected case</p> <p>Press 3 if a CHW should monitor birth and deaths in the community AND immediately report when becoming aware of a suspected case of a notifiable condition</p>
17	<p>Foday the CHW received a call about the death of a 12-year old girl. Her condition went from bad to worse very quickly and she died before the family could go to the hospital. Foday reached the house in an hour. Along the way, Foday found out that the 8-year old cousin of the deceased also died the week before with fever.</p> <p>Press 1 if Foday should offer his condolences to the grieving parents and ask gently if he could talk about the events leading up to the child having high fever the day before.</p> <p>Press 2 if Foday should also ask about the health of any other family member.</p> <p>Press 3 if Foday should delicately ask details about the girl's condition, ask about the family and village, and immediately report any cluster of similar deaths to the PHU.</p>
18	<p>Sallay, the CHW, visited the household of Yaema and learnt that her 8 years old son Dauda has a sudden weakness in his left leg and has started limping.</p>

	<p>Press 1 if Dauda most likely fell and hurt himself, so he will be fine in a few days after taking some rest</p> <p>Press 2 if Sallay should report a possible case of polio</p>
19	<p>Sallay, the CHW, visited Isatu who is very distressed. Her new-born baby stopped breastfeeding today. For four days, he was breastfeeding normally. He also started to feel a bit stiff.</p> <p>Press 1 if Sallay should report a possible case of neonatal tetanus</p> <p>Press 2 if the baby will start breastfeeding again, so Sallay should wait before taking any action</p>
20	<p>Sallay, the CHW found out that 3 people have died in her community. All three persons had high fever and were bleeding from different body parts.</p> <p>Press 1 if Sallay the CHW should report this as suspected Ebola</p> <p>Press 2 if Sallay the CHW should report this as clustered deaths</p> <p>Press 3 if Sallay the CHW should report this as clustered deaths and suspected Ebola</p>
	<p>Thank you for taking the test. Press 0 if you want to exit or press 2 to move ahead with Unit 2 of module 2, so you will start to learn about outbreak response.</p>

Appendix II: Additional Analysis

C. Baseline Results (Enumerator-survey)

	Baseline			p-values		
	T1	T2	C	T1 vs T2	T1 vs C	T2 vs C
<i>n=378 total</i>	125	126	127			
Income-generating activities						
Crop Farming	86.5%	89.6%	93.7%	0.163	0.056	0.241
Livestock	2.4%	5.6%	0.0%	0.021	0.081	0.007
Employed	23.0%	28.0%	22.8%	0.561	0.973	0.348
Casual Labor	23.8%	17.6%	32.3%	0.025	0.135	0.007
Self-employed	11.9%	12.0%	5.5%	0.139	0.072	0.069
Average income						
Less than 200000	59.5%	51.2%	48.0%	0.092	0.185	0.645
200000 – 400000	29.4%	30.4%	40.9%			
More than 400000	11.1%	18.4%	11.0%			
Time spent working as a CHW during a typical week						
Less than 10 hours	59.5%	55.2%	58.3%	0.491	0.84	0.625
More than 10 hours	40.5%	44.8%	41.7%			
Total households assigned to the CHW						
Less than 90	77.8%	76.8%	62.2%	0.854	0.007	0.012
More than 90	22.2%	23.2%	37.8%			
Total number of households visited in the past week						
Less than 45	80.2%	73.6%	71.7%	0.219	0.115	0.730
More than 45	19.8%	26.4%	28.3%			
Proportion of households visited in the last week						
Less than 50%	39.5%	47.6%	65.4%	0.00	0.202	-
More than 50%	60.5%	52.4%	34.6%			
Receives a salary as a CHW						
Yes	90.5%	83.2%	100%	0.089	0.000	0.000
Salary amount received as a CHW						
<i>n=345</i>	114	104	127	0.609	0.957	0.637
Less than 200000	75%	78%	76%			
200000 – 400000	5%	6%	6%			
More than 400000	19%	16%	19%			
Received training as a CHW in last 6 months						
Yes	97%	98%	99%	0.416	0.174	0.554
How training was received						
In person only	100%	95%	100%	0.017	--	0.016
Digitally	0%	2%	0%			
Both	0%	3%	0%			
Type of Training received						
Community-based surveillance	39.3%	43.1%	52.4%	0.553	0.040	0.143
Understanding your community	30.3%	30.9%	38.1%	0.924	0.199	0.234

	Baseline			p-values		
	T1	T2	C	T1 vs T2	T1 vs C	T2 vs C
Functions & role of CHW	40.2%	43.9%	58.7%	0.555	0.003	0.019
Effective communication as CHW	46.7%	36.6%	50.0%	0.108	0.607	0.033
Routine household visits	72.1%	50.4%	80.2%	0.000	0.139	0.000
Assessment of sick children	76.2%	43.9%	66.7%	0.000	0.097	0.000
Pregnancy	88.5%	73.2%	88.9%	0.002	0.928	0.001
Newborn care	87.7%	67.5%	89.7%	0.000	0.624	0.000
Treatment of sick and malnourished child	73.0%	66.7%	70.6%	0.286	0.687	0.502
Following up on sick children	49.2%	44.7%	61.1%	0.486	0.059	0.009
Reproductive, maternal, newborn and child health (RMNCH)	52.5%	63.4%	55.6%	0.083	0.626	0.208
Family planning	11.5%	8.9%	16.7%	0.515	0.242	0.069
Vaccinations	20.5%	22.0%	15.1%	0.781	0.266	0.164
Infectious diseases and outbreaks	14.8%	15.4%	20.6%	0.880	0.227	0.289
If yes, how much time spent in training						
n=371	122	123	126	0.019	0.544	0.005
Less than 2 hours	98.4%	91.9%	99.2%			
More than 2 hours	1.6%	8.1%	0.8%			
If yes, received reference materials (i.e. manuals) to refresh memory of training content						
Yes	50.0%	73.2%	42.9%	0.000	0.261	0.000
If yes, degree of satisfaction with training						
Very satisfied	95.9%	93.5%	96.8%	0.580	0.436	0.161
Somewhat satisfied	3.3%	5.7%	3.2%			
Dissatisfied	0.8%	0.8%	0.0%			
If yes, amount of time spent away from other IGAs						
Less than 140 minutes	99.2%	97.6%	100.0%	0.000	0.261	0.000
More than 140 minutes	0.8%	2.4%	0.0%			
When away for training, feels worried about lost income						
Yes	36.9%	35.8%	20.6%	0.857	0.005	0.008
Is reimbursed for expenses while participating in training						
Yes	98.4%	97.6%	100.0%	0.660	0.150	0.078
Is compensated for participating in training						
Yes	78%	68%	81%	0.092	0.55	0.022
If yes, amount compensated						
n=281	95	84	102	0.554	0.539	0.235
Less than 50000	96.8%	95.2%	98.0%			
50000-10000	1.1%	1.2%	1.0%			
More than 10000	2.1%	3.6%	1.0%			
Food Security						
Enough and the kinds of food we wanted to eat.	10.3%	11.2%	8.7%	0.76	0.319	0.200
Enough but not always the kinds of food we wanted to eat.	42.1%	39.2%	52.8%			
Sometimes not enough food to eat, was sometimes hungry.	46.8%	47.2%	38.6%			
Often not enough to eat, was often hungry.	0.8%	2.4%	0.0%			

	Baseline			p-values		
	T1	T2	C	T1 vs T2	T1 vs C	T2 vs C
Knowledge about Vaccinations						
n=378	126	125	127			
When visiting a household, a CHW should explain why vaccinations are important						
Yes (correct)	100.0%	100.0%	100.0%	--	--	--
Which statement about vaccinations is correct?						
Vaccines protect against all possible diseases	12.7%	20.8%	15.0%	0.086	0.604	0.228
Vaccines protect against some dangerous diseases caused by germs, but not all of them (correct)	87.3%	79.2%	85.0%			
Which statement about vaccinations is correct?						
Only babies should receive vaccines	15.1%	8.0%	7.9%	0.046	0.176	0.473
Only older children and adults should receive vaccines	5.6%	3.2%	8.7%			
Some vaccines do exist for the adults (correct)	79.4%	88.8%	83.5%			
Which statement about vaccinations is correct?						
Child should be given vaccine even in case of minor illness or if late (correct)	82.5%	80.8%	85.8%	0.668	0.241	0.11
Vaccines should not be given when a child has minor illnesses	8.7%	8.8%	10.2%			
Vaccine should not be given if the schedule is interrupted	8.7%	10.4%	3.9%			
Knows what a CHW should do if a parent believes that vaccinations are only for children						
Should explain the need for pregnant mothers to be vaccinated	2.4%	3.2%	3.1%	0.472	0.483	0.982
Should explain the need for pregnant mothers to be vaccinated and organize a visit to the PHU (correct)	96.8%	96.8%	96.9%			
CHW should move to another topic	0.8%	0.0%	0.0%			
Knows what a CHW should do if a parent believes that you cannot vaccinate a child if they do not feel well or are malnourished						
Should explain that vaccine can be given in case of minor illness	0.8%	2.4%	0.8%	0.517	0.990	0.509
Should move on to another topic	3.2%	2.4%	3.1%			
Should explain that vaccine can be given in case of minor illness and organize a visit to PHU (correct)	96.0%	95.2%	96.1%			
Knows it's necessary to give vaccinations at birth						
Yes	88.1%	88.8%	93.7%	0.862	0.122	0.170
Knows what a CHW should do if a parent believes you cannot vaccinate a child if you are behind on scheduled vaccinations						
Should explain that everyone should continue with vaccination even if the schedule is interrupted	3.2%	1.6%	1.6%	0.416	0.405	0.987
Should explain, should take vaccination if the schedule is interrupted and plan a visit to PHU (correct)	96.8%	98.4%	98.4%			
Which statement about vaccinations is correct?						
They should only go to PHU.	24.6%	22.4%	19.7%	0.577	0.311	0.653
They should only go to outreach point.	1.6%	0.0%	0.8%			
They can go to either the PHU or the outreach point (correct)	73.8%	77.6%	79.5%			
Knows caregivers do not have to pay for the vaccination of their babies						
Yes	99.2%	99.2%	100.0%	0.996	0.316	0.314

	Baseline			p-values		
	T1	T2	C	T1 vs T2	T1 vs C	T2 vs C
Knows CHWs should check vaccination status of each child at household visits to assess health practice and help find solutions if required						
Yes	99.2%	99.2%	99.2%	0.996	0.996	0.991
Knows what a CHW should do if a parent completed first vaccinations, but not the follow-up doses						
Should move to another topic, with belief that mother will take when she has time	0.8%	0.8%	0.0%	0.056	0.006	0.406
Should move to another topic if mother says family no money, respect family decision	7.1%	0.8%	0.8%			
Suggest how to make time and vaccination is free (correct)	92.1%	98.4%	99.2%			
In past month, CHW has spoken to community members about vaccinations						
Yes	100.0%	100.0%	100.0%	--	--	--
Frequency that CHW spoke to community about vaccinations in past month compared to normally						
More	86.5%	71.2%	87.4%	0.002	0.705	0.000
Same	12.7%	24.0%	12.6%			
Less	0.8%	4.8%	0.0%			
Confidence in speaking about vaccinations						
Very confident	96.0%	96.0%	96.1%	0.990	0.990	0.980
Somewhat confident	4.0%	4.0%	3.9%			
Knowledge about Outbreak Response						
Knowledge about Outbreak Response						
CHW knows what best describes community surveillance						
Community-based disease surveillance is monitoring deaths	0.0%	1.6%	4.7%	0.085	0.251	0.017
Community-based disease surveillance is being aware of any outbreak	7.1%	1.6%	7.9%			
Community-based disease surveillance is monitoring and reporting unusual events, diseases and deaths (correct)	87.3%	84.8%	78.7%			
Community-based disease surveillance is promptly reporting diseases	5.6%	12.0%	8.7%			
Knows why community surveillance is needed						
Community-based disease surveillance lets us detect early potential outbreaks so we can control them.	3.2%	2.4%	2.4%	0.127	0.729	0.060
Community-based disease surveillance allows health officials to take immediate action against potential outbreaks.	10.3%	7.2%	13.4%			
Community-based disease surveillance can avoid a lot of suffering and many deaths by helping to contain outbreaks.	19.8%	13.6%	19.7%			
All of the above (correct)	66.7%	76.8%	64.6%			
CHW knows symptoms for acute diarrhea or cholera						
3 or more watery stools in a day (correct)	88.9%	84.8%	86.6%	0.153	0.667	0.292
3 or more watery stools in a day with blood in the stools or severe dehydration	8.7%	8.0%	11.0%			
4 or more watery stools in a day and fever.	2.4%	7.2%	2.4%			
CHW knows that a person with a fever and a rash most likely has the measles						
Yes	91.3%	85.6%	85.0%	0.252	0.103	0.581
Knows what to do first if they suspect an infectious disease (i.e. Ebola or Yellow Fever)						

	Baseline			p-values		
	T1	T2	C	T1 vs T2	T1 vs C	T2 vs C
Complete the surveillance register	23.0%	34.4%	18.1%	0.627	0.071	0.032
Refer the patient to the nearest health facility	49.2%	31.2%	42.5%			
Inform the PHU (correct)	27.8%	34.4%	39.4%			
CHW knows what should be recorded in the surveillance register						
Record all births in the community	2.4%	3.2%	3.1%	0.608	0.141	0.361
Record all stillbirths	0.8%	2.4%	2.4%			
Record any of the 10 notifiable conditions that require immediate reporting	26.2%	24.8%	33.1%			
All of the above	70.6%	69.6%	61.4%			
Knows the CHW should personally verify each birth and death so it can be accurately recorded in the surveillance register						
Yes	100.0%	100.0%	100.0%			
CHW knows what to do when visiting a household where a child has had a fever for several days						
Should just console the mother	3.2%	1.6%	1.6%	0.466	0.751	0.274
Should ask for symptoms and visit the girl for symptoms and record in register	77.0%	76.0%	81.9%			
Mariatu should only report and register the high fever to the PHU.	19.8%	22.4%	16.5%			
Knows what a CHW can do to help health authorities respond to outbreaks in time						
A CHW should monitor all births and deaths in the community	2.4%	2.4%	4.7%	0.178	0.078	0.002
A CHW should know about the 10 immediately notifiable conditions and immediately report suspected case	27.8%	19.2%	35.4%			
All of the above	69.8%	78.4%	59.8%			
Knows what a CHW should do if learning about the deaths of two children whose conditions went from bad to worst quickly and both had fevers						
Should console parents and ask for leadup to the fever	0.0%	4.0%	1.6%	0.987	0.986	0.976
Mariatu should also ask about the health of any other family member.	8.7%	0.8%	5.5%			
Should ask details about girl’s condition, ask about the family and village, report suspect death	91.3%	95.2%	92.9%			
Knows what a CHW should do if a child is discovered with complaints of a sudden onset of weakness in legs and limping						
Child most likely fell and hurt himself, so he will be fine in a few days after taking some rest	1.6%	1.6%	3.9%	0.994	0.256	0.261
CHW should report a possible case of polio	98.4%	98.4%	96.1%			
Knows what a CHW should do if encounters mother who complains baby is no longer breastfeeding and feels stiff						
Mariatu should report a possible case of neonatal tetanus	92.1%	93.6%	82.7%	0.639	0.025	0.007
The baby will start breastfeeding again, so Mariatu should wait before taking any action	7.9%	6.4%	17.3%			
CHW knows what to do when discovering three people that have died in one community and all three experienced high fevers and bleeding from different body parts						
Mariatu the CHW should report this as suspected Ebola	31.7%	32.0%	31.5%	0.982	0.964	0.982
Mariatu the CHW should report this as clustered deaths	4.0%	3.2%	3.9%			
Both. Mariatu the CHW should report this as clustered deaths and suspected Ebola (correct)	64.3%	64.8%	64.6%			
CHW has spoken to community members about outbreaks or infectious illnesses in last month						

	Baseline			p-values		
	T1	T2	C	T1 vs T2	T1 vs C	T2 vs C
Yes	99.2%	97.6%	100.0%	0.312	0.316	0.08
Frequency that CHW spoke to community about outbreaks in past month compared to normally						
More	80.2%	63.2%	88.2%	0.000	0.081	0.000
Less	19.8%	29.6%	11.8%			
Same	0.0%	7.2%	0.0%			
Confidence in speaking about outbreaks						
Very Confident	95.2%	93.6%	97.6%	0.574	0.305	0.118
Somewhat Confident	4.8%	6.4%	2.4%			
Attitudes						
I have learned a lot of new things as a Community Health Worker (CHW).						
Yes	100.0%	98.4%	100.0%	0.155	--	0.154
I am aware of the duties/responsibilities of a CHW.						
Yes	100%	100%	100%	--	--	--
I am provided with the resources I need to do my job as a CHW.						
Yes	88.1%	82.4%	95.3%	0.205	0.039	0.001
I receive adequate support from my supervisor.						
Yes	98.4%	94.4%	99.2%	0.088	0.559	0.029
I receive adequate training to help me do my job as a CHW.						
Yes	92.1%	96.8%	95.3%	0.103	0.296	0.537
I am satisfied with my ability to serve the health needs of my community.						
Yes	97.6%	98.4%	100.0%	0.659	0.081	0.154
Degree of confidence in sharing right information regarding a public health outbreak, like Ebola						
Very Confident	98.4%	97.6%	100.0%	0.647	0.155	0.08
Somewhat Confident	1.6%	2.4%	0.0%			
Not confident	0%	0%	0%			
If a public health outbreak, like an Ebola outbreak, were to occur tomorrow, degree of trust CHW would have in the information if provided by mobile phone only						
I would trust this information	96.0%	96.8%	98.4%	0.991	0.772	0.781
I would be skeptical	4.0%	2.4%	0.0%			
I would not trust this information	0.0%	0.8%	1.6%			

D. Training Received by the CHWs in Last Two Months: Enumerator-facilitated Survey Results

	Baseline			Endline			DiD		
	C	T1	T2	C	T1	T2	T1v T2	T1vC	T2vC
Community-based surveillance of disease, births and deaths	52.4%	39.2%	43.4%	87.3%	93.5%	92.7%	5.0%	19.5%	14.4%
Understanding your community	38.1%	30.0%	31.1%	48.0%	36.6%	50.8%	-13.1%	-3.4%	9.7%
Functions and roles of the CHW	58.7%	40.0%	44.3%	71.6%	59.3%	69.4%	-5.7%	6.5%	12.3%
Effective communication as a CHW	50.0%	46.7%	36.1%	39.2%	39.8%	51.6%	-22.4%	4.0%	26.3%
Routine household visits	80.2%	71.7%	50.8%	63.7%	60.2%	66.1%	-26.8%	4.9%	31.7%

Assessment of sick children	66.7%	75.8%	43.4%	51.0%	48.8%	55.6%	-39.3%	-11.4%	27.9%
Pregnancy	88.9%	88.3%	73.0%	74.5%	84.6%	81.5%	-12.3%	10.6%	22.9%
New Born care	89.7%	87.5%	67.2%	61.8%	71.5%	72.6%	-21.3%	12.0%	33.3%
Treatment and Counselling for the sick child and acutely malnourished	70.6%	73.3%	66.4%	56.9%	50.4%	62.9%	-19.4%	-9.2%	10.3%
Following up the sick child in the home	61.1%	49.2%	45.1%	64.7%	50.4%	50.8%	-4.5%	-2.4%	2.1%
Reproductive, Maternal, Newborn and Child Health (RMNCH)	55.6%	52.5%	63.1%	84.3%	52.8%	55.6%	7.8%	-28.4%	-36.2%
Family Planning	16.7%	10.8%	9.0%	37.3%	27.6%	41.1%	-15.3%	-3.8%	11.5%
Vaccinations	15.1%	20.8%	21.3%	63.7%	82.9%	88.7%	-5.3%	13.4%	18.8%
Infectious Diseases and outbreaks	20.6%	15.0%	14.8%	62.7%	71.5%	75.0%	-3.7%	14.4%	18.1%
Others	0.8%	8.3%	9.8%	4.9%	2.4%	0.8%	3.1%	-10.0%	-13.1%

E. CHW MOTS Pre and post Test Results – Matched Sample CHWs

Group	Module ID	Q ID	Pretest results				Post test results			
			Correct	Don't know	Incorrect	Skipped	Correct	Don't Know	Incorrect	Skipped
T 1	Outbreak Response	q1	52.48	8.00	24.00	15.84	70.30	1.98	7.92	13.86
		q2	41.58	0.00	47.00	11.88	52.48	2.97	27.72	10.89
		q3	75.25	6.00	6.00	12.87	74.26	0.99	0.00	17.82
		q4	64.36	0.00	19.00	16.83	66.34	3.96	6.93	13.86
		q5	71.29	4.00	8.00	16.83	74.26	0.99	2.97	12.87
		q6	75.25	3.00	5.00	16.83	71.29	3.96	5.94	9.90
		q7	36.63	0.00	51.00	12.87	50.50	2.97	24.75	12.87
		q8	48.51	12.00	24.00	15.84	62.38	5.94	11.88	10.89
		q9	18.00	7.00	61.00	14.00	34.00	3.00	38.00	11.00
		q10	64.00	0.00	23.00	13.00	56.00	1.00	13.00	16.00
		q11	62.00	15.00	6.00	17.00	65.00	3.00	3.00	15.00
		q12	35.00	4.00	46.00	15.00	44.00	0.00	33.00	7.00
		q13	69.00	5.00	13.00	13.00	59.00	2.00	16.00	7.00
		q14	61.00	9.00	17.00	13.00	51.00	1.00	26.00	6.00
		q15	68.00	5.00	10.00	17.00	61.00	2.00	11.00	10.00
		q16	45.00	3.00	38.00	14.00	55.00	0.00	19.00	8.00
		q17	67.68	3.00	13.00	16.16	64.65	1.01	10.10	7.07
		q18	61.62	11.00	9.00	18.18	60.61	6.06	6.06	10.10
		q19	61.62	4.00	18.00	16.16	71.72	1.01	3.03	6.06
		q20	53.54	6.00	27.00	13.13	48.48	3.03	20.20	10.10
	Vaccination	q1	73.68	5.00	10.00	13.16	71.05	3.51	3.51	17.54
		q2	42.11	4.00	48.00	12.28	51.75	2.63	22.81	18.42
		q3	48.25	11.00	29.00	16.67	55.26	3.51	21.05	15.79
		q4	32.46	7.00	51.00	16.67	48.25	7.02	31.58	7.02
		q5	36.84	10.00	48.00	12.28	43.86	7.02	31.58	11.40
		q6	56.14	1.00	33.00	14.04	69.30	0.88	13.16	10.53
		q7	60.53	4.00	26.00	13.16	66.67	2.63	14.04	10.53
		q8	54.39	4.00	30.00	15.79	65.79	2.63	15.79	9.65
		q9	78.07	4.00	2.00	16.67	73.68	2.63	3.51	8.77
		q10	35.09	7.00	50.00	14.91	55.26	2.63	19.30	11.40
		q11	71.05	3.00	11.00	16.67	60.53	7.02	9.65	11.40
		q12	59.65	5.00	23.00	15.79	65.79	0.88	8.77	13.16
		q13	43.86	4.00	36.00	21.05	55.26	0.88	22.81	8.77
		q14	55.26	6.00	23.00	19.30	63.16	1.75	12.28	10.53
		q15	57.02	6.00	22.00	18.42	64.91	0.00	12.28	10.53
		q16	43.86	20.00	35.00	7.89	58.77	0.88	14.91	13.16

T 2		q17	67.54	20.00	6.00	9.65	73.68	1.75	3.51	7.02
		q18	46.49	21.00	32.00	7.02	59.65	4.39	13.16	8.77
		q19	69.30	22.00	4.00	7.89	71.93	0.88	5.26	7.89
		q20	57.02	19.00	21.00	7.89	64.04	1.75	13.16	7.02
	Outbreak Response	q1	52.21	10.00	27.00	15.04	69.03	0.00	15.04	12.39
		q2	44.25	3.00	44.00	14.16	51.33	12.39	19.47	13.27
		q3	68.14	6.00	13.00	15.04	46.90	3.54	1.77	44.25
		q4	72.57	4.00	14.00	11.50	82.30	0.88	2.65	8.85
		q5	76.11	2.00	9.00	14.16	78.76	1.77	6.19	7.96
		q6	66.37	7.00	20.00	9.73	65.49	5.31	11.50	12.39
		q7	64.60	2.00	23.00	13.27	61.06	8.85	9.73	15.04
		q8	53.10	13.00	22.00	15.93	61.95	6.19	14.16	12.39
		q9	29.20	6.00	52.00	19.47	39.82	2.65	37.17	10.62
		q10	58.41	1.00	27.00	16.81	54.87	3.54	23.01	8.85
		q11	65.49	4.00	14.00	18.58	76.11	1.77	3.54	8.85
		q12	36.28	7.00	43.00	19.47	42.48	1.77	31.86	12.39
		q13	67.26	3.00	11.00	20.35	20.35	0.88	54.87	12.39
		q14	47.79	11.00	26.00	19.47	40.71	1.77	34.51	10.62
		q15	50.44	6.00	23.00	23.89	61.06	1.77	14.16	10.62
		q16	40.71	5.00	40.00	19.47	49.56	0.88	29.20	7.08
		q17	60.18	0.00	25.00	17.70	60.18	1.77	15.04	9.73
		q18	57.52	7.00	13.00	24.78	70.80	2.65	5.31	7.96
		q19	60.18	4.00	10.00	27.43	67.26	2.65	2.65	14.16
		q20	38.94	5.00	38.00	23.01	48.67	3.54	25.66	8.85
	Vaccination	q1	80.58	5.00	3.00	11.65	74.76	0.00	4.85	14.56
		q2	51.46	3.00	39.00	7.77	43.69	1.94	34.95	13.59
		q3	66.99	2.00	18.00	13.59	64.08	0.97	14.56	14.56
		q4	51.46	6.00	31.00	12.62	55.34	0.00	24.27	12.62
		q5	53.40	7.00	29.00	11.65	51.46	4.85	22.33	13.59
		q6	65.05	1.00	18.00	16.50	61.17	0.97	12.62	17.48
		q7	62.14	2.00	24.00	12.62	63.11	0.00	14.56	14.56
		q8	60.19	2.00	20.00	18.45	39.81	1.94	35.92	14.56
		q9	70.87	8.00	6.00	15.53	75.73	0.97	1.94	11.65
		q10	44.66	2.00	38.00	16.50	70.87	0.97	6.80	11.65
		q11	60.19	7.00	15.00	18.45	71.84	0.97	2.91	14.56
		q12	63.73	3.00	25.00	8.82	72.55	0.00	8.82	9.80
		q13	45.10	0.00	42.00	13.73	63.73	0.98	15.69	9.80
		q14	57.84	5.00	21.00	16.67	71.57	1.96	7.84	8.82
		q15	54.90	2.00	26.00	17.65	57.84	0.98	18.63	12.75
		q16	58.82	2.00	23.00	16.67	64.71	1.96	9.80	13.73
		q17	66.67	9.00	9.00	15.69	75.49	0.00	2.94	9.80
		q18	63.73	0.00	21.00	15.69	44.12	4.90	30.39	8.82
		q19	68.63	8.00	6.00	17.65	71.57	3.92	4.90	7.84
		q20	61.76	4.00	17.00	17.65	66.67	0.98	7.84	12.75

F. Vaccination Results – Full and Matched Sample Results

Question ID	Pretest						Post test						Percentage-point change			
	T1-Full	T1-Matched	Dif (T1full-T1match)	T2-Full	T2-Match	Dif (T2full-T2match)	T1 - Full	T1-Matched	Dif (T1full-T1match)	T2 - Full	T2-Matched	Dif (T2full-T2match)	T1 Full Change	T1-Match Change	T2-Full change	T2 Match Change
Q1 – Knows CHWs should explain purpose of vaccinations when visiting households.	76.23	73.68	2.55	82.2	80.58	1.62	79.92	71.05	8.87	80.09	74.76	5.33	3.69	-2.63	-2.11	-5.82
Q2–Knows vaccines protect against some diseases but not all	40.38	42.11	-1.73	48.31	51.46	-3.15	79.74	51.75	27.99	54.3	43.69	10.61	39.36	9.64	5.99	-7.77
Q3-Knows and able to explain that it is normal that children cry after getting the vaccine and that the site of injection can be a little red or swollen.	48.3	48.25	0.05	66.53	66.99	-0.46	77.53	55.26	22.27	68.33	64.08	4.25	29.23	7.01	1.8	-2.91
Q4–Knows children should receive vaccines according to age, but vaccines exist for other age groups as well.	32.83	32.46	0.37	45.53	51.46	-5.93	77.53	48.25	29.28	58.72	55.34	3.38	44.7	15.79	13.19	3.88
Q5–Knows a vaccine can be given even when a child has a minor illness, disability, malnutrition, or is late with vaccine schedule	37.12	36.84	0.28	48.51	53.4	-4.89	73.13	43.86	29.27	54.59	51.46	3.13	36.01	7.02	6.08	-1.94
Q6–Knows a CHW should explain that pregnant mothers should be vaccinated against tetanus to protect herself and unborn child and help mother organize a visit to the clinic	54.55	56.14	-1.59	63.83	65.05	-1.22	87.05	69.3	17.75	69.27	61.17	8.1	32.5	13.16	5.44	-3.88

Question ID	Pretest						Post test						Percentage-point change			
	T1-Full	T1-Matched	Dif (T1full-T1match)	T2-Full	T2-Match	Dif (T2full-T2match)	T1 - Full	T1-Matched	Dif (T1full-T1match)	T2 - Full	T2-Matched	Dif (T2full-T2match)	T1 Full Change	T1-Match Change	T2-Full change	T2 Match Change
Q7- Knows and able to explain mothers the importance of vaccination for both pregnant mother and child and discusses and arranges visit to PHU for vaccination of children are late for vaccination	54.17	60.53	-6.36	57.02	62.14	-5.12	73.66	66.67	6.99	70.18	63.11	7.07	19.49	6.14	13.16	0.97
Q8 – Knows that when meeting a parent who has not vaccinated their child due to malnutrition or illness, a CHW should reassure the parent for need for vaccinations, even when child is weak, and to help organize a visit to the clinic	52.27	54.39	-2.12	60	60.19	-0.19	85.71	65.79	19.92	44.95	39.81	5.14	33.44	11.4	-15.05	-20.38
Q9–Knows vaccines are necessary at birth	78.41	78.07	0.34	72.65	70.87	1.78	71.88	73.68	-1.8	88.15	75.73	12.42	-6.53	-4.39	15.5	4.86
Q10- Knows that vaccines should be given at birth, and five more times as specified on the under-five card including a vaccine given after one year	33.71	35.09	-1.38	41.45	44.66	-3.21	50.2	55.26	-5.06	75.36	70.87	4.49	16.49	20.17	33.91	26.21
Q11-Knows that some vaccines are given after the fast year of life	68.56	71.05	-2.49	69.66	60.19	9.47	61.85	60.53	1.32	81.9	71.84	10.06	-6.71	-10.52	12.24	11.65
Q12–Knows that when meeting a parent who has not vaccinated their child due to missing vaccines at birth, a CHW should reassure the parent and to help organize a visit to the clinic	55.68	59.65	-3.97	61.8	63.73	-1.93	53.09	65.79	-12.7	81.9	72.55	9.35	-2.59	6.14	20.1	8.82

Question ID	Pretest						Post test						Percentage-point change			
	T1- Full	T1- Matche d	Dif (T1full- T1match)	T2- Full	T2- Match	Dif (T2full- T2match)	T1 - Full	T1- Matche d	Dif (T1full- T1match)	T2 - Full	T2- Matche d	Dif (T2full- T2match)	T1 Full Chang e	T1- Match Chang e	T2- Full chang e	T2 Match Change
Q13 – Knows caregivers can go to both the PHU and the outreach point for vaccinations	42.42	43.86	-1.44	47.64	45.1	2.54	50.21	55.26	-5.05	68.27	63.73	4.54	7.79	11.4	20.63	18.63
Q14-Knows caregivers do not have to pay for vaccinations	55.51	55.26	0.25	65.67	57.84	7.83	69.55	63.16	6.39	77.4	71.57	5.83	14.04	7.9	11.73	13.73
Q15-Knows a CHW should check the under-five card for completion of vaccines at every routine visit	59.32	57.02	2.3	61.8	54.9	6.9	71.19	64.91	6.28	63.94	57.84	6.1	11.87	7.89	2.14	2.94
Q16-Knows and able to explain that vaccinations are provided for free and assist Mariama in bringing the twins to PHU for vaccination.	43.73	43.86	-0.13	61.37	58.82	2.55	69.55	58.77	10.78	71.63	64.71	6.92	25.82	14.91	10.26	5.89
Q17-Knows when meeting a parent who indicates they live too far from a PHU as a reason for not seeking vaccinations that the CHW should explain the parent can also visit the outreach point and help organize a visit and accompany the parent there	76.43	67.54	8.89	73.82	66.67	7.15	84.91	73.68	11.23	86.27	75.49	10.78	8.48	6.14	12.45	8.82
Q18-Knows that when he visits all 3 cards: Family Health Card, Maternal newborn and child health card, and the under-five card should be checked	49.43	46.49	2.94	64.38	63.73	0.65	64.22	59.65	4.57	50.49	44.12	6.37	14.79	13.16	-13.89	-19.61

Question ID	Pretest						Post test						Percentage-point change			
	T1-Full	T1-Matched	Dif (T1full-T1match)	T2-Full	T2-Match	Dif (T2full-T2match)	T1 - Full	T1-Matched	Dif (T1full-T1match)	T2 - Full	T2-Matched	Dif (T2full-T2match)	T1 Full Change	T1-Match Change	T2-Full change	T2 Match Change
Q19-Knows that vaccination status of each child at household visits should be checked to assess health practice and help finding solutions if required	74.52	69.3	5.22	74.25	68.63	5.62	76.29	71.93	4.36	83.82	71.57	12.25	1.77	2.63	9.57	2.94
Q20-Knows and to discuss how to mothers to find time for a PHU visit with family help and explains vaccinations are free of charge	57.41	57.02	0.39	59.66	61.76	-2.1	66.52	64.04	2.48	78.43	66.67	11.76	9.11	7.02	18.77	4.91

G. Outbreak Response Results – Full and Matched Sample Results

	Pretest						Post test						Percentage-point change			
	T1-Full	T1-Matched	Dif (T1full-T1match)	T2-Full	T2-Match	Dif (T2full-T2match)	T1-Full	T1-Matched	Dif (T1full-T1match)	T2-Full	T2-Matched	Dif (T2full-T2match)	T1 Full Change	T1 Match Change	T2 Full change	T2 Match Change
Q1-Knows that community-based disease surveillance is monitoring and reporting unusual events, diseases and deaths	57.26	52.48	4.78	51.94	52.21	-0.27	74.21	70.3	3.91	72.06	69.03	3.03	16.95	17.82	20.12	16.82
Q2 – Knows community-based disease surveillance lets the health system detect potential outbreaks, allows them to take immediate action to control an outbreak and helps avoid suffering and death	41.88	41.58	0.3	51.55	44.25	7.3	54.3	52.48	1.82	56.28	51.33	4.95	12.42	10.90	4.73	7.08
Q3-Knows that adults in the community with frequent and watery unusually green stools should be reported immediately so that correct actions can be taken and to prevent an outbreak and won't spread to vulnerable members of the community such as young children and elderly.	75.21	75.25	-0.04	70.54	68.14	2.4	76.36	74.26	2.1	49.59	46.9	2.69	1.15	-0.99	-20.95	-21.24
Q4 -Knows that it is important to be able to identify and report cases of cholera, yellow fever, Ebola and measles because these diseases can spread rapidly and cause several deaths if no action is taken	63.68	64.36	-0.68	72.09	72.57	-0.48	80.86	66.34	14.52	81.33	82.3	-0.97	17.18	1.98	9.24	9.73
Q5-Knows that he/she should report deaths with similar symptoms that happened on the same day	73.08	71.29	1.79	74.81	76.11	-1.3	81.34	74.26	7.08	79.67	78.76	0.91	8.26	2.97	4.86	2.65

Q6 –Knows that households that complain of acute watery diarrhea or cholera should report 3 or more watery stools in day	76.5	75.25	1.25	67.83	66.37	1.46	81.82	71.29	10.53	70.54	65.49	5.05	5.32	-3.96	2.71	-0.88
Q7- Knows that any person with a history of bleeding, fever, or a sudden death is a suspected case of Ebola	42.74	36.63	6.11	63.57	64.6	-1.03	54.07	50.5	3.57	66.25	61.06	5.19	11.33	13.87	2.68	-3.54
Q8 – Knows that a complaint of fever and a rash is a suspected case of measles	54.7	48.51	6.19	52.71	53.1	-0.39	66.51	62.38	4.13	64.17	61.95	2.22	11.81	13.87	11.46	8.85
Q9- Knows that if any of the 10 notifiable conditions[1] are suspected, a CHW should first notify the PHU	22.32	18.00	4.32	29.46	29.2	0.26	41.09	34	7.09	49.57	39.82	9.75	18.77	16.00	20.11	10.62
Q10-Knows that a surveillance register should be filled and immediately cases of acute watery diarrhea reported to the PHU to enable health officials to take immediate action to prevent an outbreak of watery diarrhea or cholera from spreading.	64.81	64.00	0.81	56.59	58.41	-1.82	66.83	56	10.83	62.93	54.87	8.06	2.02	-8.00	6.34	-3.54
Q11-Knows that and report to PHU about potential cases of measles.	68.24	62.00	6.24	67.05	65.49	1.56	83.58	65	18.58	80.6	76.11	4.49	15.34	3.00	13.55	10.62
Q12- Knows that all births, stillbirths, and any of the 10 notifiable conditions should be recorded in the surveillance monitor	33.91	35.00	-1.09	37.6	36.28	1.32	52.02	44	8.02	41.41	42.48	-1.07	18.11	9.00	3.81	6.2
Q13 – Knows a CHW should verify each birth and death so he/she can accurately fill in the surveillance register	67.38	69.00	-1.62	69.38	67.26	2.12	67.51	59	8.51	19.82	20.35	-0.53	0.13	-10.00	-49.56	-46.91

Q14 - Knows when a CHW encounters a child who has had a fever for a few days should seek additional information and determine if the child has had conditions like a rash, yellow eyes or bleeding to accurately refer, report, and register the condition	60.52	61.00	-0.48	48.45	47.79	0.66	59.9	51	8.9	47.79	40.71	7.08	-0.62	-10.00	-0.66	-7.08
Q15- Knows that new born babies require immediate attention	67.67	68.00	-0.33	51.55	50.44	1.11	74.49	61	13.49	67.7	61.06	6.64	6.82	-7.00	16.15	10.62
Q16 – Knows a CHW should accurately monitor births and deaths and immediately report when becoming aware of a suspected case of a notifiable condition	45.69	45.00	0.69	43.8	40.71	3.09	64.74	55	9.74	57.66	49.56	8.1	19.05	10.00	13.86	8.85
Q17 – Knows that if a CHW were to discover to recent deaths in the same family, the CHW should delicately ask about the conditions of the deceased, ask about the family and village, and immediately report any cluster of similar deaths to the PHU	65.8	67.68	-1.88	64.73	60.18	4.55	73.68	64.65	9.03	66.22	60.18	6.04	7.88	-3.03	1.49	0
Q18- Knows that a child/person exhibiting a sudden weakness in a leg/limb and is limping should suspect a possible case of polio	60.17	61.62	-1.45	58.53	57.52	1.01	77.78	60.61	17.17	77.83	70.8	7.03	17.61	-1.01	19.3	13.28
Q19 – Knows that a child who previously breastfed and has now stopped suddenly and is feeling stiff should suspect a possible case of neonatal tetanus	60.17	61.62	-1.45	66.67	60.18	6.49	82.98	71.72	11.26	79.19	67.26	11.93	22.81	10.10	12.52	7.08

Q20 – Knows that if three people have died in a community and all three had complained of high fever and bleeding from different body parts, a CHW should report clustered deaths and suspected Ebola	48.48	53.54	-5.06	41.86	38.94	2.92		60.64	48.48	12.16	55.66	48.67	6.99		12.16	-5.06		13.8	9.73
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