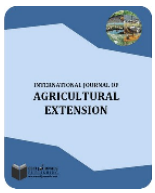

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RADIO AND MOBILE PHONE OWNERSHIP OR ACCESS BY SMALLHOLDER FARMERS OF EASTERN UGANDA AND ITS POTENTIAL USE FOR PUSH-PULL TECHNOLOGY DISSEMINATION

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A B S T R A C T

A baseline survey of ownership or access to radio and mobile phone was conducted in seven districts of eastern Uganda in 2015. The purpose of this survey was to assess the role of radio and modern communication technologies to promote push-pull technology as an integrated management approach to control striga and stemborer and improve soil fertility. The selected districts are where icipe is currently disseminating the technology. The survey was conducted from seven districts where 30 respondents from each were identified for the study. Semi structured questionnaires were administered where data including household demography, ownership and or access to radio and mobile phone was collected. The data were analyzed using STATA (version 13). The findings show that there are over eight (Ateso, Luganda, Samia, Japadhola, Lugisu, Lusoga, Kiswahili, and English) languages spoken in the surveyed districts. Most of the respondents speak more than one language. Overall, ownership of radio and mobile phone was at 82% and 87% respectively with slight differences between men and women. Moreover, those who do not own radio and mobile phones also stated that they have access to one. On average, 83% of the respondents (174 out of 210) said that they do receive text messages, whereas, only 53% of the respondents indicated that they also send text messages. A great proportion of the respondents (91%, 80%, and 77%) received agricultural, weather and market information through the radio. Over 65% of the respondents reported benefiting from the agricultural programs broadcasted via radio. 45 and 50% stated that they benefitted from market and weather information. However, the level of benefit rendered from mobile phones with regard to agricultural, market and weather information was negligible. The study showed that radio and mobile phones are best suited mass communication media to transfer technologies such as push-pull to address cross-cutting problems such as striga, cereal stem borer and low soil fertility. It will strengthen the agricultural extension service delivery at large.

Keywords: Radio, mobile phone, maize, striga, stem borer, soil fertility, radio campaign, push-pull technology.

INTRODUCTION

Maize, sorghum, millet and rice are among the major cereal corps produced in Uganda, most of the land under cereal production is located in eastern Uganda. Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) strategy document of 2010, pests, vectors and disease remain the major constraints of agricultural production (MAAIF, 2010). Among which parasitic weed striga (Striga hermontica Del.) and cereal stemborers Chilo partelius and Busseola fusca Ful. (Mugo *et al*.,2005; De Groote, Okuro, *et al*., 2004; Kifr *et al*. 2002; Odendo *et al*., 2001) are the predominant pests. In East Africa, losses in cereal grain yield due to stem borers ranges from 44-50% (Robert *et al.,* 2014). Yield loss due to striga alone is estimated to be worth US Dollars 7 billion. It also affects over 50 million ha of land and 300 million farmers in sub-Saharan Africa (SSA) (Mboob, 1986, Parker, 2008 Lagoke *et al*., 1991). It is observed that striga causes severe damage in nutrient poor soils, low rainfall areas and in farms where less input such as fertilizer or farmyard manure is applied (Gurney *et al.,* 2006, Ransom, 1999, Weber *et al.,* 1995, Lakoge *et al*., 1991). This is a typical phenomenon observed in eastern

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Uganda where the spread of striga and damage caused by it is on the rise. Thus, if combined, stemborer and striga infestation can cause a complete yield loss. Push-pull, a noble technology where maize is intercropped with a stem borer moth-repellent legume, Desmodium, surrounded with an attractant host plant, Napier grass, or Brachiaria planted as a trap plant for stem borers was developed by the International Center of Insect Physiology and Ecology (ICIPE) in collaboration with Rothamsted Research (Khan et al. 2008). As a platform technology it has proved to solve multiple problems at the farm level. It can easily be integrated with livestock, poultry, vegetable production, etc. to enhance productivity and ensure sustainability (Khan *et al.,* 2000 and 2002; Khan *et al.,* 1997),

Moreover, soil fertility improvement due to the legume intercropping and nutrient recycling through composting or utilization of farmyard manure will yield increment (Gacheru & Rao, 2001; Oswald, 2005; Oswald & Ransom, 2001). In spite of these benefits, reaching millions of affected farmers using the current extension system is less efficient and takes lots of time. This makes using mass media and particularly radio attractive. Radio was and still is the dominant communication medium in Africa compared with the print media as well as other ICTs (Mayers, 2008; Omenesa, 1997, M. McLeod Rivera & Qamar, 2003). With vast geographical coverage, diverse local languages and dialects now used by the abundant radio stations, it is possible to reach individual households from the comfort of their homes or gardens to aid the extension service (Nakabugu, 2001; FAO, 2005). However, this requires a good understanding of the sociocultural behavior of the communities with regard to their listening habits, preference of radio stations, broadcast language, and preferred time to tune in, ownership or access to radio sets, ownership of mobile phones etc. With this knowledge and proper use, technology dissemination will be a lot faster. Farm Radio International, a Canada based NGO studied how and in what ways radio and modern ICTs can be used to disseminate new or improved agricultural technologies in Africa (Farm Radio, 2011; Chapman *et al.* 2003). The African Farm Radio Research Initiative, a participatory action research conducted in five African countries with the involvement of 25 radio stations clearly demonstrated the superiority of radio and modern ICTs to reach the highest number of audience and impact on knowledge and practice of agricultural improvements (Bartholomew Sullivan, 2011).

Furthermore, Farm Radio (2016) reported that in a collaborative project with IUCN in Kapchorwa, Uganda, over 980,000 people in 89 villages tuned into My Land My Wealth, a radio show which was aired twice a week from 8:00 p.m. to 9:00 p.m. Other reports also indicate that through participatory radio campaign, pest problems such as rhinoceros beetle of coconut and banana pests were controlled (Dagron, 2001).

The objective of this study was, therefore, to determine radio and mobile phone ownership or access by smallholder farmers in eastern Uganda and further evaluate If farmers were able to benefit from agricultural, market and weather information broadcasted through radio or mobile phones.

MATERIALS AND METHODS

Study design and Study area: The study used a cross sectional design majorly employing a quantitative research method through the use of a questionnaire. The study was conducted in seven districts in eastern Uganda (Table 1).

Eastern Uganda has a bimodal rainfall where crops such as maize, sorghum, beans, cassava as well as fruits and vegetables are produced. The study districts were predetermined as they included where ICIPE was implementing the Push-pull technology to control striga and stemborer. These districts wer Bugiri, Bukedea, Busia, Iganga, Mbale, Pallisa and Tororo as listed in the Table 1.

Table 1. List of surveyed districts in eastern Uganda, 2015.

No	District	Population*	Area (km2)
1	Bugiri	426,800	1,045.9
2	Bukedea	186,400	1,051.7
3	Busia	297,600	730.9
4	Iganga	499,600	1,019
5	Mbale	441,300	518.8
6	Pallisa	362,600	1,487.7

7	Tororo	487,900	1,196.4

*- Population estimation according to the 2012 census

Sampling, recruitment strategy and sample size: Multi-stage cluster sampling was used to select sub counties from the selected districts. In each of the districts, sub counties were clustered based on proximity to the next sub county. Therefore, the number of sub counties in each district varies depending on the coverage of the program. In each Sub County, between one and three parishes were chosen using simple random sampling without replacement with due consideration given to the need for the push-pull technology (PPT).

In each parish selected, all villages were reached to select respondents for the interviews.

Smallholder farmers from selected sites were randomly identified and information was solicited using structured questionnaire administered by well-trained field technicians based in each district by way of one-on-one direct interviews. The questionnaire was administered to all consenting farmers aged between 18 and 65 years. A total of 30 small holder farmers were targeted in each district distributed across the identified sub counties. Therefore, a total of 210 farmers were interviewed during the survey.

The selection of farmers for an interview took into consideration the need to have the sample be fairly distributed along by gender and age groups. The questionnaire was pre-tested for validity, consistency, clarity, timing, and reliability before it was finally used for data collection. The pretesting was conducted within a non-study area and it was beneficial in strengthening the sequence of questions, ensuring that local language was adopted and relevant questions were consistently asked. The final revisions were made on the basis of feedback from field technicians and this led to the version that was used to collect data in the main study after input from the pre-test.

The questionnaire gathered information like: 1) household characteristics, 2) radio and mobile phone ownership, 3) access to information on agriculture, weather, and market using radio and mobile phones.

Data-collection analysis and ethical considerations: The lead scientist based at the ICIPE country office provided close supervisory support to the field technicians during data collection. Each data collection day ended with the team of technicians discussing with the lead scientist the interview processes to identify significant emerging issues and findings. For each district visited and data collection completed, the supervisor compiled field summaries of the data collection process on the basis of the daily debriefings.

Rights, anonymity, and confidentiality of the respondents were respected in all phases of the study. Informed verbal consents of the respondents were taken before starting data collection. The verbal consent process included providing information on 1) the type and purpose of the survey, discussion or interview; 2) issues of anonymity and confidentiality; 3) voluntary participation and freedom to discontinue the interview/discussion at any stage; and 4) absence of any known risk or personal benefit for participating in the study were explained. The research team ensured that the data is carefully managed (handling, transport, and storage) throughout the study period. Epidata (version 3.2) was used to enter the data. To ensure the quality of the data entry process, adequate checks were built into the design of the data-entry screen. The data entered was validated by the data analyst at ICIPE using a double-entry validation process built into Epidata, which allows for comparison of two data for consistency and accuracy. The data was then exported to STATA (version 13) for further cleaning and analysis.

The analysis captured measures of central tendencies like averages, frequencies and distributions of all study variables by district and gender, the age of respondents, tables and graph. Cross-tabulation and chi-square tests of statistical association were computed to see the association between some socio-demographic variables with radio and/or mobile phone ownership, access to radio and mobile phone information, radio and listenership. Quality-control processes started at the inception phase and continued through to analysis and report writing. Quality was maintained by ensuring the data-collection instruments met international standards both in terms of the kinds of issues and themes explored and the type of questions asked. The training of field research assistants (the technicians) also ensured they are aware of the key themes to be covered in the research. Piloting of tools provided further assurance that quality was maintained. Fieldwork supervision provided the opportunity for continued training and mentoring to prevent complacency and to reinforce standards.

RESULTS AND DISCUSSION

Household Demographic characteristics: Among 210 respondents across seven districts of eastern Uganda, 63% were male and 37% female (Table 2). The majority (90%) of the respondents are married while the rest (10%) have female household heads. Understanding the level of education in a community is important to design the appropriate content and structure of the program for participatory radio campaign. Moreover, it will also aid extension service providers to identify the best ways to engage communities and deliver the message effectively. The survey results show that 17% of the respondents have post-secondary level education, 32% secondary level, 44% primary level of education, and the remaining 5% have no formal education. Greater proportions (84%) of the respondents live out of farming while few (15%) earn a living from off farm occupations. Nevertheless, even for those who earn a living off the farm, part of their family is still engaged in farming activities.

Information on respondent's religion was collected for the sole purpose of appropriate radio identification. For example, information distribution using Christian radio might not listen in predominantly Muslim communities. Hence, the study revealed that 89% of the respondents were affiliated to Christianity while the remaining 11% were Muslims.

The household size was grouped as those who have less than five members, five to ten members, and more than ten members. Based on this clustering 19% were households with five or fewer members, 56% of the respondents were having five to ten members at a household level and 25% of the respondents have more than ten members (Table 2).

Table 2. Household demographic characteristics from seven surveyed districts of eastern Uganda.

Household characteristic (n=210)	Count	Percentage
Gender		
Male	132	63
Female	78	37
Marital status		
Single [1]	22	10
Married	188	90
Gender of household head		
Male	186	89
Female	24	11
Level of education of household head		
None	11	5
Primary	93	44
Secondary	69	33
Post secondary	37	18
Main occupation of household head		
Farming	177	84.3
Other occupation2	33	15.7
Religion		
Christian	187	89.1
Muslim	23	10.9
Household size		
<5 members	39	18.7
5-10 members	118	56.5
> 10 members	52	24.9

[1] includes participants who are single, divorced and widowed respondents, 2 include participants who do off farm business as an occupation, formally employed and informally employed.

Number of languages spoken by the respondents: Over eight languages are spoken in the surveyed districts of eastern Uganda namely; Ateso, Luganda, Samia, Japadhola, Lugisu, Lusoga, Kiswahili, and English. Interestingly, most of the respondents speak two or more languages. In Bugiri for example, 70% of the respondents (21 out of 30) speak more than three languages. Similarly, 57% of the respondents in Iganga and Mbale reported speaking three languages. No respondent in Bugiri, Busia, and Mbale reported speaking only one language (Table 3).

Averaged across the seven surveyed districts, few (8%) respondents speak only one language. 22% (46 out of 210) of the respondents speak two languages, whereas 34% (71 out of 210) are conversant to communicate with three languages. 37% of the respondents speak more than four languages (Table 3). A number of the languages spoken can be significantly associated with districts ($p<0.05$) which will also influence the selection of radio station and broadcasting language. Farmers' ability to speak multiple languages may play a positive role in radio station identification and options of broadcasting languages. On the contrary, not having a single language understood by all the targeted communities will make the campaign costly involving several radio stations.

Table 3. Number of languages spoken by the respondents across seven districts of eastern Uganda, 2015.

	Number of languages spoken			
District	One	Two	Three	>=Four
Bugiri	0 (0.0)	1 (3.3)	8 (26.7)	21 (70.0)
Bukedea	4 (13.3)	10 (33.3)	9 (30.0)	7 (23.3)
Busia	0 (0.0)	5 (16.7)	4 (13.3)	21 (70.0)
Iganga	1 (3.3)	7 (23.3)	17 (56.7)	5 (16.7)
Mbale	0 (0.0)	4 (13.3)	17 (56.7)	9 (30.0)
Palisa	7 (23.3)	11 (36.7)	7 (23.3)	5 (16.7)
Tororo	4 (13.3)	8(26.7)	9 (30.0)	9 (30.0)
Total	16 (8%)	46(22%)	71(34%)	77(37%)

Chi square=72.68 p=0.000

Radio and mobile phone ownership or access: Radio ownership across the seven surveyed districts varied from 100% in Iganga to 63% in Bukedea (Table 4). Averaged over seven districts, 82% respondents claimed to own radio sets. Those who reported not owning radio were asked if they have access to radio information and the remaining 17% respondents said they have access. This implies that 208 out of the total 210 respondents have access to radio information (Table 4). This makes radio the most suitable media of communication to promote improved agricultural technologies that will support the extension service considerably.

Mobile phone ownership and access also showed an encouraging result. It appears that the mobile phone technology penetrated very well in the rural community within a very short time since its introduction. Evidently, 93% of the farmers in Bugiri and Pallisa own mobile phones, while mobile phone ownership in the remaining districts ranged from 83% to 90%. Averaged over seven districts of eastern Uganda, about 87% of the respondents own a mobile phone. Furthermore, 96.2% of those who don't own a mobile phone have access to one (Table 4). Radio and mobile phone ownership in Bugiri and Mbale are similar at 93% and 88% respectively (Table 4). Respondents from Bukedea, Pallisa, and Tororo have more mobile phones than radio sets. On average 82% of the respondents (173) have radio while 87% (183) have mobile phones indicating mobile phone ownership is taking a lead compared to radio. This will complement the radio campaign considerably because short messages (SMS) about programs, shows and tune in times can be sent. Phone owners could also send questions or comments as well as listen to voice over programs and other automated responses. It will also make radio an interactive media as live call-in can be entertained from any location.

The data was disaggregated by gender. Out of 131 male respondents, 116 (88%) of them claimed to own radio while the remaining 15 (11%) said that they have access to one. Radio ownership by female respondents was slightly lower where, out of 77 respondents, 57 (73%) said that they own radio set while the rest claimed to have access to radio information (Table 4). Evidently, 99% of the male and 100% of the female respondents

have access to radio information irrespective of ownership. This is very encouraging because women who fail to participate in training due to family commitments could tune into the radio. This will save farmers a lot of time as the radio message is delivered at a convenient time. The majority (93%) of the male and 77% (57 out of 77) of female respondents claimed to own mobile phone (Table 4). Furthermore, all of the respondents who do not own a mobile phone said they have access to one. Similar to the scenario of radio ownership and access to radio information, 98% male and 94% female respondents also reported to have mobile phone access. Hence both male and female respondents have access to mobile phone. This shows that mobile phones have penetrated well and can be used as mass communication media particularly for short messages, alerts, e.t.c.

Mobile phone usage by smallholder farmers of eastern Uganda: Apart from determining ownership or access to mobile phones, understanding how they are used will give more information on how relevant it is to promote new or improved agricultural technologies. Averaged over seven districts, 83% of the respondents (174 out of 210) said that they do receive text messages, whereas, only 53% of the respondents indicated that they also send text messages (Table 5). With regard to sending messages, the highest number of users was recorded from Pallisa (93%) and the lowest from Busia districts (27%). The data was disaggregated by gender to evaluate how women and men experience sending or receiving text messages. Results showed that 87% of the male respondents receive text messages and 62% said they do send text messages (Table 5). On a similar note 73% of the female respondents receive a text message and 39% of them do send text messages.

Experience of farmers receiving agricultural, market and weather information through radio: Respondents seem to have good experience receiving agricultural, weather and market information. Evidently, 91, 80 and 77 percent of the respondents acknowledged receiving agricultural, weather, and market information respectively (Table 6).

The variation could be related to the program content of individual radio stations tuned by the community. This is probably why respondents in Pallisa reported having greater information access in all the three areas including agriculture, market, and weather information compared to respondents from other districts. Averaged over seven districts about 15% more male respondents claimed to have received agricultural, weather and market information compared to the female respondents (Table 6).

Table 5. Mobile phone text messaging experience by farmers in eastern Uganda, 2015.

District	Receive text messages			Send text messages		
	Female	Male	Total	Female	Male	Total
Bugiri	5 (100.0)	21 (84.0)	26 (86.7)	2 (40.0)	13 (52.0)	15 (50.0)
Bukedea	8 (72.7)	17 (89.5)	25 (83.3)	4 (36.4)	12 (63.2)	16 (53.3)
Busia	11 (64.7)	13 (100.0)	24 (80.0)	2 (11.8)	6 (46.2)	8 (26.7)
Iganga	5 (71.4)	20 (87.0)	25 (83.3)	3 (42.9)	12 (52.2)	15 (50.0)
Mbale	14 (77.8)	11 (91.7)	25 (83.3)	7 (38.9)	4 (33.3)	11 (36.7)
Pallisa	5 (71.4)	20 (87.0)	25 (83.3)	5 (71.4)	23 (100.0)	28 (93.3)
Tororo	9 (69.2)	15 (88.2)	24 (80.0)	7 (53.8)	11 (68.8)	18 (62.1)
Total	57 (73.1)	117 (88.6)	174 (82.9)	30 (38.5)	81 (61.8)	111 (53.1)

Note: missing cases excluded from analysis, counts are whole numbers, and percentages are in parenthesis

Table 6. Access to agricultural, markets, and weather information through radio by smallholder farmers in eastern Uganda, 2015.

District	Information received via radio								
	Agricultural			Market			Weather		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
Bugiri	5(100)	24(96)	29(97)	5(100)	21(84)	26(87)	5(100)	25(100)	30(100)
Bukedea	14(64)	17(90)	24(80)	4(36)	10(53)	14(47)	6(60)	12(63)	18(62)
Busia	14(82)	12(92)	26(87)	9(53)	12(92)	21(70)	14(82)	11(85)	25(83)
Iganga	7(100)	23(100)	30(100)	6(86)	20(58)	26(87)	5(71)	22(96)	27(90)

Mbale	16(89)	12(100)	28(93)	10(56)	7(58)	17(57)	11(61)	8(67)	19(63)
Pallisa	7(100)	23(100)	30(100)	7(100)	23(100)	30(100)	7(100)	23(100)	30(100)
Tororo	9(69)	15(88)	24(80)	7(54)	9(53)	16(53)	7(54)	11(65)	18(60)
Total	65(83)	126(96)	191(91)	48(62)	102(77)	150(71)	55(71)	112(85)	167(80)

Note: missing cases excluded from analysis, counts are whole numbers, and percentages are in parenthesis

Responses regarding benefits of agriculture, market and weather information via radio were averaged across the surveyed districts and categorized according to the benefits in the above-stated sectors. It seems radio worked well with regard to agricultural information dissemination. This is reflected in the fact that 36% of the respondents said that the program helped them a lot and another 31% said it helped them giving a combined result of over 65% of the respondents reporting benefiting from the agricultural programs as illustrated in Figure 1.

With regard to market information, about 50% said it helped while 29% seems not benefitting from market information and none said it helped a lot. This could also be related to the number of radio stations providing the information that benefits the surveyed audience. Some stations are providing countrywide information which might not necessarily be usable in the local market. Moreover, this could also be associated with the radio programs not featuring market information.

Regarding weather information, 47% of the respondents said it helped a lot and yes it helped, while 31% of the respondents said it helped somehow (Figure 1). Although there was variation in the level of benefits gained from the program, 78% have indicated that the programs were helpful. The variation in responses could be associated with the reliability and consistency of the information they are receiving.

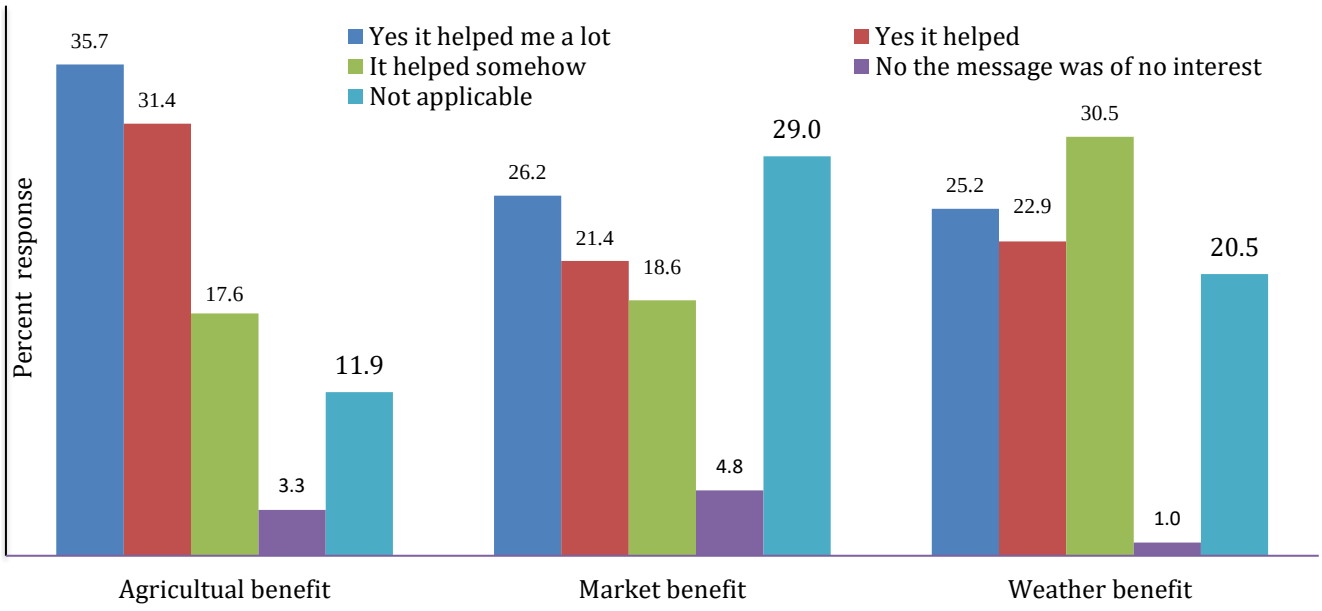

Figure 1. Level of benefit of receiving agricultural, market and weather information through the radio.

Experience of farmers receiving agricultural, market and weather information through mobile phones: Findings revealed that limited use of mobile phones to communicate market information, weather or agricultural information across the surveyed districts. Overall, 17% of the respondents experienced receiving agricultural information, 8% received market information and 9% weather information (Table 7). However, differences were noted between districts in terms of receiving information. For example, Mbale (27%), Pallisa (20%) and Tororo (23%) respondents received agricultural information while the rest ranged between 16 and 8% percent of the respondents who claimed to receive agricultural information. Moreover, market and weather information was the lowest across the districts (Table 7). This implies the little use of widely available communication media for a service that

is critical to improving livelihoods of the smallholder farmers.

With regard to rendering benefits in relation to agricultural, market and weather information via mobile phones, the response was contrary to that of the radio. Although there are valid reasons for this, the use of mobile phones by information service providers and radio stations are not yet synchronized to take advantage of the widely available communication tool.

Data of mobile phone use averaged over seven districts and disaggregated by gender showed that the women had less access to agriculture, market or weather information (Table 7). The level of benefits of receiving agriculture, market and weather information via mobile phone was negligible compared to that of radio. A greater majority of the respondents 83% to 86% said the information received was not applicable to their condition (Figure 2).

Table 7. Access to agricultural, markets and weather information through mobile phones in seven districts of eastern Uganda, 2015.

District	Information received via mobile phone								
	Agricultural			Market			Weather		
	Female	Male	Total	Female	Male	Total	Female	Male	Total
Bugiri	0(0.0)	3(12.0)	3 (10.0)	0(0.0)	2(8.0)	2(6.7)	0(0.0)	2(8.0)	2(6.7)
Bukedea	0(0.0)	4(21.1)	4(13.3)	0(0.0)	1(5.3)	1(3.3)	0(0.0)	1(5.3)	1(3.3)
Busia	0(0.0)	2(15.4)	2(6.7)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(7.7)	1(3.3)
Iganga	1(14.3)	4(17.4)	5(16.7)	1(14.3)	4(17.4)	5(16.7)	0(0.0)	0(0.0)	0(0.0)
Mbale	3(16.7)	5(41.7)	8(26.7)	0(0.0)	2(16.7)	2(6.7)	1(5.6)	2(16.7)	3(10.0)
Pallisa	1(14.3)	5(21.7)	6(20.0)	1(14.3)	2(8.7)	3(10.0)	0(0.0)	5(21.7)	5(16.7)
Tororo	4(30.8)	3(17.6)	7(23.3)	3(23.1)	1(5.9)	4(13.3)	2(15.4)	4(23.5)	6(20.0)
Total	9(11.5)	26(19.7)	35(16.7)	5(6.4)	12(9.1)	17(8.1)	3(3.8)	15(11.4)	18(8.6)

Note: missing cases excluded from analysis, counts are whole numbers, and percentages are in parenthesis

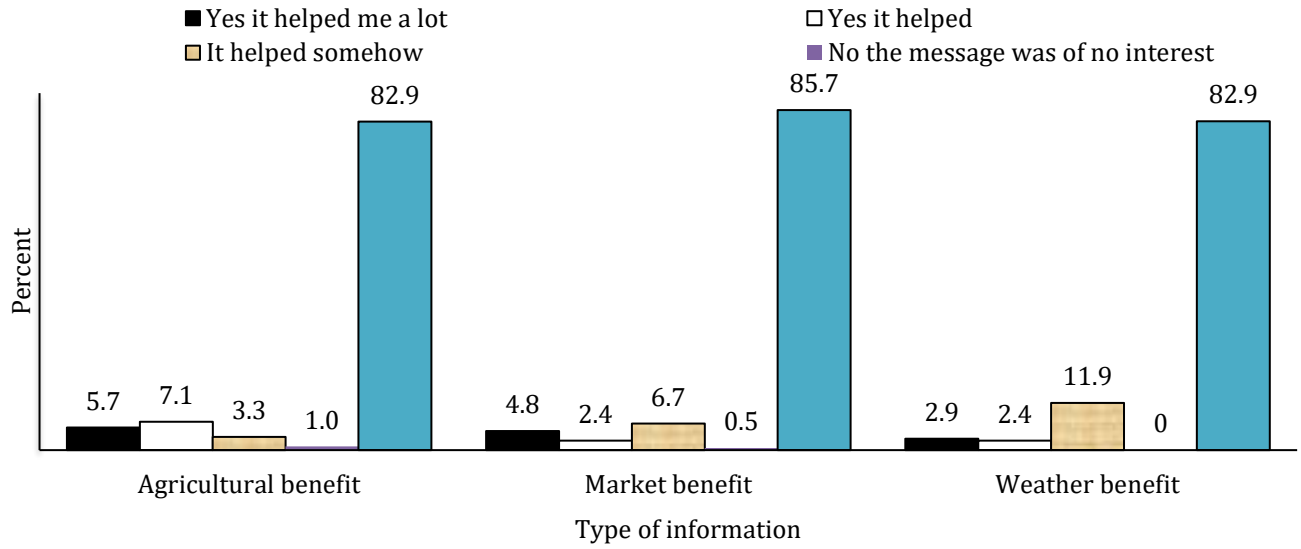

Figure 2. Level of benefit of receiving agricultural, market and weather information through mobile phones.

CONCLUSION AND RECOMMENDATION

The survey clearly showed radio and mobile phones are abundant within eastern Uganda. Moreover, even those who do not own radio and mobile phones have access to these gadgets. Farmers are receiving agriculture, market and weather information through radio. However, the efficiency and applicability of this programs to their needs require further investigation. Striga and stem borers being some landscape level problems, they can only be tackled with the concerted efforts of the farming communities at the same scale. In a situation where the extension service delivery is limited by manpower, radio, and mobile phones can significantly strengthen the service sector. Village or community level integration

Table 4. Radio and mobile phone ownership and or access by smallholder farmers of eastern Uganda, 2015.

District	Own radio			Have access to radio			Own a mobile phone			Have access to a mobile phone		
	Female	Male	Total	Female	Male	Total	Female	Male	Total	Female	Male	Total
Bugiri	5(100)	23(92)	28(93)	0(0)	2(8)	2(7)	5(100)	23(92)	28(93)	0(0)	1(4)	1(3)
Bukedea	5(46)	14(74)	19(63)	6(55)	4(21)	10(33)	8(73)	17(90)	25(83)	3(27)	1(5)	4(13)
Busia	11(65)	11(85)	22(73)	6(35)	2(15)	8(27)	11(65)	13(100)	24(80)	2(12)	0(0)	2(7)
Iganga	7(100)	23(100)	30(100)	0(0)	0(0)	0(0)	5(71)	22(96)	27(90)	21(29)	0(0)	2(7)
Mbale	15(83)	11(92)	26(87)	3(17)	1(8)	4(13)	15(83)	11(92)	26(87)	2(11)	1(8)	3(10)
Pallisa	7(100)	20(87)	27(90)	0(0)	3(13)	3(10)	6(86)	22(96)	28(93)	1(14)	1(4)	2(7)
Tororo	7(54)	14(82)	21(70)	5(39)	3(18)	8(27)	10(77)	15(88)	25(83)	3(23)	2(12)	5(17)
Total	57 (73)	116(87.9)	173(82)	20(26)	15(11)	35(17)	60(77)	123(93)	183(87)	13(17)	6(5)	19(9)

**Numbers in parentheses are percentage*

of push-pull and other relevant technologies can easily be materialized if most farmers are reached. Using mobile phones radio can easily be a multiple way communication media for participatory radio campaign where voices of farmers from the field, subject matter specialists, etc. can feature simultaneously.

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