

# Gender use of information and communication technologies among agricultural extension agents in north central Nigeria

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The paper examined gender use of Information Communication Technologies (ICTs) among Agricultural Extension Agents (AEAs) in the north central zone, Nigeria. The zone comprises Benue, Kogi, Kwara, Nassarawa, Niger, Plateau States and Abuja. A sample size of 467 AEAs was used for the study and a questionnaire was used for data collection. The data were analysed using descriptive statistics and analysis of variance (ANOVA). When the male and female AEAs were compared on their usage of all ICTs, the difference between males and females was marginally significant ( $P = 0.06$ ), with male usage being slightly higher. When the male and female AEAs were compared on the use of each individual ICTs, the result showed that the female AEAs significantly ( $P < 0.05$ ) used GSM phones more than their male counterparts, while the male AEAs used cameras, internet and media vans more than their female counterparts. There was no significant difference ( $P > 0.05$ ) in the usage of agricultural books, radio, TV, videos, cassettes and computers among the male and female AEAs. Of all the ICTs studied, GSM phone was rated as most utilized by both genders, while the least used ICTs varied from one state to another. The magnitude of mean responses showed that some ICTs like internet, computer and media van were rarely used in most of the states. The major challenge faced by the male and female AEAs on the usage of ICTs was the high cost of owning and operating the ICTs facilities. Based on findings, the paper recommends that both genders need capacity building in the use of ICTs.

**Keywords:** ICTs, extension agents, gender

Agricultural extension according to Salau and Saingbe (2008) is an educational service which brings information and new technologies to end-users (farmers) to enable them to improve production among other things. According to Anandajayasekaram et al. (2008), agricultural extension is the delivery of relevant agricultural information and technologies to farmers. Israel et al. (2011) defined an extension programme as a comprehensive set of activities that are intended to bring about a sequence of outcomes among targeted clients. In line with these definitions, Danso-Abbeam et al. (2018) argued that extension should be a primary tool for making agriculture, its related activities as well as other economic activities, more effective and efficient in meeting the needs of the clients. In other words, agricultural extension should empower farmers with the requisite knowledge, attitude and practices for enhancing productivity and welfare (Ackah-Nyamike 2007).

In Nigeria, public agricultural extension staff are the major actors in the process of transferring technologies to the end users – the farmers.

According to Alemu et al. (2016), agricultural extension service providers make innovations or agricultural technologies known to farmers and act as a catalyst to speed up adoption rates. In other words, they serve as gatekeepers between the farmers and technology developers (researchers, universities, non-government organizations, etc). Because of the growing population in Nigeria, it is not easy for technology developers to identify and transfer technologies directly to the farmers that are scattered all over the land mass hence, the importance of the Agricultural Extension Agents (AEAs). As gatekeepers, the AEAs make use of individual, group and mass media teaching methods to reach the farmers. Each of these extension teaching methods can be effectively done using one form or the other of Information and Communication Technologies (ICTs) because there is a digital revolution involving the introduction of user-friendly multipurpose ICTs.

ICTs according to Omotesho et al. (2012), are commonly used to embrace a multitude of media as well as those requiring the use of

personal computers fitted with devices that facilitate communication, processing and transmission of information. Asenso-Okyere and Mekonnen (2013) defined ICTs as an expanding assembly of technologies that are used to handle information and aid communication. Similarly, Talebian et al. (2014) stated that ICTs consist of hardware, software, network and media for collecting, storing, processing, transmitting and presenting information as well as related services. In other words, ICTs are a diverse set of technological resources that can be used to communicate, disseminate, store, retrieve, process and manage information. The application of ICTs in agriculture is often referred to as e-agriculture (FAO 2017). In modern times, ICTs have played significant roles in sustainable development and agricultural transformation. Ajah and Atewamba (2018) stated that ICTs have created opportunities for cooperative dialogue among stakeholders thereby serving as a mirror through which farmers see technologies beyond their reach.

Documented evidence shows that a lot of studies have been carried out on the use of ICTs in agricultural development, including agricultural extension. For example, Singh et al. (2017) studied the role of ICTs in agriculture and its policy implications in India. They reviewed some agricultural projects that involved the use of ICTs and concluded, among other things, that ICTs, if adopted, could revolutionize agriculture in many ways. Islam et al. (2017) assessed the utilization of ICTs in agricultural extension services in Bangladesh. The main objective was to explore the extent of ICTs utilization by the field level extension personnel under the agricultural extension service delivery system. One of their findings indicated that the overall utilization of ICTs by the extension agents in Bangladesh was very low. In the study by Agwu et al. (2008), it was concluded that there was need for Nigeria to have a national agricultural extension policy on the use of ICTs with major

emphasis on access, availability and use. Umar et al. (2015) conducted research on awareness and use of ICTs among extension agents in Kaduna State, Nigeria. They recommended the provision of ICT facilities and stable electric power, as well as capacity building on ICTs usage, this would promote ICTs usage among extension personnel. Others (Ezeh 2013; Barber et al. 2018; Thakur and Chander 2018) have also conducted similar studies. With these examples, there is no doubt that we have enough evidence to show that scholars have tried to explore the importance of ICTs in agricultural development including extension services in different parts of the world. However, despite this abundant research and literature, there is no study addressing gender use of ICTs among AEAs in north central Nigeria. This has created a knowledge gap which needed to be filled by this study.

The study is important because Dafwang (2006) stated that the ineffective agricultural extension service in Nigeria was a major constraint to the performance of the agricultural sector. Daneje et al. (2010) also supported the fact that there is a gap between agricultural performance and available research information in Nigeria. They attributed it to poor agricultural extension services delivery and limited interaction between researchers and extension agents. This problem is not only in Nigeria because the Government of Kenya (2010) attributed low agricultural productivity in Kenya to inadequate research-extension-farmer linkages. This is supported by the report from FAO (2001) which stated that in many developing countries, wide adoption of research results by the majority of farmers remains quite limited. Ironkwe et al. (2011) dealt with the social relationships between men and women and how these relationships are negotiated in the production of goods and services. A report by Huyer and Hafkin (2007) showed that, on average, men in Africa have greater chances than women in benefitting from ICTs. The report further stated that the composite indicator of female participation in

the information society was 0.65, implying that females have 35% fewer opportunities and benefits than their male counterparts with respect to ICTs. This shows that membership of social groups, religious affiliations, cultural norms, work environment, age and other socio-demographic factors can influence gender adoption and use of ICTs. This study examined whether the gender of an extension agent can influence his/her use of ICTs in agricultural extension services. Hence, the questions were: 1) Do male extension agents use each of the ICTs or all of them more than their female counterparts? 2) Are there locational (state) differences in the use of ICTs among the male and female AEAs? 3) Which ICTs are the most or least utilized in the study? 4) What is the major problem limiting the use of ICTs by the extension agents?

The specific objectives of the study were to:

1. Compare gender use of ICTs among the AEAs (Agricultural Extension Agents) in north central Nigeria.
2. Identify if there are locational (states) differences in the use ICTs among the male and female AEAs.
3. Identify the most and least utilized ICTs by the male and female AEAs.
4. Ascertain the challenges facing the male and female AEAs in the use of ICTs in the study area.

### *Hypotheses*

$H_0$ : There is no significant difference in the use of all the ICTs by the male and female Agricultural Extension Agents in the study area ( $\mu_{\text{Male use of all ICTs}} = \mu_{\text{Female use of all ICTs}}$ ).

$H_0$ : There is no significant difference in the male and female Agricultural Extension Agents' use of each of the ICTs ( $\mu_{\text{Male use of GSM phones}} = \mu_{\text{Female use of GSM Phones}} = \mu_{\text{Male use of Radio}} = \mu_{\text{Female use of Radio}} = \mu_{\text{Male use of TV}} = \mu_{\text{Female use of TV}} \dots = \mu_{\text{Male use of Internet}} = \mu_{\text{Female use of Internet}}$ ).

## **Methodology**

The study was conducted in north central Nigeria. The zone comprises of Benue, Kogi, Kwara, Nassarawa, Niger, Plateau States and Abuja but Abuja was not chosen for the study. Simple random sampling technique was used to select a total of 467 (326 males and 141 females) respondents from the states' Agricultural Development Programmes (ADPs). That is, Kwara (72 male and 15 female), Kogi (49 males and 11 females), Niger (53 males and 47 females), Nasarawa (76 males and 24 females), Benue (20 males and 16 females) and Plateau (56 males 28 females). The skewness of the sample in favour of male extension agents is a reflection of male dominance in agricultural extension services in the study area. In the questionnaires used for data collection, the AEAs were asked to rate their level of usage of ICTs (GSM phones, radio, television, videos, camera, internet, computers, agricultural books, cassettes and media van for agricultural extension work in their various states using *very high* (4), *high* (3), *moderate* (2), *low* (1) and *not used at all* (0). The rating scores were used for analysis in line with methods applied by Ajah and Atewamba (2018), Ajah (2016), Ajah and Okorie (2016), Colin and Paul (2011), Field (2005) and Shah and Madden (2004). SPSS 21.0 was used to run the analysis and mean separation was done using Bonferroni model at 5% probability level.

The three-way ANOVA model is mathematically expressed in line with that of Oliver-Rodríguez and Wang (2015) as:

$$Y_{ijkt} = \mu + L_i + G_j + LG_{ij} + e_{ij} + I_k + LI_{ik} + GI_{jk} + LGI_{ijk} + e_{kt(ij)}$$

Where:

$Y_{ijkt}$  = Individual agricultural extension agent's response on his/her usage of each of the ICTs.

- i denotes the level of factor L
- j denotes the level of factor G
- k denotes the level of factor I
- t denotes the number of observations/ participants in the study.

- $\mu$  = population mean
- $L_i$  = differences in gender use of ICTs due to location (Kwara, Kogi, Niger, Nasarawa, Benue, Plateau States). This measures the main effect of location (state) where the extension agent works.
- $G_j$  = gender, this measures the main effect of gender, i.e., differences in the usage of ICTs due to the gender of the extension agent (male, female)
- $I_k$  = ICT-type nested within location and gender - this measures the main effect of ICT-type, i.e., differences in the usage of ICTs arising from the nature of the ICT as a device (GSM phones, radio, television, videos, cameras, internet, computers, agricultural books, cassettes and media vans).
- $LG_{ij}$  = interaction between location and gender
- $LI_{ik}$  = interaction between location and ICTs-type
- $GI_{ik}$  = interaction between ICTs-type and gender
- $LGI_{ijk}$  = interaction of location, ICTs-type and gender
- $e_{ij}$  = error (between subjects)
- $e_{kt(ij)t}$  = error (within subject)

The model hypothesizes that the usage of ICTs among AEAs in the north central Nigeria depends on three factors – gender, location (state) and ICTs-type. Gender has two levels (male and female) while location (state) has six levels (Kwara, Kogi, Niger, Nasarawa, Benue, Plateau States). Both gender and location are called “*between factor variables*”. On the other hand, ICTs-type has ten levels (GSM phones, radio, television, video, camera,

internet, computer, agricultural books, cassette and media van) and it is called “*within factor variable*”. By implication, the model states that the usage of ICTs among the male and female AEAs ( $Y_{ijtk}$ ) depends on location (state) of the extension agent in the north central Nigeria ( $L_i$ ), type of ICTs ( $I_i$ ), the gender of the extension agent ( $G_i$ ), both location and type of ICTs ( $LI_{ij}$ ), both location and gender ( $LG_{it}$ ), both ICTs-type and gender ( $IG_{it}$ ), and the joint effects of location, ICTs-type and gender ( $LIG_{ijt}$ ). The  $\mu$  is the population mean which has no effect on the scores obtained and does not contribute to any variation in the observed differences (Aggarwal 2002). The error term in the model is given by  $e_{ijtk}$ .

## Results and discussion

Table 1 shows the results of the three-way mixed analysis of variance (ANOVA) carried out to assess gender use of ICTs among AEAs in north central Nigeria. The column tagged “*sources of variation*” contains the factors expressed in the ANOVA model. All the results including their interaction effects are significant ( $P < 0.01$ ) except “*gender*” with a  $p$ -value of .06. However, with reference to the objectives of the study, not all the results are interpreted in this study. Emphasis are laid on the interaction effect of gender, location and ICTs-type (*Gender\*Location\*ICTs-type*) and the main effect of gender (*gender*). This is one of the advantages of using a three-way ANOVA in comparative analysis. Hence, for a better understanding of the results, mean separation was carried out and presented in charts (2-7).

Table 1: ANOVA results of the male and female extension agents’ use of ICTs

Sources of variation	DF	SS	MS	F	P-value
ICTs-type	9	2144.76	238.31	224.82	.00
Location*ICT-type	45	723.27	16.07	15.16	.00
Gender*ICT-type	9	24.35	2.71	2.56	.00
Gender*location*ICT-type	45	77.93	1.73	1.63	.00
Error (within subjects)	4095	4355.10	1.06		
Location	5	229.78	45.96	79.24	.00
Gender	1	1.99	1.99	3.43	.06
Gender*location	5	10.41	2.08	3.59	.00
Error (between subjects)	455	265.32	0.58		

*Comparing gender use of all the ICTs among the AEAs*

Table 1 contains the result of the main effect of gender. It shows how the male and female AEAs rated their usage of all the ICTs listed for the study. Hence, the question is: Do male and female AEAs in the north central Nigeria differ in their usage of all the ICTs? The result,  $F(1, 455) = 3.43, P = 0.06$ , indicated that there was a marginally significant difference in the male and female (gender) use of all the ICTs studied. Figure 1 shows that the males (2.69) slightly used all the ICTs more than their female (2.53) counterparts. This is in line with the *a priori* expectation because gender gap in

the performance of agricultural activities is gradually diminishing in Nigeria. On the other hand, the result disagrees with the report of FAO (2018) which indicated that women are marginalised in the digital world especially in rural societies. It is also contrary to the report of Ma et al. (2018) which showed that men far outnumbered women in the use of information technologies. In terms of policy formulation, this result is very useful in assessing the overall utilization of all ICTs by the male and female AEAs in extension services. However, it may be misleading if such policy is applied at the state level hence the need to compare gender use of each ICT in each state in subsequent analysis.

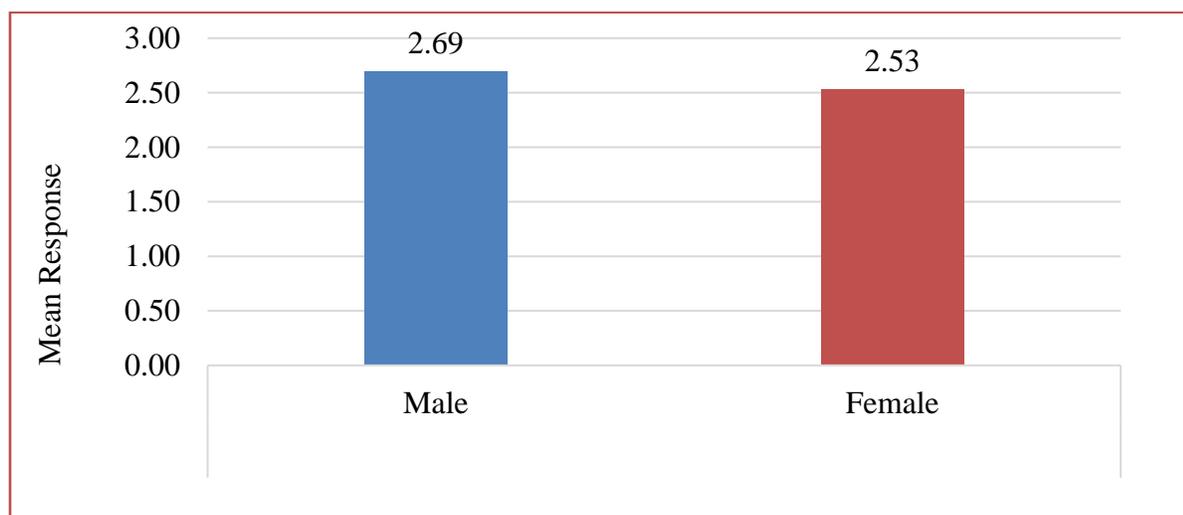


Figure 1: Gender use of all ICTs (irrespective of location and ICT-type) ( $P = 0.06$ )

Response scores: very high (4), high (3), moderate (2), low (1), not used at all (0)

*Comparing gender use of each ICT in each state*

In Table 1, the result of gender use of each ICT in each of the states is represented by the interaction of gender, location and ICTs-type (*Gender\*Location\*ICT-type*). The result,  $F(45, 4095) = 1.63$ ,  $P = .00$ , indicated that there was significant interaction effect hence the rejection of the null hypothesis. Based on the results, mean separation was done for each state and presented in Figures 2 – 7.

*Gender use of GSM phones among the AEAAs*

The results of how the male and female AEAAs rated their use of GSM phones across the states are presented in Figures 2 – 7. The mean responses showed that gender use of GSM phones significantly ( $P < 0.05$ ) differed in favour of the female AEAAs in Nasarawa (Figure 5) and Kwara (Figure 2). On the contrary, there was no significant ( $P > 0.05$ ) difference in gender use of GSM phones in Kogi (Figure 3), Niger (Figure 4), Benue (Figure 6) and Plateau (Figure 7). The fact that the male and female AEAAs did not significantly differ in their use of GSM Phones in majority of the states corroborates the report by Global System for Mobile Communications Association (2015) which indicated that the ownership and use of mobile phones by women have increased globally during the last couple of years. In all the states sampled, the magnitude of the mean responses showed that GSM Phones were the most utilized ICTs. This agrees with the report by Syiem and Raj (2015) which showed that mobile phones are the most highly accessible and used devices by farmers. It also agrees with the finding of Chhachhar et al. (2014) which showed that mobile telephony has emerged as the foremost choice of majority of the urban and rural people. In Ghana, Subervie and Galtier (2017) revealed that farmers who benefited from continuous information on market prices via mobile phone were able to improve their average selling

price of maize and groundnuts by 12.7% and 9.7% respectively. Chhachhar, et al. (2014) revealed that mobile phones are among the most vital tools for communicating knowledge and information to farmers in rural communities.

*Gender use of radio among the AEAAs*

The results of gender use of radio among the male and female AEAAs showed that it was one of the most utilized ICTs in the north central Nigeria. It was rated as the second or third most utilized ICTs in most of the states. Comparing radio to television, Mtega (2018) argued that radio sets are more accessible and owned by more farmers than television sets. The popularity of radio as an important tool is supported by Godson-Ibeji et al. (2020) who stated that 100% of the male and female AEAAs interviewed in Imo state, Nigeria were familiar with and used radio in their extension activities. According to FAO (2018), radio remains one of the most effective means of reaching farmers in the field because the infrastructure already exists. Apart from Plateau State (Figure 7), there were no significant ( $P > 0.05$ ) differences in the usage of radio among the male and female AEAAs in Kwara (Figure 2), Kogi (Figure 3), Niger (Figure 4), Nasarawa (Figure 5) and Benue (Figure 6) States. Both male and female AEAAs listen to radio and also use it to disseminate information to farmers; Fadairo and Oyelami (2019) stated that respondent's sex is not associated with his/her listenership to radio. Among the mass media devices, Uwandu et al. (2018) said that radio plays an important role in creating awareness about new agricultural technologies among farming communities across the world. They stated that this is possible because radio programmes are usually timely and capable of extending messages to target audiences irrespective of location. The authors further stated that radio programmes are capable of bridging gaps that are caused by difficult terrain, distance, topography, time and socio-political exigencies. This also

corroborated the finding of Chhachhar, et al. (2014) which indicated that radio is one of the most important tools for communicating knowledge and information to farmers.

*Gender use of television (TV) among the AEAs*

There was no significant ( $P > 0.05$ ) difference in the usage of television (TV) between the male and female AEAs in all the states studied except Niger. Apart from the fact that there

was no significant difference in gender use of TV in most of the states, the results also indicated that TV did not fall within the top three most used ICTs in study area. In Kwara State (Figure 2), for example, it was rated as the seventh most used ICTs. This is contrary to the finding of Salifu et al. (2016) which indicated that television is one of the most available ICTs used by AEAs. It also does not agree with the finding of Chhachhar et al. (2014) which found that television is one of the most important tools of communicating knowledge and information to farmers.

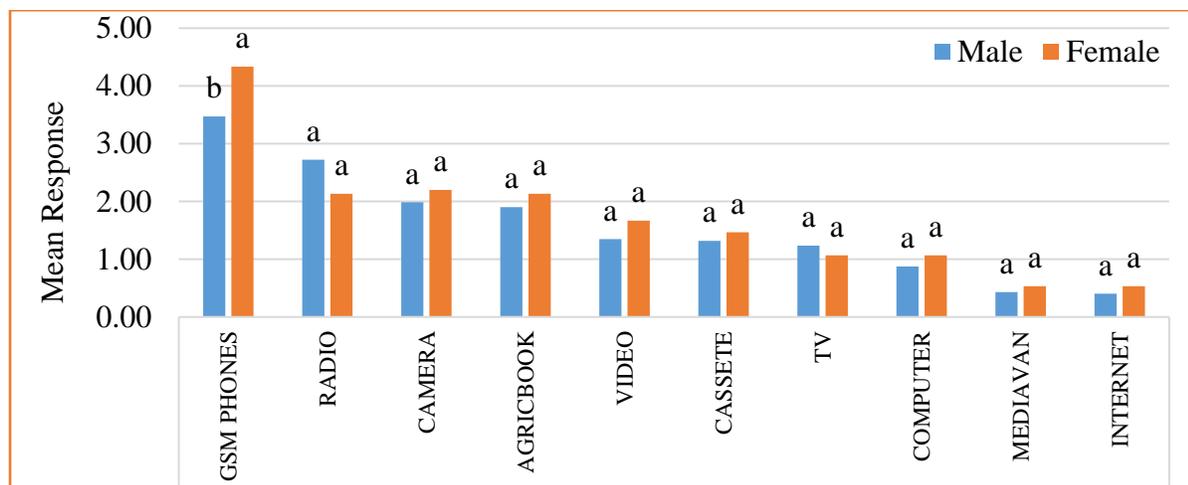


Figure 2: Gender use of each ICTs in Kwara State

Response scores: very high (4), high (3), moderate (2), low (1), not used at all (0)

Note: Mean with same alphabet (for each ICT) did not significantly differ ( $P > 0.05$ )

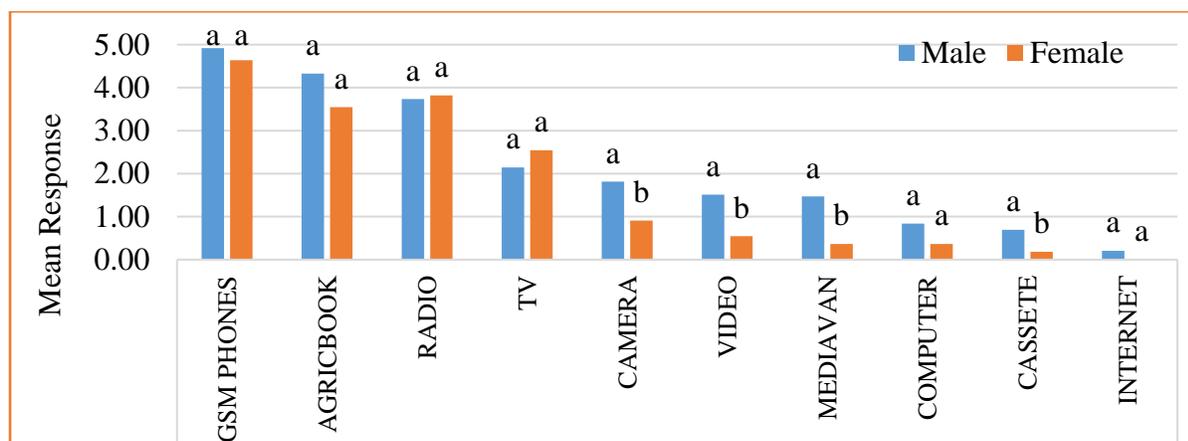


Figure 3: Gender use of each ICTs in Kogi State

Response scores: very high (4), high (3), moderate (2), low (1), not used at all (0)

Note: Mean with same alphabet (for each ICT) did not significantly differ ( $P > 0.05$ )

### *Gender use of agricultural books (print media) among the AEAs*

Agricultural books here refer to those print media that contain information about agriculture. Examples are posters, newspapers, books/booklets, magazines, journals, pamphlets, etc. In the questionnaire, the term “*agricultural books*” was used to separate it from other print media that are not wholly or mainly devoted to agricultural information. There was no significant ( $P > 0.05$ ) difference in the usage of agricultural books among the male and female AEAs in all the states. Apart from Kwara State (Figure 2) where it was rated as fourth most utilized ICT, it falls among the three most utilized ICTs in the study area. This is in line with *a priori* expectation because most AEAs in Nigeria are degree holders in agriculture or related fields. Although, most of the small-scale farmers in Nigeria are illiterate they can understand and interpret the messages of print media through its pictures, or sometimes with the help of their sons, friends or neighbours (Pour 2011). In Pakistan, print media were rated as the third most used ICT, after fellow farmers and television, for dissemination of agricultural information (Farooq et al. 2007); according to that report the most used form of print media for agricultural information was pamphlets followed by posters, newspapers, book/booklets, magazines and journals.

### *Gender use of computers among the AEAs*

Apart from Benue State (Figure 6) where the male AEAs significantly ( $P < 0.05$ ) used computers more than their female counterparts, the result showed that there was no significant ( $P > 0.05$ ) difference in the usage of computers by the male and female AEAs. Interestingly, the magnitude of the mean responses showed that computer is one of the least utilized ICTs among the male and female AEAs in the study area. This is contrary to a

*priori* expectation because computers can be used with other devices to enhance extension work. This finding agrees with an earlier study by Kiplang'at and Ocholla (2005) which indicated that majority of rural extension personnel lacked basic computer skills. On the other hand, the finding is contrary to the report by Godson-Ibeji et al. (2020) which revealed that 100% of the agricultural extension staff in Imo State, Nigeria were familiar with desktop/laptop computers and 83.3% used them in their extension work.

### *Gender use of the internet among the AEAs*

Apart from Benue State (Figure 6), there was no significant ( $P > 0.05$ ) difference in the usage of internet by the male and female AEAs in the states studied. This is contrary to the finding of Hafkin and Odame (2010) which showed that the proportion of men using internet was higher than the proportion of women in two-thirds of countries worldwide. In Benue (Figure 6), the male AEAs significantly ( $P < 0.05$ ) used internet more than their female counterparts. This tallied with the report by Johnson (2009) who observed that the major users of ICTs especially computers, internet, and e-mail were young males while women were marginal users. It is important to highlight here that among the ICTs, internet is one of the least utilized in the study area. For instance, in Kwara (Figure 2) and Kogi (Figure 3), it was rated as the least utilized ICT while in Plateau (Figure 7) and Nasarawa (Figure 5) States, it was rated as the second and third least utilized device respectively. This may be attributed to inadequate or lack of internet facilities in the study area; Putra et al. (2020) observed that poor internet connectivity prevailed in the remote areas of Indonesia and this may also be applicable to the study area. This is discouraging because Chhachhar et al. (2014) stated that internet is among the most important devices for communicating knowledge and information to farmers.

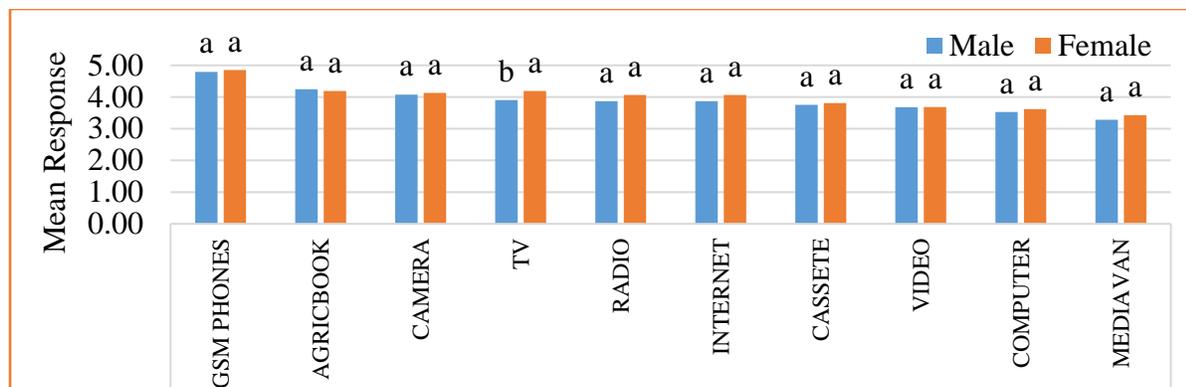


Figure 4: Gender use of each ICTs in Niger State

Response scores: very high (4), high (3), moderate (2), low (1), not used at all (0)  
 Note: Mean with same alphabet (for each ICT) did not significantly differ ( $P > 0.05$ )

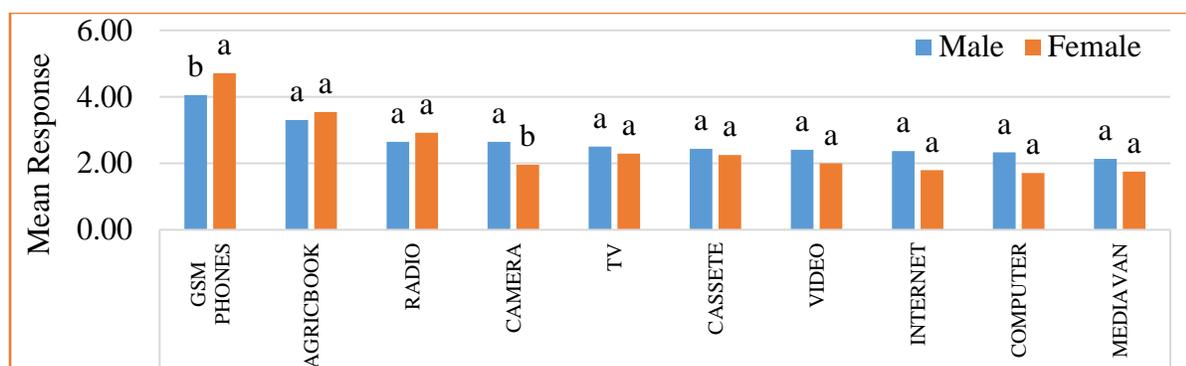


Figure 5: Gender use of each ICTs in Nasarawa State

Response scores: very high (4), high (3), moderate (2), low (1), not used at all (0)  
 Note: Mean with same alphabet (for each ICT) did not significantly differ ( $P > 0.05$ )

### *Gender use of cameras among the AEAs*

In Nigeria, Okeke et al. (2015) listed cameras as one of the ICTs used by AEAs. There was no significant ( $P > 0.05$ ) difference in the usage of cameras among the male and female AEAs in the study area except Kogi (Figure 3) and Nasarawa (Figure 5). The magnitude of the mean responses showed that camera lies in between the least and most utilized ICTs by the AEAs. That is, the application of camera in agricultural extension in the study area was relatively low compared to radio and GSM phones. This, to an extent, agrees with the finding of Godson-Ibeji et al. (2020) which showed that out of 91.6% of the AEAs in Imo State, Nigeria who were familiar with digital cameras, only 29.2% applied them in

agricultural extension work. This should be addressed because Putra et al. (2020) demonstrated that a digital camera was very useful in plantation management in Indonesia where it was used for nutrient, pest/disease management and yield monitoring among other farm activities.

### *Gender use of videos among the AEAs*

Apart from Kogi State (Figure 3) where the male AEAs significantly used videos more than their female counterparts, there was no significant ( $P > 0.05$ ) difference in gender use of videos in the states studied. Looking at the magnitude of the mean responses, video is one of the least utilized ICTs across the states. The inclusion of videos among the ICTs studied is

important because Salifu et al. (2016) listed it and other ICTs such as computers, phones, internet and television as the most available devices for use by AEAs. The inability of the AEAs to apply videos to agricultural extension work is a setback in agricultural development because training videos according to Van Mele et al. (2016) have become proper agricultural extension tools in which many development agencies invest in order to communicate information to farmers.

*Gender use of cassettes among the AEAs*

Apart from Kogi State (Figure 3), there was no significant ( $P > 0.05$ ) difference in the usage of

cassettes by the male and female AEAs in the states studied. Although there was a significant difference in gender use of cassettes in Kogi, the mean responses indicated that it was rated as one of the least utilized ICTs in the study area. This is in line with *a priori* expectation because cassettes are currently being displaced by modern ICTs such as flash drives, CDs and DVDs for information storage and retrieval. In this regard, it can be inferred that the AEAs were in tune with modern trends in ICTs needs in agricultural extension work. However, where the skills for the use of some of these ICTs are lacking, the capability of such an agent to deliver is in doubt (Godson-Ibeji et al. 2020).

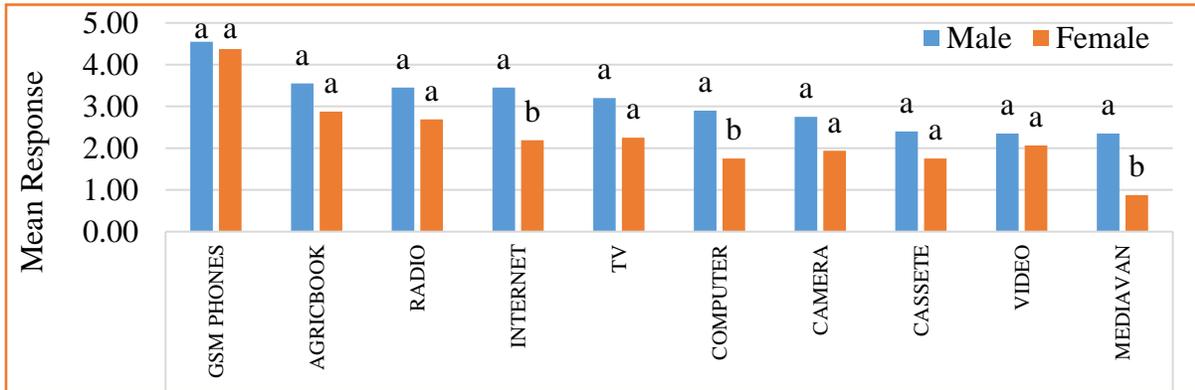


Figure 6: Gender use of each ICTs in Benue State

Response scores: very high (4), high (3), moderate (2), low (1), not used at all (0)

Note: Mean with same alphabet (for each ICT) did not significantly differ ( $P > 0.05$ )

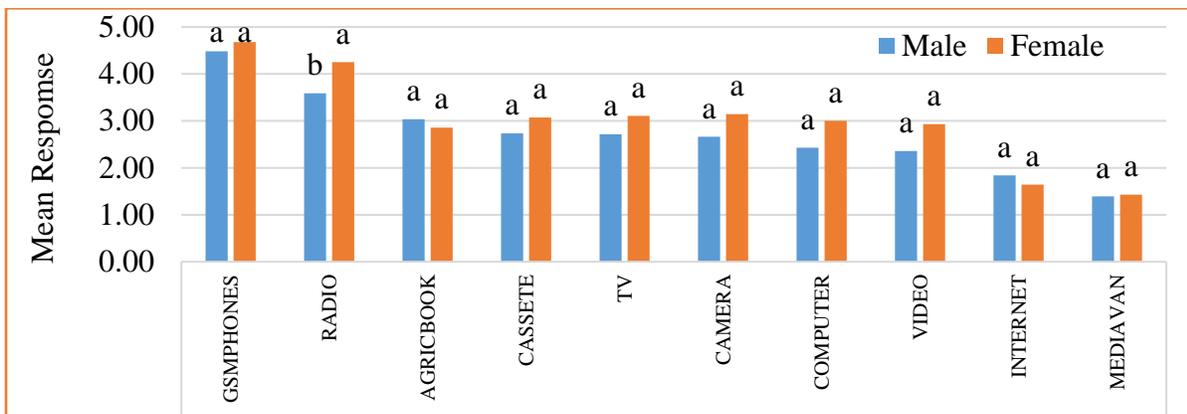


Figure 7: Gender use of each ICTs in Plateau State

Response scores: very high (4), high (3), moderate (2), low (1), not used at all (0)

Note: Mean with same alphabet (for each ICT) did not significantly differ ( $P > 0.05$ )

### *Gender use of media vans among the AEAAs*

Media vans include vehicles such as trucks, pick-ups and buses owned by agricultural extension agencies that are dedicated to supporting agricultural extension operations in communities. Most of them are fitted with microphones and used for extension campaign, rallies, field trips, etc. They are also used to convey extension staff and other vital materials to target locations in the communities. In this research, they are treated as an information communication technology. Apart from Kogi (Figure 3) and Benue (Figure 6), there was no significant ( $P > 0.05$ ) difference in the usage of media vans by the male and female AEAAs. Irrespective of gender, the result showed that media van is one of the least utilized ICTs in the study area.

### *Constraints to the use of ICTs*

Table 2 shows the constraints facing the male and female AEAAs on the usage of ICTs. Among the constraints, high cost of owning

and operating the ICTs was expressed by both males (14.72%) and females (14.89%) as the most limiting factor. The cost of maintaining ICT facilities (14.89%) was seen as second major challenge hindering the use of ICTs by the female AEAAs, while poor power supply to operate ICTs (14.11%) was seen as the second noticeable challenge hindering the use of ICTs by the male AEAAs. The implication is that there is a lack of basic infrastructure such as electric power supply and this may have slowed down the use of ICTs for information transfer in the study area. The least factor limiting the usage of ICTs according to the male AEAAs was lack of interest in ICTs even when they are available, while for the female AEAAs, it was lack of skill to operate ICT facilities. Some of these challenges have also been expressed in other countries. In Tanzania, Mtega (2018) reported that farmers indicated that their major challenge in accessing information through radio and television was the high costs associated with their maintenance.

Table 2: Constraints to the use of ICTs by agricultural extension agents

Challenges affecting ICTs	Male		Female	
	Freq.	%	Freq.	%
High cost of owning and operating ICTs facilities	48	14.72	21	14.89
Poor power supply to operate ICTs	46	14.11	19	13.48
Low literacy among farmers in my area	44	13.50	18	12.77
Cost of maintaining ICTs facilities	44	13.50	20	14.18
Poor training on the use of ICTs facilities	42	12.88	19	13.48
Lack of ICTs facilities in my area of work	41	12.58	18	12.77
Lack of skill and knowledge to operate ICTs facilities	31	9.51	12	8.51
Lack of interest in ICTs even when available	30	9.20	14	9.92
<b>Total</b>	<b>326</b>	<b>100</b>	<b>141</b>	<b>100</b>

### **Conclusion**

Information and Communication Technologies (ICTs) have proved to be very useful in agricultural extension services especially as recent innovations complement each other in their daily usage. Because of the

importance of ICTs in agricultural transformation, the study assessed gender use of ICTs among the male and female AEAAs in the north central Nigeria. The main objective is to determine if male AEAAs use ICTs more than their female counterparts or vice versa.

First, there was no statistical evidence to show that the male AEAAs used ICTs more than

their female counterparts or vice versa across the states. In other words, gender gap in the use of all ICTs was not pronounced in the study area. This finding is very useful in policy formulation at the zonal or national level where interest is not on any particular ICT or location. Second, at the state level, the finding showed that there were significant variations in the use of each of the ICTs among the male and female AEAs. That is, some ICTs were used by the male AEAs more than their female counterparts and vice versa in some states. In this regard, policy makers at the state level should identify the ICTs where the male or female gender has comparative advantage over the other and close the gap through capacity building. Third, irrespective of gender, it was observed that some of the ICTs were used more than others across the states. For example, GSM phones were rated as the most utilized ICT while the least used varied from one state to the other. More research should be conducted to identify the reasons for such observations and use the outcome in extension education and outreach. Fourth, the magnitude of the mean responses showed that some ICTs like internet, media vans and computers were rarely used in some states even when they appeared to be universally available and accessible. Generally, the study concluded that the use of ICTs by the male and female AEAs in the north central Nigeria, depended on the state, gender and type of ICTs in question. It is, therefore, recommended that the study should be replicated in other zones to see if similar conditions apply so that gender-based ICTs policies for improving agricultural extension services in Nigeria should be based on empirical evidence rather than speculations.

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