Building Capacity of Radio Stations in the Brong Ahafo and Northern Region on Climate Change Adaptation to Radio Program

Farm Radio International
Outcome Evaluation Research Report
2015

FARM RADIO INTERNATIONAL

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

MINISTRY OF FOOD & AGRICULTURE
REPUBLIC OF GHANA

Abstract

Sharing information and giving voice to small-scale farmers is a necessary support component that enables farmers to improve their prospects of achieving improved income and food security in the face of climate change. Based on this premise, Farm Radio International in collaboration the Department for Agricultural Extension Services (DAES) of MoFA with funding from the German Technical Cooperation (GiZ), implemented the radio dissemination component of the AAESCC Project (Adapting Agro-Ecosystems to Climate Change). The project was titled, "Building Capacity for Radio Stations in the Brong Ahafo and Northern Region on Climate Change and Adaptation Radio Program." Four radio stations in four districts broadcast 40-week programs on climate change and adaptive farming practices. This endline analysis estimates that roughly 500,000 adults in the radio coverage area listened to at least one episode of the program. Of those, approximately 370,000 adults tried at least three new adaptive farming practices – thereby increasing their ability to make informed decisions about improving their livelihoods and ultimately, their food security.

Keywords

Effective farm radio service on climate change; Ghana; radio; farming adaptation strategies

Tables

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Acknowledgements

Farm Radio International would like to thank all those who made this report possible. We express deep gratitude to all the farmers who shared their time and information with us. Furthermore, we are grateful for Ghana's Department for Agricultural Extension Services (DAES) of the Ministry of Food and Agriculture (MoFA) for their collaboration on this project. We would like to extend special thanks to the German Technical Cooperation (GiZ), whose funding made this project possible.

Contents

Acronyms

AAESCC	Adapting Agro-Ecosystems to Climate Change
AEA	Agricultural Extension Agent
CARS	Climate Change Adaptation Radio Service
FCC	Federal Communications Commission
FGD	Focus Group Discussion
FRI	Farm Radio International
GIS	Geographic Information System
GiZ	German Technical Cooperation
ICT	Information and Communication Technology
ITM	Irregular Terrain Model
IVR	Interactive Voice Response
KII	Key Informant Interviews
MoFA	Ministry of Food and Agriculture

1. Introduction

Climate change poses significant threats to the food security of small-scale farmers in Africa. Changes in rainfall patterns and extreme events like floods and droughts threaten the livelihoods of vulnerable communities in sub-Saharan African countries like Ghana. In Northern Ghana, the country's poorest region, climate change and land-degradation have resulted in both decreased yields and crop failures for farmers (Laube, Schraven, & Awo, 2011). However, farmers can respond to the impacts of climate change by integrating adaptive techniques into their farming practices – that is if they have access to the information they need to be successful. Communication strategies that convey good information, provide timely advice, and facilitate dialogue about weather, seasonal climate forecasts, and adaptive farming strategies can increase the capacity of smallholder farmers to adapt to climate change. Unfortunately, "access to information and improved technologies, as well as poor support mechanisms to promote assimilation of new knowledge" remains a serious constraint for smallholder farmers in Africa (Mapfumo, Adjei-Nsiah, Mtambanengwe, Chikowo, & Giller, 2013, p. 6).

1.1 About the project

Sharing information and giving voice to small-scale farmers is a necessary support component that enables farmers to improve their prospects of achieving improved income and food security in the face of climate change. Based on this premise, Farm Radio International in collaboration the Department for Agricultural Extension Services (DAES) of MoFA with funding from the German Technical Cooperation (GiZ), implemented the radio dissemination component of the AAESCC Project (Adapting Agro-Ecosystems to Climate Change). The project was titled, "Building Capacity for Radio Stations in the Brong Ahafo and Northern Region on Climate Change and Adaptation Radio Program." Four radio stations in four districts broadcast 40-week programs on climate change and adaptive farming practices.

1.1.1 Objectives

The objective of the project was to disseminate radio information on climate change and adaptation information to 250,000 small-scale farmers and equip them with the skills to make changes on their farm. Our goal was to help farmers improve their crop yields while

increasing their resiliency to the effects of climate change. Table 1 (below) outlines our final project achievements in relation to pre-implementation project objectives.

Table 1: Project objectives and results

PHASE	OBJECTIVE	RESULT
Phase 1 (Jan-April 2014)	At the end of the first quarter, four radio stations are selected and trained to produce and broadcast information on climate change and adaptation strategies for cultivating and managing staple crops to rural farmers in the Brong Ahafo and Northern Region.	We assessed the information needs of the farmers. Based on those needs, we designed and implemented capacity building workshops for four radio stations to produce and broadcast interactive, participatory and effective farm radio programs on climate change and adaptation strategies. The radio stations were selected for this project were: Star FM and Adars FM in the Brong Ahafo Region; and Lom FM and Yagbon Radio in the Northern Region.
Phase 2 (May - Aug 2014)	By the end of the second quarter, the four radio stations are researching, designing and producing climate change adaptation programs in the local languages of the beneficiary communities	Radio station staff increased their skills researching, designing and producing climate change programs. Benefits included: increased knowledge on climate change, enhanced capacity to use ICTs, and increased knowledge of agricultural practices
	At least 125,000 (out of a total of 250,000) small-scale farming households have enhanced their knowledge on climate change and adaptation strategies in the selected regions	*Refer to Phase 3 total below.*
	Recorded changes in the agricultural practices of beneficiary farmers	The majority of respondents reported making changes to their site selection, seed selection, soil fertility, or disease and harvesting practices. For example, since the last rainy season, 76% of respondents in Atebubu, 90% in Bole, 96% in Bunpurugu Yunyo and 47% in Kintampo reported making changes to their disease and pest management practices. Similar numbers of respondents reported making changes in the other four practice areas (seed selection, site selection, soil fertility and harvesting practices).
	The four radio stations broadcast regular weather information in local language to their listeners	When possible, all radio stations aired weather projections in local languages throughout the broadcast period (see below).
	The four Radio stations will provide biweekly weather projection for listeners during their weekly farmers program	Weather projections were interrupted at two radio stations due to civil unrest and faulty equipment. Broadcasts were interrupted at Lom FM for four weeks due to civil unrest in Bunkpurugu. Radio station staff had to postpone activities due to a government-instituted curfew to restore peace. Yagbon Radio was unable to send weather information for 12 weeks due to a faulty tablet, which prevented them from accessing our IVR platform. Farmers were receiving weather updates from Ignitia, an agent contracted by GiZ to provide location specific weather information to farmers. Despite the interruption, almost all listeners in all four districts said weekly weather updates were either “important” or “very Important” in their farm planning activities (see Figure 10).
Phase 3 (Sept-Dec 2014)	At least 250,000 small-scale farming households have access to effective farm radio advisory service on climate change and adaptation strategies in the Brong Ahafo and Northern Region	By using the extrapolation method outlined in section 1.1.2, we are able to estimate that **506,842** adults in the radio coverage area listened to at least one episode of the program.
	At least 250,000 small scale farming households experience improvement in their food security	By using the extrapolation method outlined in section 1.1.2, we are able to estimate that **372,765** adults in the radio coverage area tried at least three of the five main promoted practices from the radio program and **429,018** people tried at least one of the five main promoted practices.
	Each of the four radio stations broadcasting the CARS program for 40 weeks or more in the Brong Ahafo and Northern Regions	Compared to the initial target of **160 episodes** (40 episodes x 4 radio stations), a total of 171 episodes of radio programs on climate change and adaptation were broadcast to farmers at the time of the evaluation (these number correspond to number of weeks of broadcast). Five more were broadcast after the evaluation for a final tally of 176 – exceeding the goal by 10%. The number of weeks broadcast are as following: Star FM - 45 weeks; Adars FM - 44 weeks; Lom FM - 47 weeks and Yagbon Radio - 35 weeks (5 remaining).

1.1.2 Project region and participating radio stations

The project took place in the Brong Ahafo and Northern Regions of Ghana. The project served a total of four districts and eight communities within those two regions. Each is outlined in Table 2 below, along with their associated radio stations.

Table 2: Project regions and radio stations

REGION	DISTRICT	COMMUNITY	RADIO STATION
Brong Ahafo	Kintampo North	Alhassan Akura	Adars FM
		Cheranda	
	Atebubu Amantin	Primukyae	Star FM
		Lailai	
Northern Region	Bole District	Bale	Yagbon Radio
		Gbogdaa	
	Bunkpurugu Yunyoo	Jilik	Lom FM
		Ninik	

Mapping the coverage of radio stations

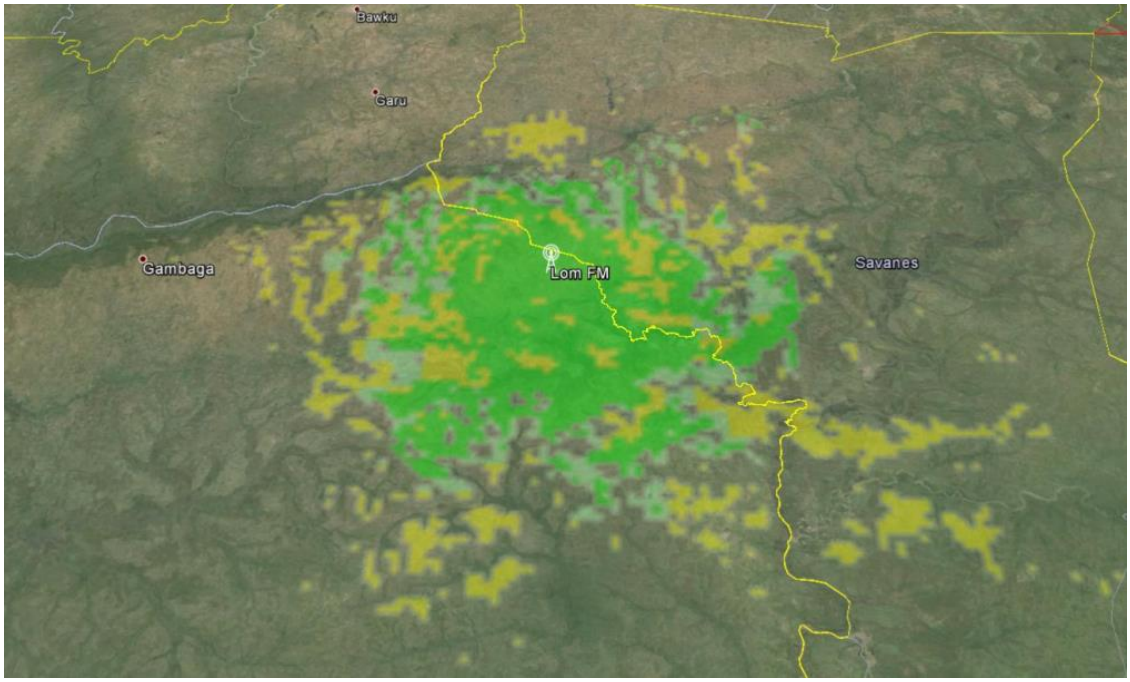
Farm Radio International has developed a standardized process for creating radio coverage maps which show broadcast coverage zones for each radio station we work with. This process involves gathering specific information about the radio transmitter such as power and height above average terrain at the radio station in order to estimate station coverage. The process also estimates the potential number of people served within this range. The output map adheres to commonly used principles of FM radio signal propagation shown in the Irregular Terrain Model (ITM), also sometimes referred to as the Longley-Rice prediction model (Longley & Rice, 1968).[1] For the purposes of this project a model was produced for the FM output of the four radio stations.

The diagrams below illustrate the predicted coverage of the stations showing both 60dB (green) and 48dB (yellow) signal strength for handheld radios. We can expect people within the reach of the yellow (and green) areas to be able to hear the radio broadcasts on a standard handheld radio.

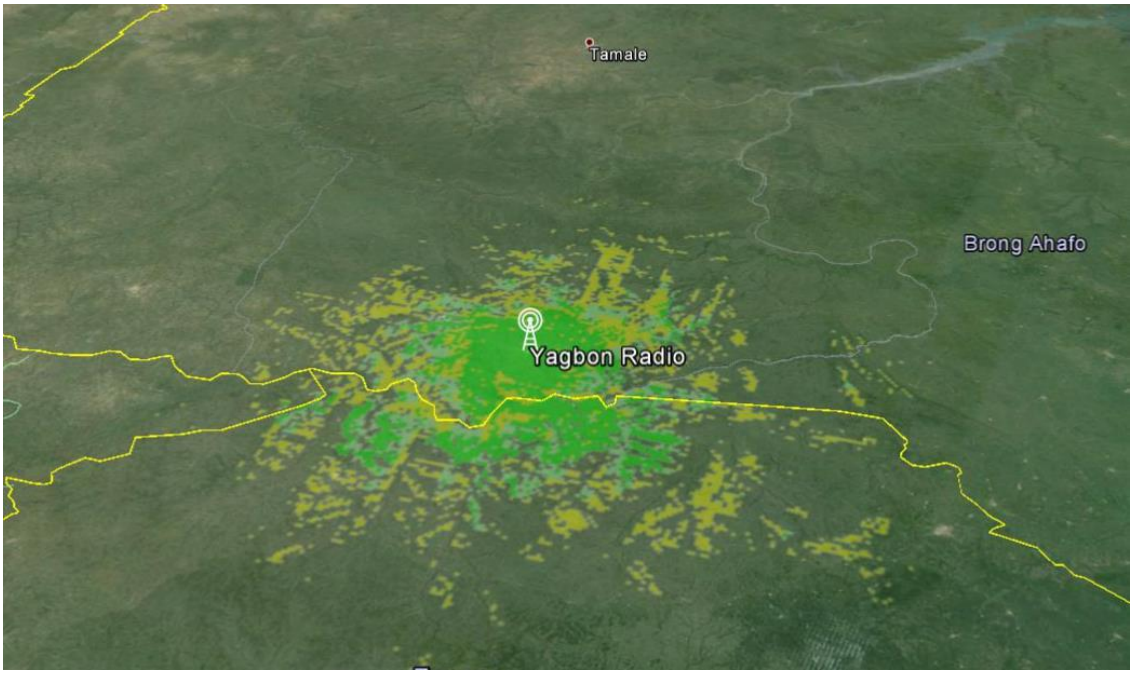
1 This is the model adopted as a standard by both Industry Canada and the United States Federal Communications Commission (FCC) for both FM radio and over-the-air television broadcasts.

Predicted radio coverage of Adars FM

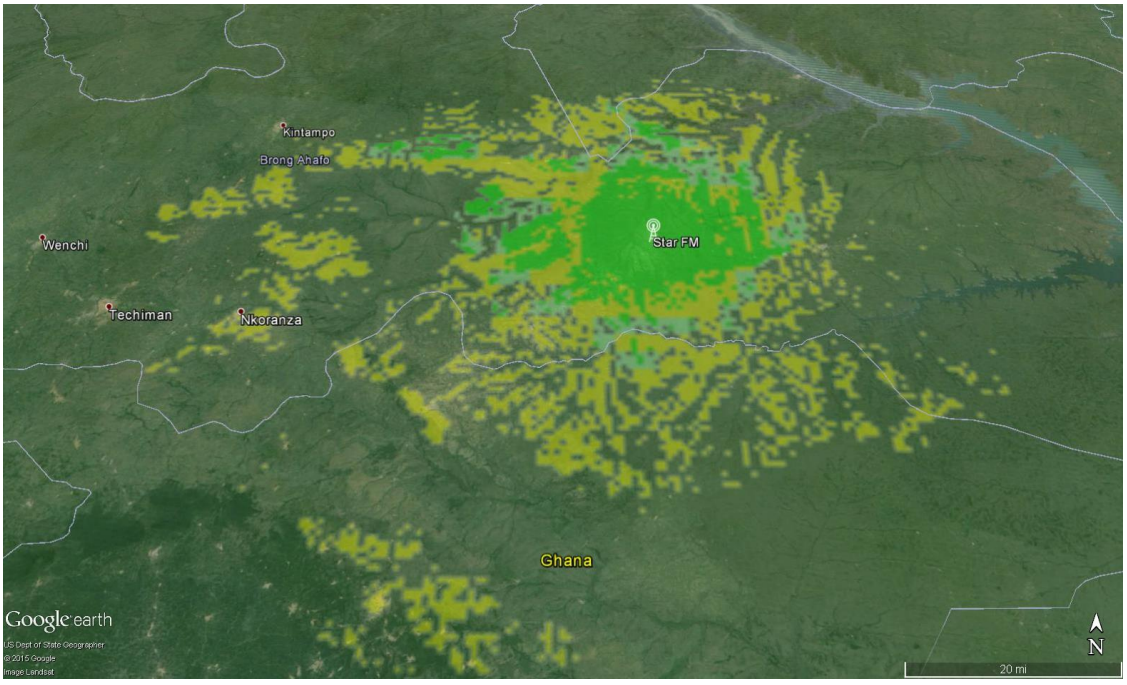
Predicted radio coverage of LOM FM



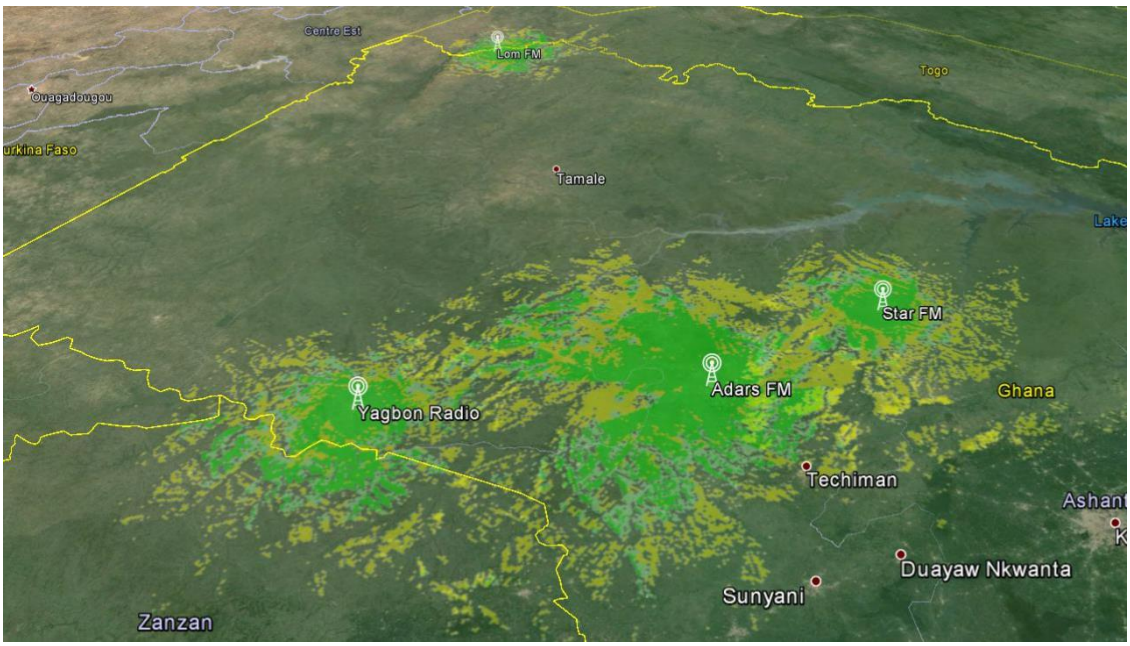
Predicted radio coverage of Yagbon Radio



Predicted radio coverage of Star FM



Using the open-source GIS (Geographic Information System) mapping program QGIS, FRI was able to estimate the number of people (working age adults) that lie within this range of these three stations to be **603,258** people.[2] We can make an estimate at the number of people in this population that listened to the climate change broadcast by extrapolating from our 636 household survey participants. Based on this, at least **506,842** people listened to at least one episode of the broadcasts of the four stations participating in this project. Lastly, using the same method, we are able to estimate that **372,765** farmers would have tried at least three of the five main promoted climate change adaptation practices from the programs of these four stations.



2 This is done by overlapping the coverage plot with population data from the most recent Ghanaian census available from http://www.worldpop.org.uk/

2. Methodology

This section outlines the research design and methodology used to collect and analyze the data presented in this report. It is organized into two sections. Section 2.1 outlines the data collection sources and methods while section 2.2 outlines how participants were recruited for this study.

2.1 Data collection sources and methods

The research in this report is based on multiple data sources in order to strengthen findings and understanding. Questionnaires were used as the primary data collection method. Focus Group Discussions (FGDs) and Key Informant Interviews (KII) were also used in order to triangulate findings and add qualitative context to the quantitative findings gathered through questionnaires.

2.1.1 Questionnaires

A mobile-based survey application, called Mobenzi, was used to collect survey data. This system allowed the surveyor to conduct the survey solely on a basic mobile phone, which sends survey data to a central server immediately on completion. FRI staff, Mark Kudafa and Emmanuel Appiah provided training to researchers and oversaw the data collection process. Data collection was carried out by a total of 20 MoFA officers (five data collectors in each of the four project districts). FRI chose this method of data collection as it enabled us to gather a large number of responses from farmers. Furthermore, surveys provide the structure needed to compare and contrast responses by indicators such as region or sex.

Purposive sampling was used to identify survey communities. Purposive sampling ensured surveys only took place in communities within the radio coverage area. Within those communities, we used systematic random sampling. Survey data was collected from May 13 to 23, 2015.

2.1.2 Focus Group Discussions

While surveys provide large amounts of quantitative data, qualitative data that tells the story of individual farmers' attitudes and practices is equally significant. Therefore, we conducted FGDs with 280 farmers (152 men and 128 women). Participants were selected using purposive sampling. Primarily, participants from community listener groups were

invited to participate. However, we also randomly selected farmers who live in the project communities and who also reported listening to the climate change program. The women- and men-only discussions were carried out in each of the four project districts from May 13-22, 2015.

2.1.3 Key informant interviews

Key informant interviews were carried out with MoFA focal persons, district Agriculture Extension Agents (AEAs), a World Vision International representative based in Atebubu as well as radio broadcasters from partner radio stations. These partners played a major role in both the design and implementation of the 40-week broadcast program. For this reason, they were asked to weigh in on both the benefits of the radio programs on climate and adaptation, as well as areas for improvement for future programs. The MoFA district focal persons and AEAs provided technical or agronomic information during program development. In addition, they participated in live radio broadcasts on climate change and adaptive farming techniques and supported farmers to organize listener groups. A participant from World Vision served on the advisory panel and also participated in live radio broadcasts.

2.2 Participant information

This section provides an overview of those who informed the findings of this endline report. Information about survey participants, those who participated in FGDs as well as key informants are detailed below.

2.2.1 Survey participants

A total of 636 participants from all four districts participated in the survey. As shown in Appendix 1, participants were asked a selection of questions about their knowledge of climate change practices, their radio listening practices and preferences as well as their climate change adaptive practices. Our objective was to gather responses from both male and female farmers of various ages and economic backgrounds.

Figure 1: District breakdown (n=636)

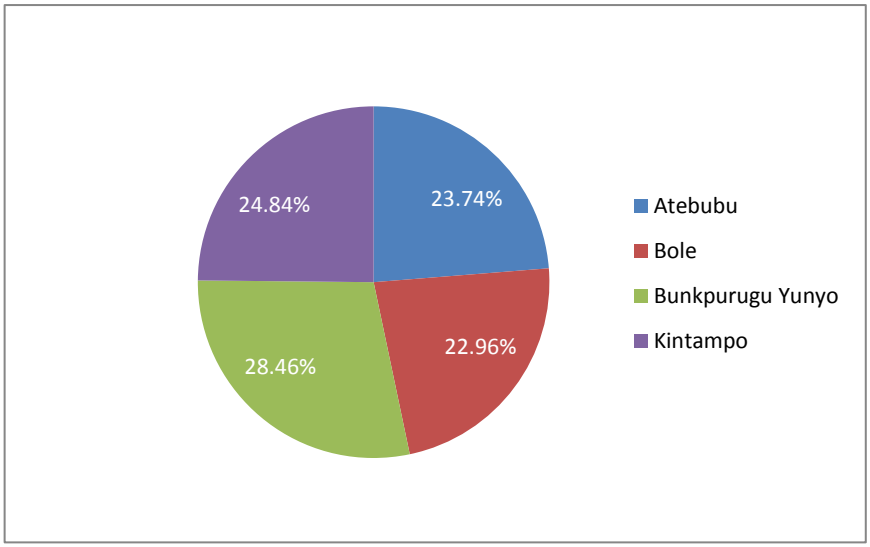
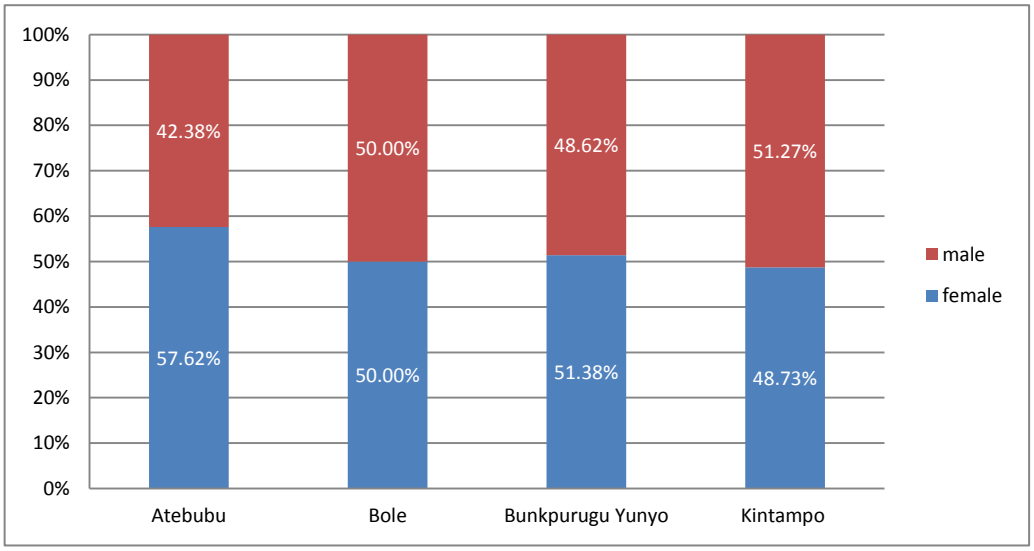
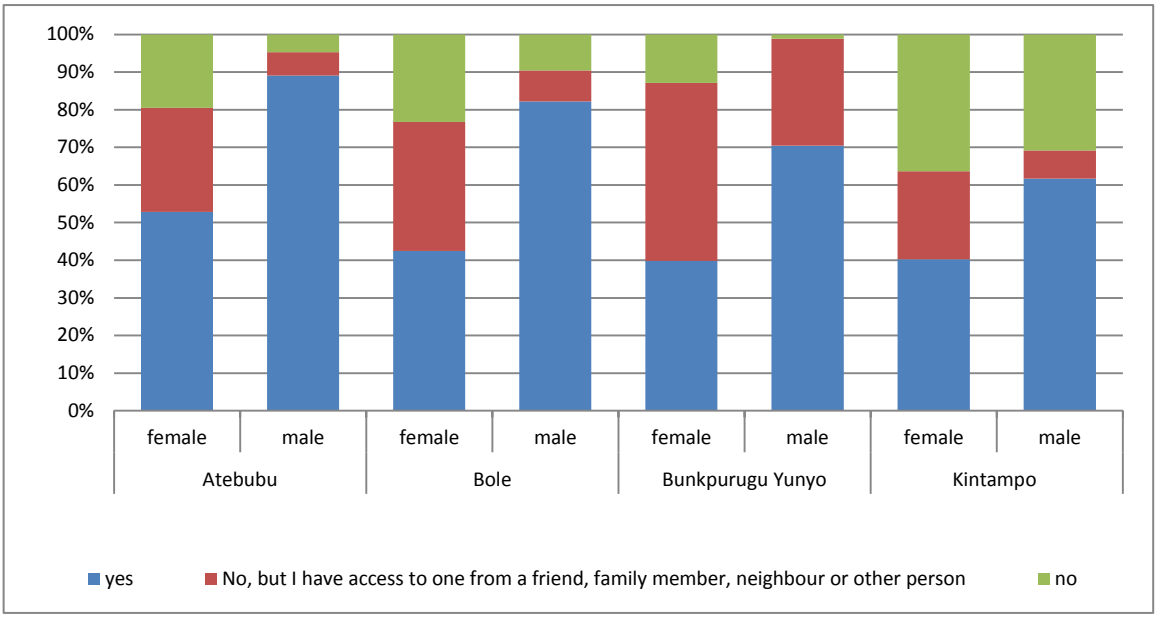


Figure 2: Gender breakdown (n=636)



We asked participants if they either owned or had access to a radio. Asking this question was significant as it not only allowed us to see how access to radio differs by region, but also how men and women's access to radio differs. As shown in Figure 3, more male participants owned radios as compared to their female counterparts. This was the case across all four districts. Radio ownership was highest amongst males in Atebubu at 89 per cent. Similarly, 82 percent of male respondents in Bole reported owning a radio. Females reported the highest levels of radio ownership (52 per cent) in Atebubu. Fewer than half of all female respondents in each of the three other districts owned a radio. However, in all four districts, the majority of participants either owned a radio or had access to one from a friend, family member, neighbour or another person.

Figure 3: Respondent radio ownership (n=636)



2.2.2 FGD participants

As shown in Table 3 below, FGDs took place in all eight of the active listening farming communities. A total of 152 men and 128 women participated in the group discussions. Group facilitators asked participants to reflect on the relevancy of the radio broadcasts to their farming practices, which practices they tried (if any), and if so, what challenges they faced implementing the adaptation techniques. In addition, we asked participants what they liked about the programs and what they would like to see included in similar programs in the future.

Table 3: Participants by region and sex

District	Project Community	FGD participants	
		Men	Women
Atebubu	Lailai	18	20
	Primukye	23	18
Kintampo	Cheranda	9	15
	Alhassan Akura	11	8
Bunkpuru	Jilik	25	13
	Nanik	20	13
Bole	Bale	22	26
	Gbogdaa	24	15
TOTAL		152	128
		280	

2.2.3 Key informants

Results from Key Information Interviews (KIIs) are based on discussions with six broadcasters from the four partner radio stations (four station managers and two presenters), four MoFA officers (one from each of the four districts), and one representative from World Vision International in Atebubu.

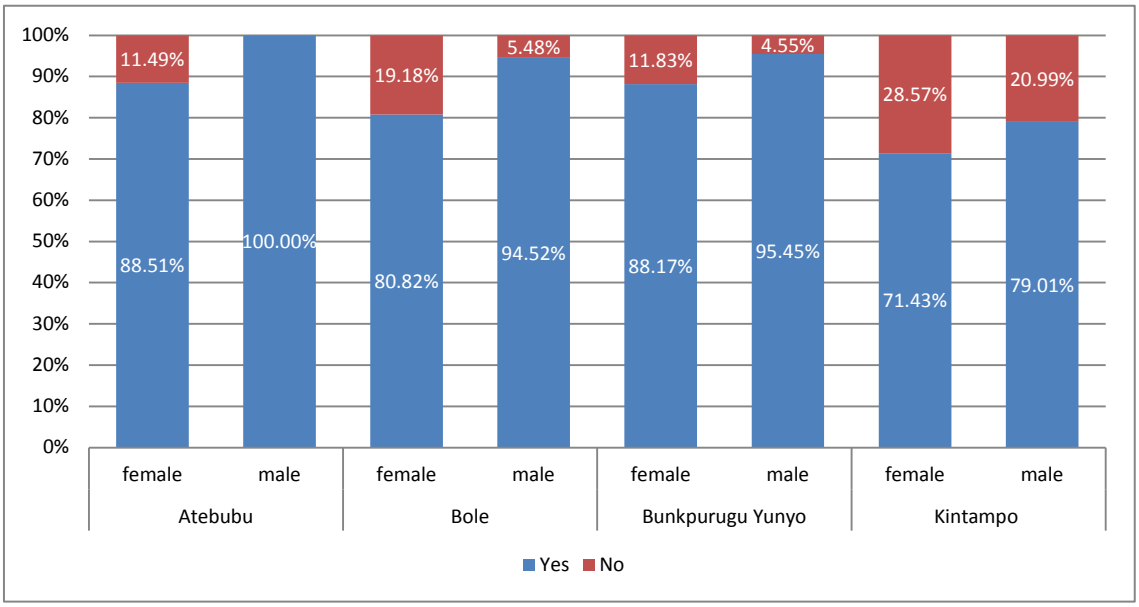
3. Key findings

This sections deals with the findings of our research, which were gathered through survey questionnaires, FGDs and interviews with partners. Findings are divided into five sections. The first section deals with participants' radio listening habits (3.1) while section 3.2 provides an assessment of farmers' knowledge in relation to climate change and adaptive practices. Section 3.3 outlines how participants select and prepare their farming site(s), how they select and use seeds, as well as what their soil fertility, disease management and harvesting practices look like. The following section (3.4), deals with the role that climate adaptation radio programs play in helping participants change their farming practices. Finally, section 3.5 looks at the barriers participants faced both adopting new farming practices and participating in programs.

3.1 Radio listening habits

We asked survey respondents if they had listened to the radio program on climate change and adaptation. As shown in Figure 4, the large majority of respondents indicated they had heard the program that aired in their community. Listenership rates were highest for both male (100 per cent) and female farmers (88.5 per cent) in Atebubu and lowest for male (79 per cent) and female farmers (71 per cent) in Kintampo. Higher listenership rates in Atebubu can be attributed in part to higher radio ownership rates in the district, which are illustrated in Figure 3. Similarly, participants in Kintampo who had lower ownership rates also had lower levels of listenership. In all four districts, more men reported listening to the programs as compared to female farmers. As shown earlier in Figure 3, female participants reported having less access to radio sets than men. In Ghana, however, radio ownership is only one of the barriers preventing women from tuning in to their favourite programs. Other key constraints include domestic duties, household chores, having money for batteries and the ability to choose what programs to listen to and when.

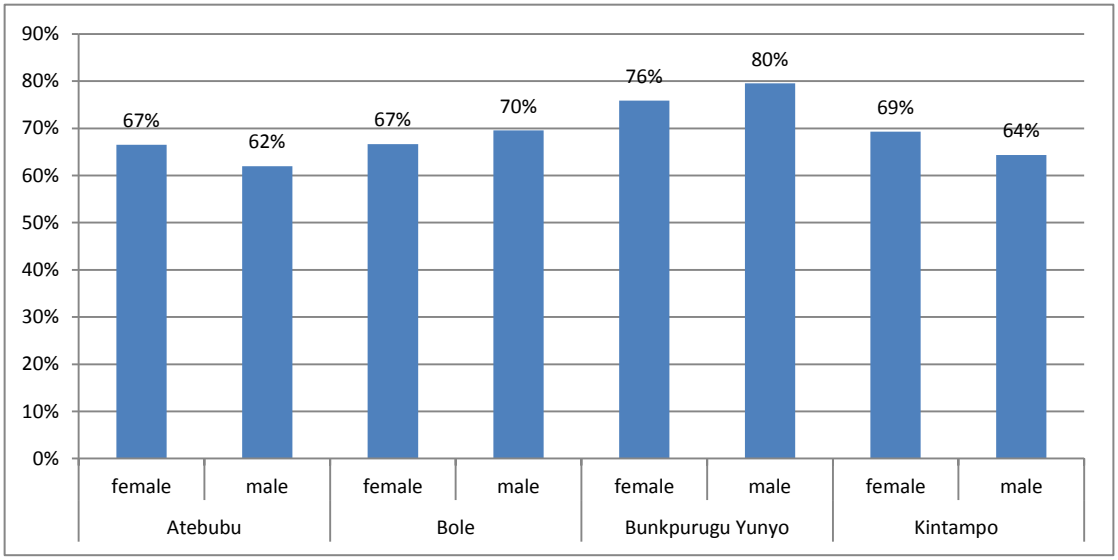
Figure 4: Percentage of respondents who listened to the climate change program (n=579)



3.2 Knowledge

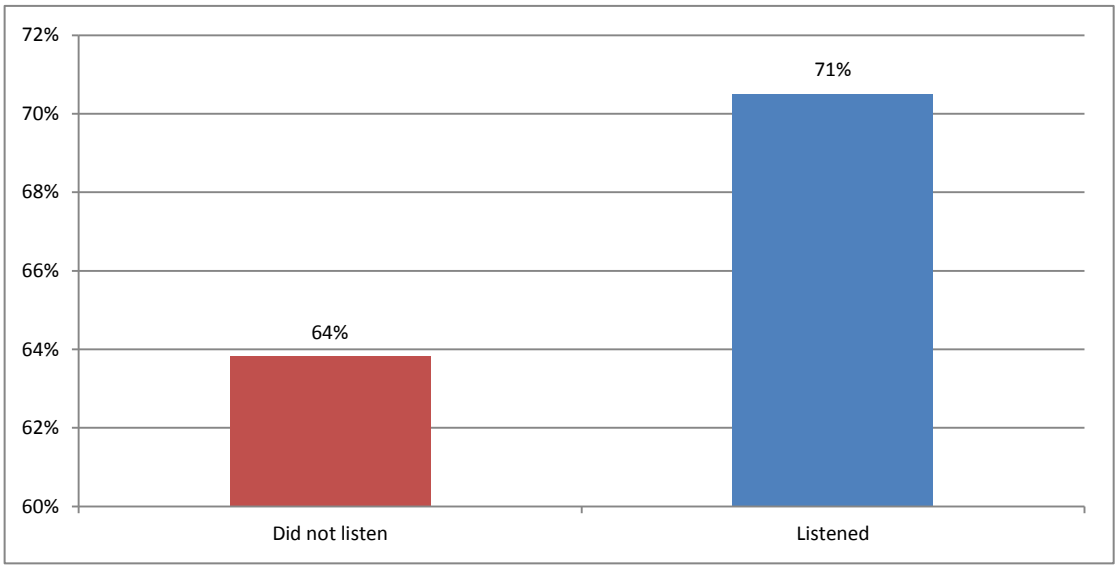
The goal of this project was to help farmers access information in order to increase their resiliency to the effects of climate change. When the project ended, we wanted to know what farmers learned and how their listening practices affected their knowledge of best farming practices. Therefore, FRI assessed respondents' knowledge level with a series of nine multiple-choice and true/false questions. The knowledge questions touched on a number of issues including: site selection, the use of pesticides, and land topography. Analyses of participant responses, disaggregated by sex, district, quiz score and listening practices is detailed below. We found that participants who listened to their communities' climate change and adaptation radio program not only fared better on the knowledge quiz, but were also willing to try more improved farming practices.

Figure 5: Average score on 9-question knowledge quiz (n=636)



On average, participants in Bunkpurugu Yunyo scored the highest on the knowledge quiz, with male participants answering 80 per cent of questions correctly compared to women's average score of 76 per cent. Participants in Atebubu had the lowest scores of the four districts, with women scoring an average of 67 per cent as compared to 62 per cent for men.

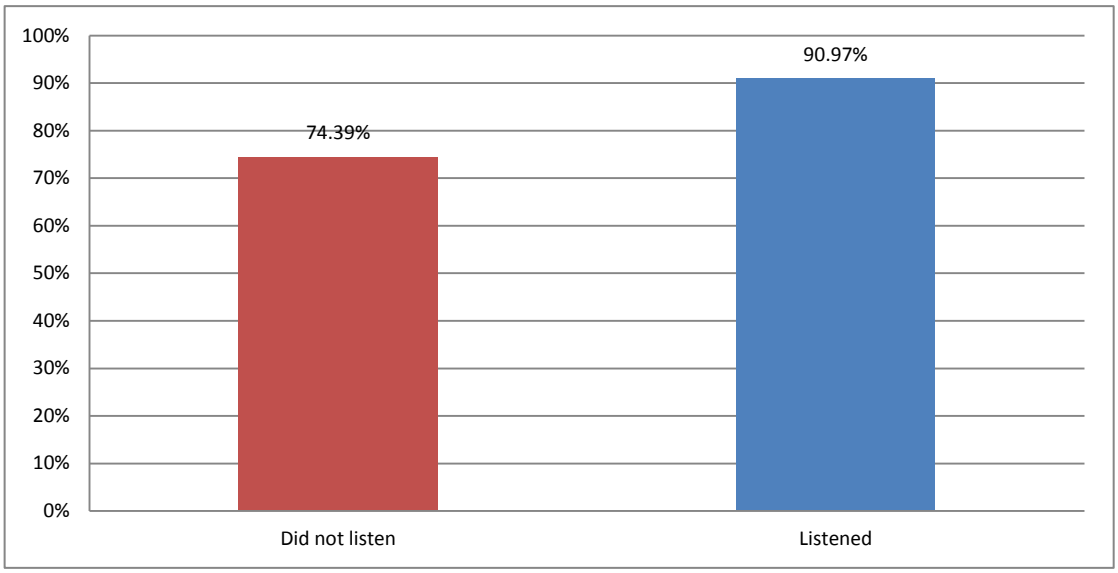
Figure 6: Average score on 9-question knowledge quiz verses listening habits (n=636)



Participants who reported listening to at least some of the radio programs on climate change and adaptation fared better on the knowledge quiz than those who did not. Those who listened to the program scored an average of 71 per cent on the 9-question knowledge quiz.

Those who did not listen scored 64 per cent. While the quiz was not designed to provide a comprehensive assessment of farmers' knowledge, these findings indicate that those who listened increased their knowledge over those who did not by an average of 7 percentage points.

Figure 7: Percentage of respondents that scored 55 per cent or better on knowledge quiz verses listenership (n=636)



Of those who tuned in to their local climate change radio program, more than 90 per cent scored 55 per cent or more on the knowledge quiz. In contrast, just 74 per cent of those who did not listen scored 55 per cent or better. We found that those who listened to the programs fared better on the knowledge quiz. As illustrated in the following section, we also found that those who tuned in tried more of the improved farming techniques they learned about on the radio.

3.3 Practices

We wanted to know what changes to their farming practices (if any) farmers had made since the previous rainy season (aligning with the time that the radio program was on the air). We asked them about how they select and prepare their farming site(s), how they select and use seeds, as well as what their soil fertility, disease management and harvesting practices look like. We found that farmers who reported higher listenership not only scored higher on their knowledge quiz, but also reported trying more new farming practices. These practices are illustrated below.

Table 4: Farming practices and techniques

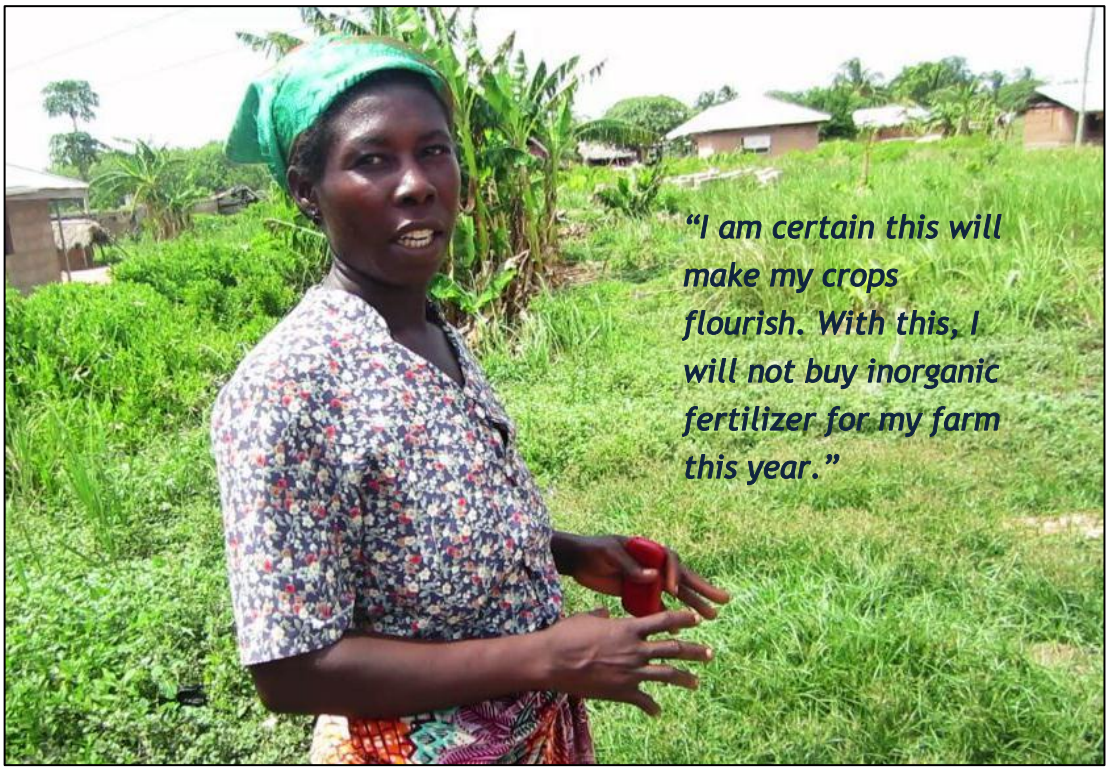
PRACTICE CATEGORY	SPECIFIC TECHNIQUE	
SITE AND LAND PREPARATION PRACTICE	Use of cover crops	Stone bounding
	Ridging	Identifying a good site to plant
	Ploughing across the slope	Mulching
SEED SELECTION PRACTICE	Use of indigenous seeds	Seed sorting and testing
	Soaking of seeds	Purchase of late maturing seeds
	Purchase and use of appropriate seeds	Use of early maturing seeds
	Introduction of new breeds	
SOIL FERTILITY PRACTICE	Application of fertilizer (liquid and solid)	Composting
	Crop rotation	Intercropping
	Use of manure	
DISEASE/ PEST MANAGEMENT PRACTICE	Integrated pest management techniques	Removal and burning of diseased crops
	Recommended application of chemicals	Early control measures
	Scouting for diseases	
HARVESTING AND STORAGE PRACTICE	Pest control in storage	Use of triple bags
	Proper storage	Sorting and grading
	Proper drying	Proper threshing techniques
	Timely harvesting	

3.3.1 Useful changes: stories from the field

We not only asked participants what changes they made to their farming practice, but which of these changes listed in Table 4 they found most valuable. We found that participants across all four districts tried a variety of practices. Participants in Bunkpurugu Yunyo tried the most number of practices by far. Not only did participants in that region have the highest levels of ownership and access to radio, they also had one of the highest listenership rates. In addition, participants in Bunkpurugu Yunyo scored the highest of all the regions on the knowledge quiz. These factors may have contributed to farmer's willingness to try more practices.

Composting

Ama Mary (pictured below), a farmer from Cheranda, Kintampo, said learning to prepare organic fertilizer made a big difference to her farming practice. Ama Mary says she learned how to make compost by listening to the program on Adars FM. The program, Akuafo Mo (meaning "congratulations to farmers"), taught her how to use household waste like groundnut husks, maize cobs, animal droppings and water and worms to prepare the compost for use on her farm. Ama Mary is using the compost on her Okra and maize farm. "I am certain this will make my crops flourish," she said. "With this, I will not buy inorganic fertilizer for my farm this year."



Fifty per cent of respondents in her region made changes to their soil fertility practices as well. Twenty-eight per cent of those who made changes to their soil's fertility in Kintampo did so with the use of manure or composting. Others used crop rotation (21 per cent), intercropping (27 per cent) or other fertilizers (24 per cent). Respondents found intercropping and the use of liquid or solid fertilizers to be the most useful practices.

Fertilizer

Baalenga (below, right), a farmer from Primukyae in Atebubu Amantin district, says the program on Star FM helped teach her how to increase her crop yields through the use of fertilizer. "I now know that it is important to apply the fertilizer/manure under every row so

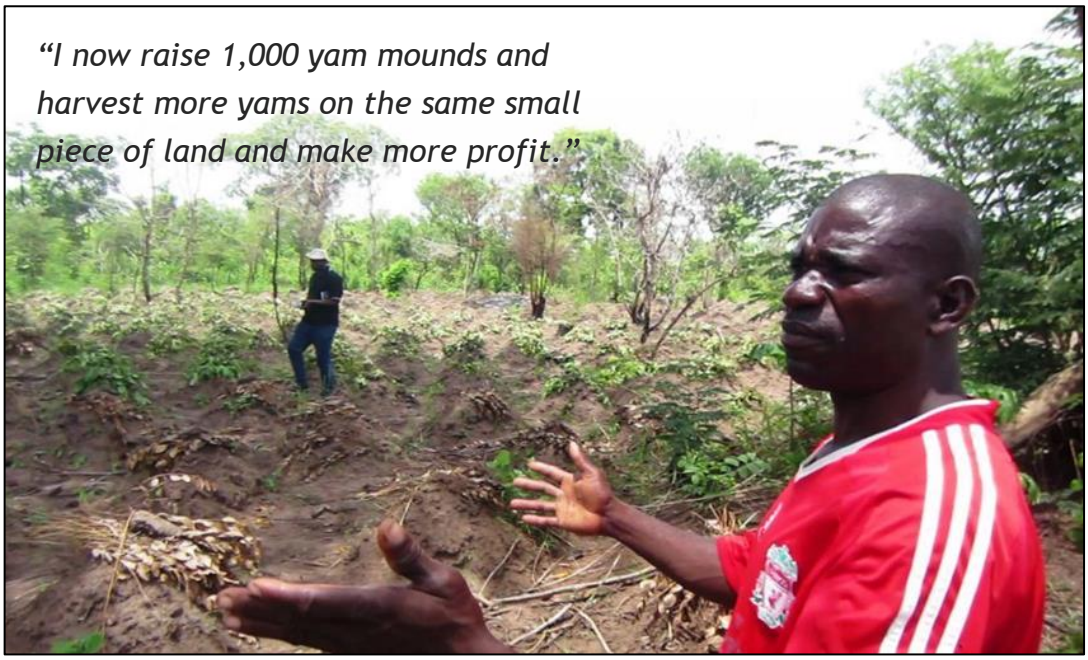
that I will be able to harvest good yields," she said. Ninety per cent of respondents in Atebubu district reported making changes to their soil fertility practices since last season. Of those who did, the majority (35 per cent) said the use of liquid and solid fertilizers were the most useful while 32 per cent said the use of manure was their most valuable farming practice. The remaining participants had a preference for intercropping (7 per cent), crop rotation (20 per cent) or composting (7 per cent).

Dry season farming

Yarbout Peter is from Jilik, a community in Ghana's Northern region in Bunkpurugu Yunyo district. During the last dry season, she says she has been able to increase her farm yields by listening to the programs on climate change and adaptation on Lom FM. She learned how to use stones as boundaries for dry season farming. "I gained a lot of profit from it," she said. "I plant my vegetables; I use some for home consumption and sell some to get money to pay my children's school fees." Participants in Yabout's district found stone bounding to be one of the most valuable farming practices. Twenty-nine per cent of those who made a change to their land preparation practices said stone bounding was the most useful. Ploughing across the slope was also a popular choice (28 per cent), followed by identifying a good site to plant (21 per cent), ridging (10 per cent), mulching (9 per cent), and the use of cover crops (6 per cent).

Spacing of yam mounds

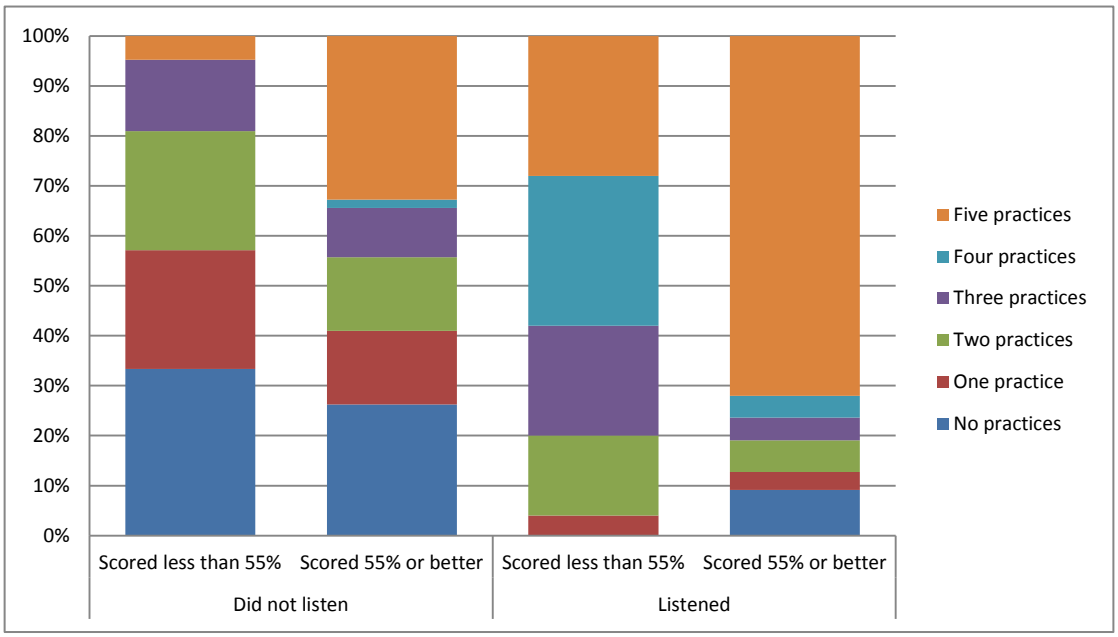
Yaw Dapaah (pictured below) used to over space his yam mounds. The farmer from Kintampo learned to make better use of his land by listening to the program on Adars FM. He learned he could be more efficient, and increase his profits, by planting his yams closer together. He used to plant about 500 yam mounds on his farm. "I now raise 1,000 yam mounds and harvest more yams on the same small piece of land," he said.



3.3.2 Practice in relation to knowledge and listenership

As mentioned earlier, farmers who listened to the climate change program in their communities not only scored higher on their knowledge quiz, but also reported trying more new farming practices. This is illustrated in Figure 8 below.

Figure 8: Level of reported practice since last rainy season versus knowledge and listenership (n=636)



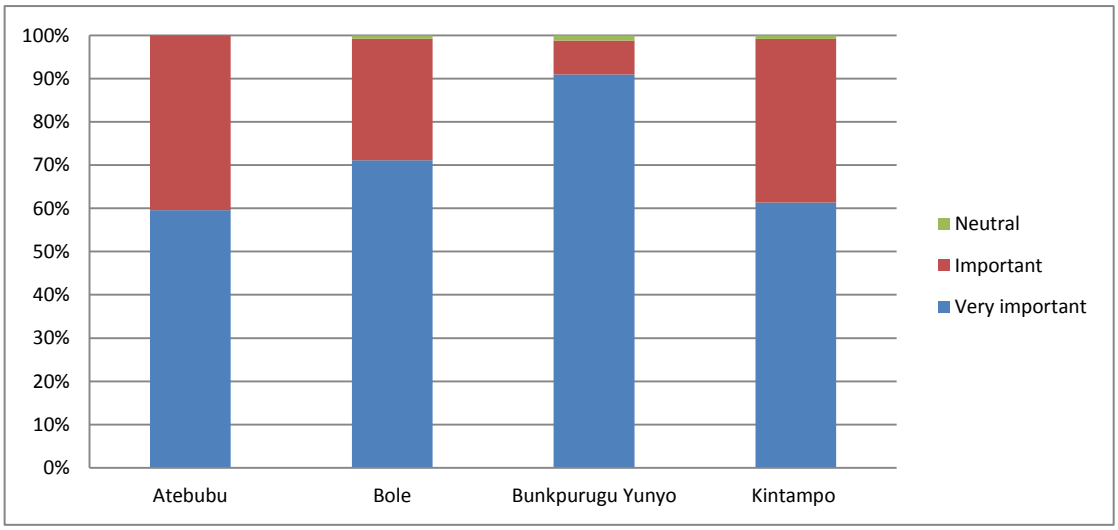
We can draw some interesting conclusions based on the findings in the above graph. Our research indicates that participants who scored better on the knowledge quiz (regardless whether or not the listened to the radio program) were more likely to try greater numbers improved farming practices. Of those who did not listen to the program, less than five per cent of respondents who scored less than 55 per cent on the knowledge quiz tried five new farming practices. In contrast, almost 33 per cent of those who scored 55 per cent or greater, tried five new practices. This finding indicates that farmer's confidence and ability to implement new farming practices increases as their knowledge about those practices also increases. Our experience has shown that radio is the best medium we can use to help farmers not only access that information, but put it into practice. Participants who listened to the radio program *and* scored 55 per cent or greater on the knowledge quiz, were the most likely (72 per cent) to try five new farming practices since the last rainy season. Those who listened but fared poorer on the quiz tried fewer practices, but still tried more than those who did not tune in.

3.4 Importance of listening to programs

Farmers largely rated the Climate Adaptation Radio Programs they listened to as "much better" than other agricultural radio programs they heard in the past. Farmers in FGDs reported that while the messages they heard were similar from information they had received from other sources (extension officers or other NGOs), they said they preferred the radio programs for two key reasons: a) the program had more detailed climate change and adaptation information than they had previously heard; and b) the messages were clear and understandable which motivated them to try the practice. In addition, farmers said they enjoyed listening to engaging and entertaining programs, the practical nature of the suggested techniques as well as the opportunity to participate in the programs.

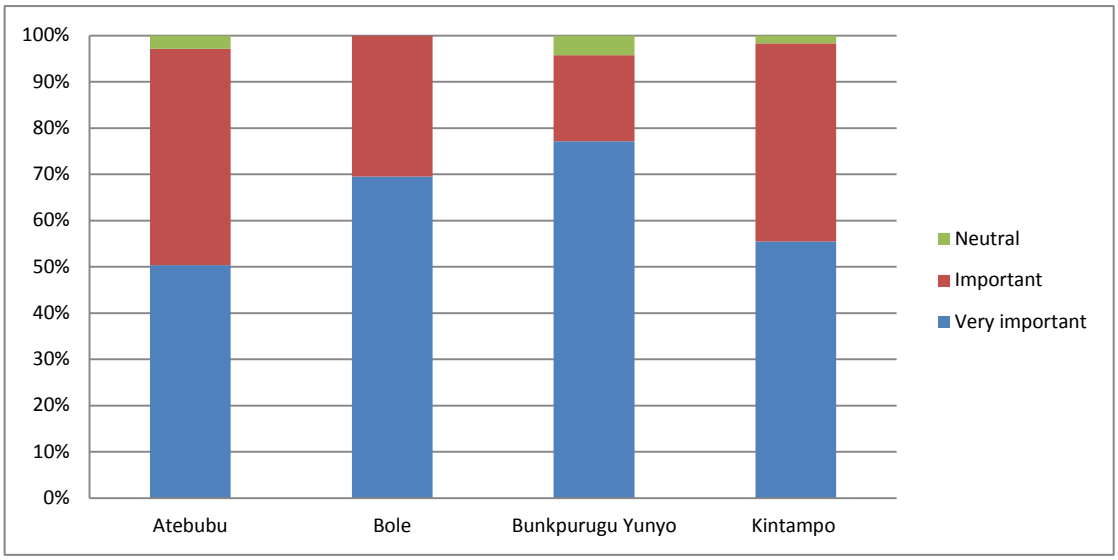
As shown in Figure 9 (below), the overwhelming majority of farmers in each of the four districts reported that listening to radio programs was either an important or very important factor in their decision to change their farming practices.

Figure 9: How important was listening to the radio in your decision to change your farming practices? (n=554)



One of the goals of this project was to enhance the knowledge of small-scale farming households. As shown in Figure 10 (below), weekly weather updates appear to have played a significant role in meeting this goal. We found that almost all respondents said weekly weather updates they accessed through radio played either an "important" or "very important" role in planning their farm activities in the previous season.

Figure 10: How important were the weekly weather updates on radio in your planning of farm activities last season? (n=554)



3.5 Barriers to adaptation, participation and broadcasts

While Table 1 shows that the project met or exceeded anticipated results, it is important to consider the challenges farmers had in a) adopting new practices and b) participating in the climate change programs. In addition, this section also outlines the challenges broadcasters identified in producing climate change programs. Reflecting on these challenges is significant in order to strengthen similar projects in the future.

3.5.1 Barriers to adopting new practices

As mentioned earlier, of the estimated 500,000 farmers we think listened to three of the four climate change radio programs, an estimated 370,000 farmers tried at least three of the five main promoted adaptation practices. That leaves about 130,000 farmers who tried one, two or no new practices at all. Focus Group Discussions with farmers and interviews with key informants and partners indicated that farmers might have been unwilling or unable to adopt new practices for various reasons. In some cases, female farmers, who often worked on their husbands' farms before their own, indicated that the new techniques increased their already heavy workload. In addition to having lower ownership rates and less access to land, Ghanaian women have a 15-20 per cent longer workday than men (as cited in Glazebrook, 2011, p. 766). Therefore, women farmers' ability to implement adaptation techniques was constrained. Partners also indicated that some farmers' preference for traditional farming practices made them reluctant to try anything new. Farmers who did not try new practices said

they were unable to due to: a lack of access to recommended materials, inadequate storage facilities, financial constraints, and the lack of a practical demonstrator.

3.5.2 Barriers to participating in programs

While the climate change radio programs played an important role in respondents' farming activities, FGDs revealed that some farmers within the radio listening communities had difficulty accessing and participating in the programs. Some farmers said they were unable to participate in phone-in segments because numerous callers congested phone lines. Our partners also noted a few challenges and setbacks during project implementation. Occasionally, partner radio stations experienced power cuts, which impacted their regularly scheduled climate change program. Partners also mentioned that some radio stations failed to consistently re-broadcast radio programs (as was the agreement), and occasionally, the radio stations failed to start the program on time. Farm Radio International weekly program monitoring system quickly identified and corrected these problems.

3.5.3 Challenges of radio production

Interviews with selected radio broadcasters revealed that they faced several key challenges in producing the climate change programs. Broadcasters reported that field visits could be timely and expensive. In addition, they had difficulty meeting farmers at pre-arranged times. Broadcasters also experienced technical difficulties, making production challenging. Some technical challenges included: faulty voice recorder and tablet, network difficulties and power outages. Finally, broadcasters said it was challenging to produce programs in two languages.

Summary and Conclusion

In Ghana, farmers' food security is threatened in part by declining soil productivity, lack of access to improved farming technologies as well as a lack of access to climate information (Mapfumo, et al., 2013). Given these challenges, the "Building Capacity for Radio Stations in the Brong Ahafo and Northern Region on Climate Change and Adaptation Radio Program" aimed to help farmers increase their food security by broadcasting information on climate change and adaptation on the most accessible medium for small-scale farmers – radio. Four radio stations in Ghana's Northern and Brong Ahafo regions produced and disseminated the 40-week programs. By providing this access to climate information and knowledge, an estimated 500,000 adults heard at least one episode of the program and 370,000 farmers tried at least one improved farming technique promoted through the program.

Farmers who tuned in scored higher on the knowledge quiz and tried more new farming practices than those who did not. Listeners said the climate change programs were more accurate, detailed and entertaining than other messages they had heard in the past. Farmers especially liked hearing their own voices or those of other farmers on air. For those reasons, farmers in focus group discussions said they were more likely to try the suggested practices. Farmers who tried new practices reported increased yields, increases in soil fertility and earned greater profits from their produce.

But farmers weren't the only ones left with increased knowledge after the project ended. Broadcasters from partner radio stations sharpened their research, production and ICT skills. Broadcasters also said they learned a lot about climate change and agricultural practices. As a result of the project, radio station staff visit communities more frequently to speak to farmers and include more listener feedback into programs. In addition, broadcasters from partner radio stations are using increased varieties of formats to engage listeners. They have also expanded the number of hours they devote to farmers' programs each week.

Appendix 1: Outcome evaluation questionnaire

Section 1.Location

1.1

Intro Instruction

Welcome to the 2015 MoFA/GIZ Climate Change and Adaptation project evaluation study. Many thanks for agreeing to participate in answering these questions. We are asking these questions find out more about what you think and are doing about farming. We will put your answers in our mobile phone and send them to the main researcher. We will not share your name or your own answers with anyone else. The information will only be used to help us understand your views. It will take about 20 minutes to complete this survey. If you agree, we would like to you for your mobile phone number (if you have one). We might use this to call you later if we need to ask more questions. We would also like to take your picture with the phone at the end of the survey. This photo will not be shared with anyone, it is only used for verification of the survey. Enumerator: Please push Next to continue.

Region District

Please enter the district you are located in

- Atebubu [Atebubu]
- Bole [Bole]
- Bunkpurugu Yunyo [Bunkpurugu Yunyo]
- Kintampo [Kintampo]

Community

Please enter the community that you are conducting this survey in.

- Lailai [Lailai]
- Premukyae [Premukyae]
- Alhassan Kura [Alhassan Kura]
- Chiranda [Chiranda]
- Gbogdaa [Gbogdaa]
- Bale [Bale]
- Jilik [Jilik]
- Nanik [Nanik]
- New Kokronpe [New Kokronpe]
- Suronuase [Suronuase]

☐ Najong No. 1 [Najong No. 1]

☐ Dikaatama [Dikaatama]

☐ Other [Other]

Community Other

Please enter the community you are conducting this survey in

Expects a single line text response (**required**)

Section 2.About Respondent

About Instruction

This section will gather information about the farmer being interviewed. Please push Next to continue.

Name

Please enter the respondent's name.

Gender

Please enter the respondent's gender.

☐ male [male]

☐ female [female]

Age

Age (Please enter a number, estimate if the farmer does not know)

Educational Level

Level of education. Please enter the highest level COMPLETED by the respondent.

☐ Primary [Primary]

☐ Secondary [Secondary]

☐ Tertiary (post-secondary) [Tertiary (post-secondary)]

Adult Literacy [Adult Literacy]

None [None]

Head_of_HH

Head of the respondent's household.

male headed [male headed]

female headed [female headed]

other [other]

own a radio

Do you own a radio?

yes [yes]

No, but I have access to one from a friend, family member, neighbour or other person [No, but I have access to one from a friend, family member, neighbour or other person]

no [no]

own mobile

Do you own a mobile phone?

yes [yes]

no, but I use someone else's phone [no, but I use someone else's phone]

no [no]

number

Can you please give us your phone number or the number you used when contacting the station? (skip if not applicable) Please let the respondent know that this number will be fully confidential and will only be used to follow up on this survey.

Expects a numeric response (optional)

mobile_credit

Mobile credit: On average, how much do you spend on mobile phone credit each month? (local currency)

extension support

An average, how many visits from extension officers do you get per month?

Section 3.Knowledge

knowledge instruction

The following section will ask the respondent 9 knowledge questions that correspond to content from the climate change radio campaigns. Please inform that there is nothing to gain from guessing, it is a valid answer to say I don't know. Please press Next to continue.

knowledge 1

True or false: The incidence of some pests and diseases can be influenced by climate change.

- ☐ true [true]
- ☐ false [false]
- ☐ I don't know [I don't know]

knowledge 2

Before site selection, farmers need to consider all the following except one. (There is one answer that is incorrect).

- ☐ Soils requirement of the crop [Soils requirement of the crop]
- ☐ Climatic requirement of the crop [Climatic requirement of the crop]
- ☐ Topography or slope of the land [Topography or slope of the land]
- ☐ Market price for the crop [Market price for the crop]
- ☐ I don't know [I don't know]

knowledge 3

True or false: As much as possible, it is necessary to keep soil surfaces completely covered with farm residues after harvest.

- ☐ true [true]
- ☐ false [false]
- ☐ I don't know [I don't know]

knowledge 4

In the face of climate change, when farmers are preparing land they should take the following actions except one (There is one incorrect answer).

- ☐ Leave at least 30 percent of the tree cover. [Leave at least 30 percent of the tree cover.]
- ☐ Keep all bee colonies [Keep all bee colonies]
- ☐ Leave an adequate space between crop fields and river banks [Leave an adequate space between crop fields and river banks]
- ☐ Slash and burn or gather and burn all crop residuals [Slash and burn or gather and burn all crop residuals]

I don't know [I don't know]

knowledge 5

True or false: It is appropriate to purchase pesticides sold in containers other than the original containers.

true [true]

false [false]

I don't know [I don't know]

knowledge 6

True or false: In the face of climate change, farmers are advised NOT to practice slash and burn as a method for land preparation.

true [true]

false [false]

I don't know [I don't know]

knowledge 7

True or false: High temperatures do NOT increase evaporation in dams and dug-outs.

true [true]

false [false]

I don't know [I don't know]

knowledge 8

True or false: Farmers sometimes should replant crops after extended drought in May and July.

true [true]

false [false]

I don't know [I don't know]

3.10

knowledge 9

True or false: Where possible, farmers should avoid planting on slopes that are more than 30 degrees.

true [true]

false [false]

I don't know [I don't know]

Section 4.Radio Listening Practices and Preferences

radio_instruction

The following section contains questions relating to radio listening practices. Push Next to continue.

Partner Radio

Please enter the partner radio station (or stations) associated with this community. (Enumerator: Select the partner radio station)

- [ ] Star fm [Star fm]
- [ ] Adars fm [Adars fm]
- [ ] Yagbon Radio [Yagbon Radio]
- [ ] Lom fm [Lom fm]

radio_six months

Have you listened to radio in the past six months?

- [ ] Yes [Yes]
- [ ] No [No]

Heard climate program

Have you listened to the radio program on Climate Change and Adaptation called _____ on _____? (Insert specific name of radio program and radio station)

- [ ] Yes [Yes]
- [ ] No [No]

listen frequency

There were 40 episodes of the radio program about climate change adaptation. Approximately how many did you listen to?

- [ ] 1-3 [1-3]
- [ ] 4-5 [4-5]
- [ ] 6-10 [6-10]
- [ ] 11-15 [11-15]
- [ ] 16-20 [16-20]
- [ ] 21-30 [21-30]
- [ ] 31-40 [31-40]
- [ ] I can't recall [I can't recall]

Section 5.Practice - Climate Change Radio Program

Practice instruction due to climate change radio program

This section includes questions related to farmers practice. Press next to continue.

Practice 1 site land

Have you made any changes to your site selection and land preparation since the last rainy season (2014)?

Yes [Yes]

No [No]

Practice 1 site land changes

If yes, select the changes to your site and land preparation that you have made since last rainy season. (select all that apply)

Mulching [Mulching]

Ploughing across the slope [Ploughing across the slope]

Stone bounding [Stone bounding]

Identifying a good site to plant [Identifying a good site to plant]

Ridging [Ridging]

Use of cover crops [Use of cover crops]

Other [Other]

Practice 1 site valuable

Which is the most valuable change you made to site and land preparation since last rainy season. (select only one option)

Mulching [Mulching]

Ploughing across the slope [Ploughing across the slope]

Stone bounding [Stone bounding]

Identifying a good site to plant [Identifying a good site to plant]

Ridging [Ridging]

Use of cover crops [Use of cover crops]

Other [Other]

Practice 2 seed selection

Have you made any changes to your practices around seed selection since the past rainy season?

Yes [Yes]

No [No]

Practice 2 seed selection changes

If yes, select the changes to your seed selection that you have made since last rainy season. (select all that apply)

Use of early maturing seeds [Use of early maturing seeds]

Use of late maturing seeds [Use of late maturing seeds]

- [ ] Purchase and use of appropriate seed [Purchase and use of appropriate seed]
- [ ] Introduction of new breeds [Introduction of new breeds]
- [ ] Soaking of seed [Soaking of seed]
- [ ] Seed sorting and testing [Seed sorting and testing]
- [ ] Use of indigenous seeds [Use of indigenous seeds]
- [ ] Other [Other]

Practice 2 seed selection valuable

Which is the most valuable change you made to seed selection since the last rainy season? (select only one option)

- [ ] Use of early maturing seeds [Use of early maturing seeds]
- [ ] Use of late maturing seeds [Use of late maturing seeds]
- [ ] Purchase and use of appropriate seed [Purchase and use of appropriate seed]
- [ ] Introduction of new breeds [Introduction of new breeds]
- [ ] Soaking of seed [Soaking of seed]
- [ ] Seed sorting and testing [Seed sorting and testing]
- [ ] Use of indigenous seeds [Use of indigenous seeds]
- [ ] Other [Other]

Practice 3 soil fertility

Have you made any changes to your practices related to soil fertility since the last rainy season?

- [ ] Yes [Yes]
- [ ] No [No]

Practice 3 soil fertility changes

If yes, select the changes to your soil fertility practices that you have made since last rainy season. (select all that apply)

- [ ] The use of manure [The use of manure]
- [ ] Intercropping [Intercropping]
- [ ] Crop rotation [Crop rotation]
- [ ] Composting [Composting]
- [ ] Application of fertilizer (liquid and solid) [Application of fertilizer (liquid and solid)]
- [ ] Other [Other]

Practice 3 soil fertility valuable

Which is the most valuable change you made to soil fertility since the last rainy season? (select only one option)

- [ ] The use of manure [The use of manure]
- [ ] Intercropping [Intercropping]
- [ ] Crop rotation [Crop rotation]
- [ ] Composting [Composting]
- [ ] Application of fertilizer (liquid and solid) [Application of fertilizer (liquid and solid)]
- [ ] Other [Other]

Practice 4 disease management

Have you changed any of your practices in disease and pest management on your farm since the last rainy season?

- [ ] Yes [Yes]
- [ ] No [No]

Practice 4 disease changes

If yes, select the changes to disease and pest management on your farm since last rainy season. (select all that apply)

- [ ] Scouting for diseases [Scouting for diseases]
- [ ] Early control measures [Early control measures]
- [ ] Application of recommended application of chemicals [Application of recommended application of chemicals]
- [ ] Removal and burning of diseased crops [Removal and burning of diseased crops]
- [ ] Use of integrated pest management techniques [Use of integrated pest management techniques]
- [ ] Other [Other]

Practice 4 disease valuable

Which is the most valuable change you made to disease and pest management since last rainy season? (select only one option)

- [ ] Scouting for diseases [Scouting for diseases]
- [ ] Early control measures [Early control measures]
- [ ] Application of recommended application of chemicals [Application of recommended application of chemicals]
- [ ] Removal and burning of diseased crops [Removal and burning of diseased crops]
- [ ] Use of integrated pest management techniques [Use of integrated pest management techniques]
- [ ] Other [Other]

Practice 5 harvesting

Have you changed any of your practices in harvesting your crops and storing your seeds since the last rainy season?

- [ ] Yes [Yes]
- [ ] No [No]

Practice 5 harvesting changes

If yes, select the changes to harvesting your crops and storing your seeds on your farm since last rainy season. (select all that apply)

- [ ] Timely harvesting [Timely harvesting]
- [ ] Proper threshing techniques [Proper threshing techniques]
- [ ] Proper drying [Proper drying]
- [ ] Sorting and grading [Sorting and grading]
- [ ] Proper storage [Proper storage]
- [ ] Use of the triple bags [Use of the triple bags]
- [ ] Pest control in storage [Pest control in storage]
- [ ] Other [Other]

Practice 5 harvesting valuable

Which was the most valuable change you made related to harvesting your crops and storing your seeds since the last rainy season? (select only one)

- [ ] Timely harvesting [Timely harvesting]
- [ ] Proper threshing techniques [Proper threshing techniques]
- [ ] Proper drying [Proper drying]
- [ ] Sorting and grading [Sorting and grading]
- [ ] Proper storage [Proper storage]
- [ ] Use of the triple bags [Use of the triple bags]
- [ ] Pest control in storage [Pest control in storage]
- [ ] Other [Other]

Changes factors

How important was listening to the radio program (name of specific radio program) in your decision to change your farming practices?

- [ ] Very important [Very important]

Important [Important]

Neutral [Neutral]

Not very important [Not very important]

Not important at all [Not important at all]

Changes factors 2

How important was the weekly weather updates on radio in your planning of farm activities last season?

Very important [Very important]

Important [Important]

Neutral [Neutral]

Not very important [Not very important]

Not important at all [Not important at all]

Changes factors 3

How important was the participation in the community listener groups sessions in your decision to change your farming practices?

Very important [Very important]

Important [Important]

Neutral [Neutral]

Not very important [Not very important]

Not important at all [Not important at all]

Overall Benefits

What were some of the benefits derived from your adaptation practices on farm last season? Please specify.

Expects a long text response (**required**)

Section 6.Assessment of PRC Quality

6.1

quality compared

Comparing the _____ program (PRC) to other agricultural radio programs, I rate the _____ PRC program on _____ radio station as:

Much better [Much better]

- [ ] Somewhat better [Somewhat better]
- [ ] About the same [About the same]
- [ ] Somewhat worse [Somewhat worse]
- [ ] Much worse [Much worse]

Appendix 2: Focus Group Discussion interview guide

CLIMATE CHANGE AND ADAPTATION RADIO PROGRAM EVALUATION:
FOCUS GROUP DISCUSSION GUIDE

CHECKLIST FOR FOCUS GROUP DISCUSSION

NAME OF STATION	
RESEARCH TEAM MEMBERS	**1** **2** **3** **4**
Day & Date of fieldwork	
Time Started	
Time Ended	
Name of Community	
Name of District	
Name of Region	
Type of Focus Group (Men, Women)	

FOCUS GROUP DISCUSSION

No.	Name of participant	Age	Gender	Occupation
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				

12				
13				
14				
15				

1. What was the focus (general idea) of the radio program **(Get them to agree on the focus)**

_____
_____

2**. Content of the program**

2.1 Can we list 6 MOST IMPORTANT TOPICS that you have learned from the radio program?

a) _____ d) _____

b) _____ e) _____

c) _____ f) _____

2.2 Were the topics relevant to your farming practices? Yes or No

If No, what was missing?

2.3 Were the topics similar to what you have heard before? Yes or No

Is there any difference?

_____
_____

3. **Impact of the Radio Program**

3.1 Raise your hand if you have tried any of the suggested practices proposed in the program?

Write the #_____hands raised total # participants_____

3.2 Which suggested practices proposed in the radio program have you tried THE MOST?

a) _____ c) _____

b) _____ d) _____

3.3 Which of the practices will you like to practice in the coming season?

A_____ b_____

C _____ d_____

3.4 What has **prevented** you from trying some of the proposed practices?

a) _____ c) _____

b) _____ d) _____

3.5 How many of you have implemented (# of Hands) Composting _____ seed selection or improved seeds _____ site selection ---------- -- contour bounding _____

Minimum Tillage _____ use of manure _____ bushfire control_____

Planting of Early/late Maturing_____ Tree planting _____

Soil Fertility Management techniques _____ other _____

4**. Community Involvement**

4.1 What has been the most significant idea that you have implemented as a result of the radio program?

(Get them to agree on 1) FOR passive COMMUNITIES, ask if there was any change in their farming

_____

_____

_____

5. **The role of ICTs**

5.1 How often did you use your cell phone to call to the program or called the IVR for weather and Market information? Write the # of respondents after each answer option

-At every program _____ -None_____

-At some _____

5.2 What prevented you from calling at all?

a) _____ b) _____

c) _____

5.3 Raise your hand if you have access to a radio # of hands_____

Summary

6.1 Lets list # things that you liked the most from this Radio programs

_____ _____

_____

6.2 Do you have any suggestions for future improvement? Share your happiest moment about this project

_____

_____

_____

_____

_____

_____

_____

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