



ENHANCING FARMER TO FARMER INFORMATION EXCHANGE THROUGH THE USE OF MOBILE PHONES IN NIGERIA

¹A. Abdullahi, ²C.J Garforth and ³P.T. Dorward.

^{1,2,3} School of Agriculture, Policy and Development, University of Reading, RG6 6AR, United Kingdom.
Email: A.Abdullahi@pgr.reading.ac.uk; falkawo@hotmail.com

Abstract

Information and knowledge are the major socio-economic transformation drivers and presently the most important factors of development in the world. Agricultural information is important in promoting agricultural production of farmers. The information is obtained from various sources, depending on the type and use to which the information is considered for. Despite an overwhelming increased in the number, access and use of various Information and Communication Technologies (ICTs), especially mobile phones in Nigeria, it was argued that farmer to farmer exchange and sources of agricultural and related information has not been researched recently. This paper examines whether, or not farmer to farmer information exchange is enhanced through various uses of mobile phones and other ICTs. A focus group discussion was used to collect data from fifteen farmers in Kurje village (Agricultural Development Project (ADP) Zone II) of Kano State (Nigeria) for the effectiveness of the various information sources considered relevant to information exchange. A survey was also conducted in each of the three ADP zones (I, II and III) with thirty participants. Thus a total of ninety participants were involved in the survey for the access and use of information in the area. Binary logit regression analysis was used to analyse the effect of demographic characteristics influencing access and use of information in the three ADP zones. The result of the FGDs shows that information obtained through extension agents has positively changed when mobile phones were introduced. Virtually all the farmers agreed that fellow farmers, lead farmers and media were the sources through which these information types (strategic, operational, technical, policy and marketing) were obtained. The result of the survey indicates that 82% of the respondents had access to various information in the community and 64% use the information obtained in one form or another. With more than 70% of them being farmers, it was found that 95% had access to agricultural related information and shared such information with other farmers. It was found that gender, educational status and farming experience were significantly related to access and use of information in the study area. Therefore, these factors need to be considered in promoting access and use of information among individuals. For enhancing information exchange among farmers in the area, use of the following information sources i.e. fellow farmers, lead farmers and media should be prioritised for the following information types: strategic, operational, technical, policy and marketing.

Key words: enhancing, farmer, information exchange, mobile phones,

INTRODUCTION

Information and knowledge are the major socio-economic transformation drivers and presently the most important factors of development in the world. Agricultural information is important in promoting agricultural production of farmers. The information is obtained from various sources, depending on the type and use to which the information is considered for. Agricultural information is normally generated from different sources and disseminated to farmers through different channels.

[3] argue that about 75% of the rural people in Africa earn their livelihoods through agriculture, and they still face food insecurity and poverty. Low incomes result from low agricultural productivity. Poverty in the rural areas of Africa can be reduced by transforming the agricultural sector, through sustainable land improvement, labour productivity and remunerative market structures. Inadequate technology and lack of market and other useful agricultural information are major reasons given for the low agricultural productivity in Africa.



[16] described the widespread of mobile phones across developing countries, now available to the most poor and remote individuals. More sophisticated services and applications are recently complimenting calls and SMS from financial products to government services. Accessibility of mobile phones is widely broadened recently across the world, from the use of basic devices to increasingly sophisticated smartphones and tablets. This was achieved according to [16] through regulatory reforms, technological advances and business model innovation.

However, [16] emphasised that diverse ways in which connectivity in mobile phones is being used are not well understood. According to them broad generalisations of mobile technology in relation to global character tend to overlook disparities of mobile applications in meaning and significance in the developing world.

Knowledge transfer through various public and private information systems is provided in developing countries with widespread ICT. The spread of mobile phones as one of these technologies is very wide in Latin America, Asia and Africa. [1] observed that in 2009 more than half of the populations of these countries have access to mobile phones, 77%, 67% and 60% respectively. Thus, investments in this network coverage had overshadowed that of other related infrastructures, such as roads, landlines and electricity. Increase in mobile phone coverage is associated with increase in the rate of their adoption, irrespective of the level of poverty of a country.

The use of ICT in Nigeria for the provision of appropriate information to rural farmers in large part depends on the socio-economic background of each component within agricultural sectors. The forms of ICTs use by researchers and extensionists

may be different from that use by farmers. However, some ICTs are used by all the actors within agricultural sector.

[14] considers the applications of ICT in Nigeria vital for a revolutionary role in diversification of scientific and indigenous technology. He suggests that ICT can bridge the detrimental agricultural gap created by geographical and cultural barriers. Thus, information is shared among farmers most effectively in post-harvest technology, databases, market prices and other related information for immediate and future use; this is achieved by internet, email and World Wide Web to facilitate communication.

Farmers' dependency on extension agents as the major sources of information has been the greatest challenge to agricultural production in developing countries. It was argued that some of the sources of information to farmers are unclear. However, with overwhelming increase in access and use of various ICTs, especially mobile phones in Nigeria, would the communication landscape in respect to the ways farmers' exchange information among themselves changed? If not, why not.

The main objective of this paper is to explore the use of mobile phones and other ICTs in enhancing farmer to farmer information exchange. Other objectives are to;

- Determine the use of various information channels in enhancing generation and dissemination of information among farmers.
- Analyse the effect of socio-economic status of farmers, e.g. education, farming experience, household size, age, gender, on access and use of information.

LITERATURE REVIEW

According to [3] 'ICTs generally refer to an expanding assembly of technologies that are used to handle information and aid communication' (p.1). In a related development, [7] considers ICT as those technologies that can be used to interlink information technology devices, such as personal computers with communication technologies, such as telephones and their communications.

The increase in access and use of mobile telephony and its related applications are the most striking evidence in the development of ICT in Africa, with an estimated penetration rate to reach 41% at the year ending 2010, 200% more than in 2005. This was higher than the penetration rates of related telecom services (internet users, fixed telephones, fixed broadband subscriptions) which saw an increase of less than 10%. It was further observed in the year, 2007 there were differences in the



penetration rates of key telecom services among Sub-Sahara Africa (SSA). Mauritius, Botswana, South Africa, Gabon and Seychelles had the highest mobile phone subscription in the same year with a rate of penetration ranging from 74% to 89% per 100 inhabitants. About 62% of the SSA countries in 2007 had between 10 - 50 per cent rate of penetration per 100 inhabitants. In contrast, there were low penetrations of fixed telephone (3 countries) and internet (5 countries) in 2007 in the range of 10 - 40 per cent per 100 inhabitants. Moreover 67% and 49% of those countries for internet and fixed telephone had less than 2 per 100 inhabitants' penetration rates respectively. Increasing mobile phone subscription may be attributed to the low rate of fixed telephone penetration [3]. However, [9] emphasises that despite the tremendous increase in the growth of the mobile phone market in Africa in the past decade, individual access and use was low compared to other regions like Asia and the Pacific, the Arab States, the Americas and Europe.

In their findings on the increase in access and use of mobile phones in Nigeria, [15] observed that the majority of Nigerians are now using mobile services since the liberation of telecommunication in the year 2000; subscriptions rose from 422,000 in 2001 to 73 million, with the rate of penetration accounting for 49% of the country's population in 2009. The teledensity is now over 50%. [15] further projected the subscription of mobile phones in the country by the year 2014 would be more than 129 million. The revenue generated through mobile phone operations in Nigeria has considerably increased, from \$135m in 2001 to \$7.0bn in 2008. Mobile phones are the rapidly spreading communication tools that cover large areas across various agricultural components of farmers, research and extension.

However, [3] argue that the use of ICTs especially mobile telephony, innovative community radio and TV programmes, mobile phone combined with radio, rural telecentres and farmers call centres are the most promising means of enhancing agricultural information exchange, not only between extension agents and farmers, but among farmers themselves. With the increasing availability of ICTs for empowering the farming communities and provision of timely and reliable information from various sources, low number of extension agents and intensity of extension contact may no longer be a case of concern in agricultural supporting services. The low literacy level of farming communities is no longer a reason for

denying them extension services. A large number of listeners in Africa receive messages through mobile telephone combined with radio. In Asia and Africa knowledge management web portals are used for information related to production and marketing. The same technology has been effective in some African countries with information related to weather forecasts, transport, market prices, storage facilities, crop and livestock diseases and agricultural related advice [5].

However, despite the increase rate of penetration of modern ICTs, [6] argue that conventional/traditional ICTs, like radio and television are still popular. They found that in 17 SSA countries, 57% to 89% of the households sampled owned a radio. The percentage of the households in 2007 that owned a radio was highest in countries like Mozambique and Zambia, while countries like Ethiopia, Nigeria and Senegal were the lowest. The study further revealed that in 8 of the 17 countries sampled, the percentage of those who owned a radio was lower than the percentage of those who listened to radio. This could be an indication of ICTs multiplying effect in extending information to many farmers, thus enhancing agricultural extension services.

Radio is still the ICT of choice for innovation in Africa, because it is more readily available than any other conventional or modern form of ICT. Various innovative agricultural practices have been successful in some countries of West Africa through the use of combination of radio and other extension teaching methods. When evaluating the effectiveness of alternative extension methods for disseminating information to farmers in Burkina Faso and Niger, [12] examined the use of a combination of radio and core extension programmes (demonstrations) for extending Purdue Improved Cowpea Storage (PICS) technology. In the first phase of the research, the effects of the core extension programmes on the technology (PICS) transfer were evaluated. While in the second phase, the effectiveness of radio messages, in addition to village demonstrations were examined. The data was collected from 1000 farmers in 211 villages from the two countries and was categorised into two; villages that received demonstration only (as core extension programme) and villages that received demonstration and radio announcements. In Burkina Faso, 48% of the villages received core extension programmes in addition to radio announcements. In Niger, 36% of the villages received core extension programmes and radio announcements. The research also



realised that rural communities' access to television was very low, mainly due to an inadequate supply of electricity. Instead, radio messages were used during various events of sensitisation, demonstration, follow-up and open the bag¹ programmes. The result of binary logit regression indicates that the use of radio messages in addition to demonstration has positively affected the transfer of PICS technology to farmers in Burkina Faso and Niger.

Furthermore, the benefits of radio as conventional ICT in Nigeria for dissemination of agricultural information to farmers have been increased due to emergence of many private radio stations. Although these radio stations are profit-oriented, and thus, favour programmes that are mostly sponsored by private organisations, they provide range of programmes to the listeners from agricultural to rural development related programmes. Public radio stations are inclined to air programmes that satisfy the political agenda of the government, rather than farmers. Kano State government established a new radio station in 2011 called 'Radio Manoma' meant for broadcasting agricultural programmes, through which farmers are involved in many telephone programmes.

Still on the dramatic increase in access and use of mobile phones in the World in general and in Sub-Saharan Africa in particular, [8] investigated that out of the then 4 billion mobile phone subscribers in the world, there were 460 million in Latin America, 791 million in Asia and 374 million in Africa. Moreover, [16] report on mobile usage at the base of pyramid argue that by the year ending, 2012 mobile connections in the world were more than 6.8 billion, with 3.2 billion subscribers. The report emphasised that out of the 6.8 billion connections, Africa alone has over 650 million connections. [16] found that speed, capacities and devices of mobile networks have been upgraded generally to augment calls and SMS by more advanced services.

[1] observed that apart from tremendous increase in coverage and adoption, use of mobile phones in Sub-Saharan Africa (SSA) had increased considerably. [1] added that in SSA there were only 16 million subscribers in 2000, while in 2008 the

number of subscribers had reached up to 376 million, which accounts for one-third of the whole population. [2] emphasise that in developing countries, number of mobile phones per 100 people had significantly superseded some other ICTs like landline, newspapers and radio in accessibility. According to them in developing countries, the rapid growth of mobile phones provide some advantages over other ICTs in relation to coverage, non-difficulty in use and low cost.

Although over 55% households in SSA listen to radio on weekly basis, the information provided by radio is generally limited in range. On the other hand, newspapers are beyond the reach of resource poor and illiterate individuals, in addition to mostly being found in urban areas. [2] also found that in SSA, less than 19% individuals read a newspaper once in a week. In related findings, [9] examined that in 2008 there was limited landlines coverage in SSA, with estimated landlines subscription of less than one per 1,000 people, which in turn affects access to some search mechanisms like email, internet and fax machines.

METHODOLOGY

Description of the study area

Nigeria is one of the West African countries, lying between latitude 4⁰ N to 14⁰N and longitude 2⁰ and 14⁰ E. It is bordered by Niger republic and Chad to the North, the Atlantic Ocean to the South, Benin Republic to the West and Cameroun Republic to the East. River Niger is the most prominent river and source of the country's name. Nigeria covers an area of 923,769 km² [4].

With a population of 131, 859,731 [13] Nigeria is considered the most populous African country. According to 2006 estimates, the average annual growth rate was 2.4%. In the world context, Nigeria is ranked the eighth most populous country in the world. The population growth rate of Nigeria according to UNDP declined from 2.8% in the period (1975 – 2005) to 2.2% in (2005 – 2015). The UN projected that by 2025 the population of Nigeria would be 210 million and 289 million in 2050, where it is predicted to be the sixth most populous country in the world.

This study was conducted in Kano State – Nigeria, West Africa, located in the North Western part of Nigeria on latitude 11⁰ to 34⁰N and longitude 8⁰ to

¹ Open the bag – Is the key event in PICS technology transfer, through which the bags filled with cowpea during demonstration are open in the presence of other farmers to find the same condition of cowpeas as filled earlier (4-6months).



34° E, and 472.45 meters above sea level. It has a total land of 20,760 square kilometers and is predominantly inhabited by Hausa and Fulani ethnic groups. Kano is the second largest industrial and commercial center in Nigeria after Lagos. According to [13] it had a population of 9,383,682, with 4,844,128 males and 4,539,554 females. The ecology is typically that of Sudan Savannah vegetation, with average annual rainfall of 700mm, while the amount and frequency in distribution vary across the state. There is significant variation in temperatures in the state, with minimum of as low as 15°c and maximum of 35°c, in March/April and December/January respectively [11].

The focus group discussion was conducted in Kurje village of Makoda Local Government Area of Kano State (Zone II of the State ADP). The village was purposively selected based on its central location, as it is bordered by all major towns of the Zone. Thus farmers have opportunities to exchange information with other farmers in all the major towns.

Participants' selection

Fifteen participants from different backgrounds were randomly selected for focus group discussions in Kurje village. The discussions were conducted in the village square for the use of various information channels to enhance generation and dissemination of information among individuals.

Method of data analysis

Logit regression analysis was used to evaluate the extent to which demographic characteristics of the respondents influence their access and use of information in the area. It analyses qualitative data (data with 1 or 0) conveniently and designed to analyze data reflecting a choice between 2 alternatives. The dependent variable in a logit model Y_t , will always take a value of 0 or 1. Y_t is assigned the value of one when the event in the equation for example access and use of information occurs. It therefore provides a model for the probability of observing $Y_t = 1$.

Model specification

The logit model is based on cumulative logistic function represented by;

Thirty participants each were systematically selected from the three ADP zones (I, II and III). Thus a total of ninety participants were involved in the self and trained researcher completion questionnaire for the access and use of information in the research area.

Procedures and tools for data collection

Focus group discussion was used to collect data from fifteen randomly selected farmers. Issues that were discussed include among others, the sources of agricultural information, reliability of the sources, types of information obtained from the sources, various communication channels used and effectiveness of these channels.

Questionnaire for the effects of socio-economic status of respondents on access and use of information was designed as an instrument for collecting data from ninety systematically selected farmers. The farmers were from different socio-economic status and were selected from the three ADP zones of the state. The questions asked were related to the types of information they had accessed to, effectiveness for the use of media in accessing information, whether or not the information is shared with other individuals and the problems associated with access and use of information in their community.

$$P(i) = F(z_i) = 1 / (1 + e^{-z_i}) = e^{z_i} / (e^{z_i} + 1).$$

Where;

P_i = Probability that the i^{th} decision maker selects the 1th alternative.

$$Z_i = X_i \beta$$

X_i = Vector of attributes associated with i^{th} decision.

β = the vector of parameters to be estimated.

e = Natural logarithm base.

Z_i = ranges from 0. The probability of adoption, P_i however, has between 0 and 1.



RESULT AND DISCUSSIONS

Access and Use of Information

Intensity of information use

The farmers in the focus group discussed the frequency with which they received and used information from various sources. They unanimously stated that they mostly received information from fellow farmers and radio on a daily basis. This was mainly due to the nature and time the programmes were aired and togetherness with each other in the community. Such information was considered immediate and spread widely. Information received through phone in programmes on 'Radio manoma', lead farmers and extension agents was mainly on a weekly basis. Farmers emphasized that despite weekly visits by extension agents, information on emergency cases was mostly received through mobile phones. Group leader farmers with more contact with extension agents and other agencies supplied relevant information on a weekly basis. Their contacts were mainly due to contact as they travelled to other major towns.

The views of two discussants in relation to that are:

'Depending on whether somebody is staying here permanently or travelling out for business or other activities. As far as I'm concerned, we that are here always, I mean hardly travel to some places, the exchange of information is mostly on daily basis, but for those travelling frequently the exchange of information is on weekly basis'.

'The role played by lead farmers in relation to information exchange is worthy of consideration. This man (pointing at the lead farmer) for example, last year introduced some improved seeds and encouraged us to use them, but we refused to. Later when we have seen the benefits we contacted him for them. The information we received from him was normally on weekly or fortnightly, after visiting the extension agents or other lead farmers outside, he then informed us. Lead farmers provide useful information to us, but mainly on weekly or monthly basis'.

Sometimes information is exchanged between farmer groups. This is mainly because differences

exist in the type of crops grown. The information can equally be exchanged between group leaders, based on the types of crops they spread among the farmers. The information however depends largely on the distance between farmers or farmer groups. For those that are closer, the information is exchanged on a weekly basis (on market days), but may take a month or more to disseminate to those that are far away.

The farmers listen to and receive reliable information from the 'Radio manoma' every day. There are other radio stations that broadcast agricultural programmes mainly on weekly basis, but this one broadcast more agricultural programmes, available every day.

Opinion leaders are other sources through which they received agricultural information. The nature of the information obtained from them is entirely different. It is information which mainly encouraged farmers to adhere strictly to other formal sources (like state ADPs, research institutes, Governmental and Non-Governmental organisations). According to farmers whatever kind of information comes from these sources needs to be considered and prioritised. Information from opinion leaders is received occasionally, when some innovations or programmes are to be introduced.

Usefulness of the information received

The extent of information use was also discussed in the group. According to the discussants, information provided by extension agents has increasingly been useful among the farmers in the area. Since mobile phones have been readily available in the area, sourcing information, especially from the extension agents, has positively changed. Regardless of their visiting schedules, extension agents provide supporting services which require urgent attention. In line with this, one of the participant farmers stated that:

'To me all these mentioned sources are not as useful as the extension agents. My reason for this is that sometimes we used to find ourselves in a serious situation that we cannot find the solutions in the whole area. By calling extension agents on mobile phones, the problems are easily solved. Depending on the time and the need which arises, we often call them every week. When we go to the city for



some other matters we do go to see them as well'.

However, some participants considered information from fellow and lead farmers more useful. There were differences in opinion on the usefulness of the information from media, as some considered such information very useful, still others regarded it as less so. According to the latter group, sometimes the information was targeted at some farmers or focused on a particular innovation not of interest to other farmers. Although considered useful, information received from community leaders was not as useful as that received from others.

Reliability of information received from the sources

All the information sources presented were considered reliable in relation to farmer to farmer information exchange. Concerning the reliability of the information sources, fellow farmers were ranked highest, followed by extension agents, due to the ability of face-to-face contact when the need arises. This argument was supported by these participants:

'The information received from fellow farmers is always considered reliable. I have to trust somebody before I'll ask him about certain information in relation to agricultural activities'.

While another person explained that:

'The information received from the extension agents is also reliable. If we consider how governmental and non-governmental agencies are constantly using these sources to pass information to farmers and their level of interaction with farmers, you can see that they are very reliable sources'.

Lead farmers and community leaders were considered 3rd and 4th in ranking respectively. Contact with these sources may be difficult especially at the peak of the growing season, but still some farmers found the information from lead farmers highly reliable, as they were mostly receiving such information from the experts. Thus, the information was as if directly from the extension agents or research institutes. Farmers stated that, sometimes information about innovation is received from lead farmers before the

agents. Community leaders are other sources of reliable agricultural information. The reliability was based on the training skills obtained from the state ADPs.

Reliability of the media as an information source was discussed on the basis of the media type. Information is not obtainable through printed materials, television and internet services. The former was attributed to low educational status of the farmers in the area, while the latter was mainly due to complete absence of power supply. Although some considered information from Radio Manoma reliable, others argued that the usability was mostly subject to clarifications from extension agents, as emphasized by this discussant:

'Information from the media (Radio manoma) is direct and widely spread, but we have to contact extension agents for approving it. In fact, as far as I'm concern, information from that source is mostly unreliable and unclear'.

Types of information received from various sources

When issues related to types of information obtained from various sources were raised, it was found that virtually all the farmers agreed that fellow farmers, lead farmers and media were the sources of all the information types (Strategic, operational, technical, policy and marketing). However, they emphasized that operational, technical and marketing information was unobtainable from the community leaders, despite the relative importance of these information types: the farmers attributed this to level of commitments of the community leaders and lack of technical know-how. On the other hand, strategic and marketing related information were unobtainable from the extension agents. The farmers emphasized the extension agents in the area considered such information less important to their extension work when compared with others.

Five most important sources for information type

For further evaluation of the information used in the area, the five most important information sources were ranked in relation to the types of information used. According to the farmers engaged in the focus group discussion, media was



the highest rank source through which farmers in the area accessed and used strategic, policy and marketing information. They explained the use of radio and mobile phones for disseminating such information. However, operational and technical information was obtainable through the extension agents. It was mainly associated with the interest of farmers in seeking such information from the extension agents and the trainings acquired. Lead farmers and community leaders were ranked 3rd and 4th sources for strategic and policy information respectively. Strategic and policy information as described by the farmers was in most cases obtained from the governmental and non-governmental agencies.

From the discussions, it emerged that farmers play a significant role in exchanging marketing, technical and operational information with other farmers. They emphasized the particular interest of the farmers in marketing information, which formed the basis of their future projections of which crops to grow.

Information channels used in the area

When assessing the effectiveness of different information channels in relation to information sources, the results show that all the sources of information apart from media were channelled through personal contact, which according to the farmers was highly effective, and the information was passed on to others in a timely manner. TV, internet and written papers were not utilized as channels of information in the area, mainly due to non-availability of power supply, high cost of internet facilities and low educational status of the people in the area. Mobile phones on the other hand, were considered useful for receiving information when it was needed. All the sources of information apart from community leaders, considered mobile phones as a reliable information channel with the exceptional strength of promoting information exchange among individuals from other areas.

The discussions were highly interactive and expressed the importance of various information sources. Focus group discussion with clear guidance of the main issues is relevant for the provision of better understanding of the benefits in exchanging agricultural related information in the area.

Association of demographic characteristics of farmers on access and use of information

Socio economic status of the participants

The mean age of the 90 survey respondents was 38, with minimum of 17 years and maximum of 70 years. Majority (64%) appeared to be between the ages of 30 and 50. It appeared that the research areas were made up of relatively young farmers. As expected, it was found that 78% of the interviewees were married while 15% were single. People in the area of research mostly engaged in early marriage. Men are normally married at the age of 25, while majority of the women at the age of 18 – 20. The level of formal education was high among the respondents with over 90% having received one form of formal education or the other. When individual educational level was considered, it was found that a reasonable per cent of the respondents (41) had obtained primary education, while 19 and 28 per cents had tertiary and secondary education respectively. This may likely influence their ability to access and use various information appropriately.

The size of the individual farm under cultivation at the time of survey was asked. The mean farm size was 2.7 hectares, with 76% of the respondents having 1 – 3 hectares of land under cultivation. The farms according to them were scattered, which mostly affects intensive cultivation or utilisation of the farms negatively. When asked about their experiences in farming, 56% of them claimed farming experience of 15 and above years, while 12% each had such experiences of 15 and 20 years. The mean years of experience in farming was found to be 17. This shows that most of the farmers started farming at early stage of their lives as emphasised by other farmers interviewed. The household size was obtained by summing up the number of wives, relatives and other dependents living with the respondents at the time of survey. The respondents had an average of 8 household size, with majority (70%) having 1 – 10 persons living with them. The measure of the household size is particularly important as the main source of labour for the farmers in the State is the farmers' immediate dependents. The respondents were asked about other income sources apart from farming and 69% of them had additional income sources. This could be helpful in having additional communication means like mobile phones, television, satellite, computer and possibly internet facilities, which in turn influence their access and use of information.



The result indicates that more than 60% of the respondents were members of self-help group, which according to them worked together with community development department of the Local Government Council. They mainly engaged in community development services like monthly drainage clearings, local savings (Adashi) and more importantly information on agricultural activities. It was also found that 82% of the respondents had access to various information in the community and shared the information with each other and 64% use the information obtained in one form or another. With more than 70% of them being farmers, it was found that 95% had access to agricultural related information, which was followed by political related information (82%). They also claimed to have access to information on health, business, education and sports. According to them access to information mostly depends on the interest of individuals in particular information types.

The survey assesses perceptions of the respondents on level of effectiveness of information sources to access of information. Media was found highly effective information source in access of information in the study area which followed by fellow farmer. The reason may be related to the tremendous increase in access and use of mobile phones, in addition to many radio stations that promote the call-in services. The services provide a baseline for asking questions through mobile phones. Community leaders were considered less effective information sources in access and use of information. This according to farmers was obvious when considered the low level of interaction of these leaders with farmers. However, it is important to note that extension agents were not as effective as fellow farmers in access to information. Farmer to farmer information exchange was seen to be high in the area.

When perceptions of the respondents on the effectiveness of media were assessed in the survey it indicates that radio was more highly effective in

Table 1: Identification of variables used

Variable	Description
Dependant: Access and use of information	Dummy variable equal to one when the respondent has access and use of agricultural information otherwise zero.
Independent: Age	Age was measured by the age in years of each respondent at the time of survey. Age was considered as a continuous variable.
Gender	Gender as demographic status, has qualitative features (Dummy variable) of either 1 or 0. Thus, male had a score of

access to information than mobile phones. This occurred as a result of increasing number of radio stations and ability of the radio stations to cover a wide area of transmission. Areas which are not yet covered by mobile network are reached by radio. Radio according to them is relatively cheap to maintain compared to mobile phones. The high rank of radio in access to information agrees with findings of [6] that despite the increase rate of penetration of modern ICTs, the popularity of traditional/conventional ICTs like radio is still high. As expected, the use of printed materials was not effective means of access to information. This is related to non-availability of printed materials (newspapers, magazines, agricultural bulletins) in the rural areas and majority of them are listening oriented. The low effectiveness of printed materials as means of access to information is consistent with findings of [2] that less than 19% individuals read a newspaper once in a week in SSA. Landlines were less effective media in access of information in this study. This agreed with findings of [10] that mobile phones were 10 times more in number than landlines in SSA.

Regression Analysis

Binary logit regression analysis was used to analyse the effect of demographic characteristics influencing access and use of information in the three ADP zones. It is designed to analyse data reflecting a choice between two alternatives. The dependent variable in a logit model Y_t , will always take a value of 0 or 1. Y_t is assigned the value of one when the event in the equation, in this case access and use of information occurs. The independent variables are the demographic characteristics like age, gender, educational status, farming experiences, non-farm income. Some of them are used as dummy variables while others are continuous variables. The description of the variables is given in the table 1 below



Marital status	<p>1 and female had a score of 0.</p> <p>This was categorised into whether the respondent is single, married, divorced or widowed. In this analysis, it was considered as dummy variable equal to one if the respondent is married and zero otherwise.</p>
Educational status	<p>It was measured by the number of years of formal schooling of the respondents at the time of survey and had the following scores; those who never been to school had a score of 0; those who had vocational education had a score of 1; primary education had a score of 2; those who had secondary education had a score of 3; those with tertiary institutions had a score of 4 Thus the scores range from 0 – 4. In this analysis, educational status was considered as dummy variable of either 1 if the respondent had either secondary or tertiary education at the time of survey otherwise zero.</p>
Non-farm income	<p>This variable has qualitative measures of either 1 or 0. Respondents with additional income after farming had a score of 1, while those without additional income had a score of 0.</p>
Household size	<p>Household size was measured by adding up the number of wives, children, relatives and dependants actually living with respondents in their households at the time of survey. Household size like age and farming experience was measured as continuous variable.</p>
Farming experience	<p>This was measured as the number of years the respondent spent in farming activities as at the time of interview. This variable was measured as continuous.</p>
Farm size	<p>This was measured by size of the respondent’s farm (in hectares) at the time of interview. Farm size was considered as a continuous variable.</p>

Source: Survey Data, 2012.

Results for binary logistic regression analysis for access and use of information

The results of the access and use of information is shown in the table 2 below. As earlier described in the research methodology, the survey considered respondents from all the three ADP zones of the state, selected randomly for unbiased representation.

The result reported that gender was found to be significant to the access and use of information with coefficient value of 0.077 at significant level

of 90%. This indicates that in the area of the study, males have more access and use of information than females. It was earlier shown that a female farmer claimed having no contacts with male extension agents in the area. Although the females in the area owned radio, mobile phones and other related information sources, their traditional roles of housekeeping strongly affect their level of interaction, which in turn affect their access and use of interpersonal information sources.



Moreover, educational status as one of the important variables considered in this analysis was significantly related to the access and use of information in the area with coefficient value of 0.018 at 95% level of significant. This shows that the more educated the respondent is, the more he/she will have access and use of information. Respondents that are educated can easily use various information technologies and also read publications for better understanding of the contents. It is no wonder that the educational status is significantly related to access and use of information as 90% of the respondents had one form of formal education or the other.

The result further shows that farming experience was significantly related to access and use of information (0.054) at 95% significant level. It can therefore be explained as the more years a respondent is in the farming activities, the more he/she have access and use of information. This is possible when considered the average years of farming experience of 17 and that 56% of them had 15 and above years of farming experience. It may also be attributed to the high percentage of farmers in the state 70%, interested mostly in agricultural related information.

Table 2 : Binary logit estimates for association of socio-economic variables on the access and use of information

Variable	Estimates
Age	0.619 ^{NS} (0.041)
Gender	0.077* (0.888)
Married	0.778 ^{NS} (0.772)
Educational status	0.018** (0.903)
Farm size	0.194 ^{NS} (0.182)
Farming experience	0.054** (0.035)
Household size	0.695 ^{NS} (0.056)
Non-farm income	0.788 ^{NS} (0.636)

Source: Survey Data, 2012.

Values in parenthesis are the standard errors.

*Significant at 90% level.

**Significant at 95% level.

Ns = Non-significant.

It was observed that gender, educational status and farming experience were significantly related to access and use of information in the study area. Therefore, these factors need to be considered in enhancing access and use of information among individuals.

Conclusion

Farmer to farmer information exchange was discussed and it was found that fellow farmers and

radio provided information daily and were considered to be immediate and reliable. The reliability of information received from opinion leaders was high and prioritised. The key findings on the usefulness and sourcing of information in this paper emphasised that information from extension agents which has positively been changed with use of mobile phones. Farmers agreed that fellow farmers, lead farmers and media were the sources of all the following information



types: strategic, operational, technical, policy and marketing.

This paper assessed the effectiveness of different information channels in relation to information sources. All the sources of information apart from media were channelled through personal contact. Mobile phones were considered useful for receiving timely information on innovation. All the sources of information apart from community leaders, considered mobile phones as a reliable information channel.

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