USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) AMONG WOMEN FARMERS IN NORTH-EASTERN NIGERIA

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To

Betterment of the African woman

Whose stock in trade is tilling the soil

And yet go to sleep hungry.

ABSTRACT

Availability of information on improved technologies is an important ingredient for agricultural development. However, Nigerian women farmers have low access to technological information. The use of Information and Communication Technologies (ICTs) among these women in accessing information on improved agricultural practices has not been adequately explored. Use of ICTs among women farmers in north-eastern Nigeria was assessed in this study.

Adamawa and Bauchi were randomly selected from the six states in north-eastern Nigeria. All the seven Agricultural Development Programme (ADP) zones in the two states were included in the sample. Twenty five percent of Women-in-Agriculture units of the ADP extension blocks in each zone were selected and 15% of women in each unit were randomly sampled. A total of 359 respondents, made up of 172 and 187 from Adamawa and Bauchi States respectively, were selected. Interview schedule was used to collect information on respondents' characteristics and benefits. Social participation, awareness and attitude were assessed and categorised on point scales thus: low (0-11.4), high (11.5-39.0); low (0-5.9), high (6.0-10); and unfavourable (37.0-60.0), favourable (61-79) respectively. The use of old ICTs (radio, television, telephone, video, extension bulletin and newspaper) and new ICTs (mobile phone, computer, internet and CD-ROM) were also assessed. Data were analysed, using descriptive statistics, Chi-square, correlation, t-test, and logit regression (p=0.05)

Married respondents constituted 86.6% and the mean age was 41.0 ± 12.6 years. Christians were 65.1%, Muslims in seclusion were 32.9% and 52.0% attained primary education. Most respondents (64.3%) practised mixed farming, with mean farm size of 3.4 ± 2.7 ha; 93.0% cultivated cereals and 58.5% raised poultry. Also, 57.7% had low social participation score (0.0-11.4) and 99.0% were aware of ICTs. Majority of the respondents benefitted from access to information on fertiliser sources and application (75.8%), credits, grants and loans (71.5%), child care and nutrition (67.1%), market prices and location (65.5%), crop pests; diseases and control (63.5%). The most commonly used old ICTs were radio (92.8%) and television (59.6%), while the most commonly used new ICT was the mobile phone (59.3%). Fifty-two percent had unfavourable attitude (0.0-60.0) towards the use of ICTs. Use of ICTs was significantly related to residence location (χ^2=0.12), seclusion status (0.44) and education (0.10). It was also significantly related to social participation (r=0.47), cosmopoliteness (0.19), awareness (0.65) and attitude (0.32). Mean awareness of old ICTs (4.1±1.9) was significantly higher than of new ICTs (1.7±1.3). Mean use of old ICTs (14.8±11.3), its use among non-secluded (21.5±6.8) and among urban respondents

(23.1±16.6) were significantly higher than mean use of new ICTs (4.8 ±3.2), its use among secluded (15.7 ±9.3) and among rural respondents (19.2±12.4). Education, social participation, awareness of ICTs, cosmopoliteness and residence location had likelihood of increasing the use of ICTs by 0.03, 0.01, 0.46, 0.04 and 0.09 respectively.

Women farmers in north-eastern Nigeria had high awareness of ICTs and used them in accessing agricultural and other livelihood information. However, the unfavourable attitude and low awareness and use of new ICTs need to be addressed to increase the potential to deliver agricultural information to women farmers.

Keywords: Women farmers, Information and communication technologies, Agricultural information

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Augustine Anthony NDAGHU

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CERTIFICATION

I certify that this study was carried out by Augustine Anthony Ndaghu, a Ph.D candidate in the Department of Agricultural Extension and Rural Development, University of Ibadan, Ibadan, Nigeria.

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Acronyms

ADP	-	Agricultural Development Programme
CD-ROM	-	Compact Disk Read-Only-Memory
DVD	-	Digital Versatile Disk
ECA	-	Economic Commission of Africa
FGD	-	Focus Group Discussion
FAO	-	Food and Agriculture Organization
GSM	-	Global System Mobile phone
ICTs	-	Information and Communication Technologies
IDI	-	In-depth Interview
IFAD	-	International Fund for Agricultural Development
NAERLS	-	National Agricultural Extension and Research Liaison Services
NGO	-	Non-governmental-Organisations
NPC	-	National Population Commission
PCU	-	Project Coordinating Unit
SMS	-	Subject Matter Specialist
SPSS	-	Statistical Packages for the Social Sciences
UN	-	United Nations
VCR	-	Video Cassette Recorder
WAICENT	-	World Agricultural Information Centre
WIA	-	Women-in-Agriculture
WOUGNET	-	Women of Uganda Network
WWW	-	World Wide Web

CHAPTER ONE
INTRODUCTION

1.1 Background to the study

Women farmers the world over are making significant contributions to food production. According to the United Nations Report on status of the world's women (2000), women are twice as likely to be involved in agriculture-related activities as men. About 90% of rural women in sub-Saharan Africa are farmers; they perform about 70% or more of all agricultural production activities, 100% of food processing and utilisation and 50% of storage and marketing operations (Kawani and Pernia, 2002 cited by Dimelu *et al, 2009).* Women farmers are found in both rural and urban areas and are also involved in several income-generating activities such as; food processing, marketing, gathering/selling of non-timber forest products and craft making, among other activities, to help feed their families and better their well being.

The situation in Nigeria is not different. According to Majindadi (1993, cited by Yahaya, 1995), women farmers constitute about 60% of the farming population and are responsible for up to 70% of the actual farm work. Also, out of the 10 linkages in food chain, viz.; land clearing and harrowing, planting, weeding, harvesting, transportation, processing, distributing, marketing, storing and cooking, only the first two are dominated by men. The next two are done by women and about 70% of the other activities are carried out by women along with their normal domestic responsibilities. It is therefore, clear that women farmers in Nigeria are a vital link to agricultural development and food production.

However, despite the significant contribution of women farmers to food production in both rural and urban Nigeria, women farmers were previously not considered productive. This, according to Olawoye (1994), was because women farmers usually worked as unpaid family labour whose inputs are not usually quantified in economic terms. This has marginalised the women farmers and limited their access to important production resources like fertile land, capital in the form of credit, extension services and technology. This brings to bear, the need for appropriate use of Information and Communication Technologies (ICTs) through which women farmers can have access to information they need to improve their activities and boost their productivity. This is because, all over the world, the use of ICTs is replete with success stories of how they have been used to transform societies and improve the livelihood of disadvantaged people. Therefore, women farmers, most of whom live in rural areas and provide for the food demands of the entire family (Moser, 1993), can exploit the window of opportunities in the use of ICTs to access information on improved

agricultural practises, and increase their agricultural production to match the high food demand associated with increase in population and rising urbanisation.

1.1.1 Concept of Information and Communication Technologies (ICTs)

According to Michiels and Vancrowther (2001), cited by Chapman and Slaymaker (2002), ICTs are a range of electronic technologies which, when converged in new configurations, are flexible, adaptable, enabling and capable of transforming organisations and redefining social relations. The range of technologies is increasing all the time and there is convergence between the new and the old media. The new media are computers, mobile phones and the internet, while the old media include radio, television, telephone, newspapers and extension bulletins, among others. According to Hafkin and Odame (2002), ICTs are an individual or a set of technologies that include both the new and old equipment for human and digital communication. They contend that the information carriers are used in new ways and that the convergence of the new and old media in ICTs is the best for use among women. For example, there are phones with radio, media centres with computing capabilities and digital television. In the strict sense, ICTs are used to describe the use of radio, video, telephone, computer-based technology and the internet to avail information and communications service to users (FAO, 1998).

Using cross sectional data for different countries, Norris (2000, cited by Joseph, 2004), identified the correlation between the level of diffusion of old media such as telephones, television, radio, newspapers and new media like computers, internet and mobile phones is positive and statistically significant. Most devices can now be linked to others to share and exchange information and allow it to be used in a way that they can be categorised as ICTs. The beauty of ICTs lies in convergence in the use of old and new technologies. According to Chapman and Slaymaker (2002), even books are being incorporated into ICTs either through the potential of informal web publishing or more informal digital book publishing with designated readers or e-books. ICTs, therefore, are an expanding assembly of technologies that can be used to collect, store and share information among people, using multiple devices and multiple media.

The effectiveness of ICTs to solve different developmental problems depends on the strength of convergence and the content they carry. The strength of convergence is exploited on evidence that no one medium is inherently better than another and that a mix of media may often be more effective and efficient than a single medium, no matter how powerful. For the issue of content, once ICTs are fed with the appropriate messages they become the powerful tools of possibilities that they are meant to be. ICTs therefore promise to improve

information delivery or sharing among small farmers if properly exploited. Based on this, the study conceptualised ICTs as the use of radio, television, telephone, video, newspapers, extension bulletins, GSM-phone, the internet and computer-based technologies to facilitate communication among users.

1.1.2 Internet and the multiplier effect

The truly revolutionary nature of ICTs and the information "superhighway" that spans the globe is occasioned by the advent of internet on the information scene. The internet refers to a large global network of public computers, which comprises thousands of smaller networks (http://www.tiaa-cref.org/help/glossary.htm). Since the late 1990s, the internet has been a global 'people's network for communicating and sharing information to converse, debate, meet, teach, learn, buy and sell, and share virtually every type of information imaginable (FAO, 1998). As many communication technologies before it, the internet enables rural communities to receive information and assistance from outside development organisations. However, unlike such mass media, the internet is the first medium that allows every user to be a sender, receiver, narrow caster and broadcaster. The internet offers opportunities for a two-way interactive and horizontal communication and for opening up new, non-traditional channels for rural communities and development organisations. This innovation creates a multiplier effect in which once content is created, it can be made available through e-mail, websites, distribution lists or digital file exchange to those interested (Munyua, 2004). The cost of information transport, beyond its initial creation and cost of an individual connection to access it, becomes very low compared to the size of the audience it can potentially reach.

The use of internet represents a radical departure from the traditional way that the government, media, academics and others have controlled information. Since the late 1990s and early 2000, people have been free to read alternative news sources; consumers can compare products and services and researchers can do their work outside the printed media. People can then place information on the internet and benefit from a much more democratic tool to popularise their ideas and opinions. Of course, the abuse of the internet is a reality as well, but overall, it has given birth to the modern concept of the "information society".

1.1.3 The role of ICTs in agriculture and rural development

Much of the poor performance of agriculture in rural areas can be attributed to failure in the process of information transfer upon which agricultural development depends. ICTs permit faster and more efficient delivery of information to farmers from the over five million websites and over 1.6 billion web pages. The availability of ICTs digital media such as

diskettes and CD-ROMs for dissemination function led to the emergence of wide area connectivity through the internet and has made information on agriculture available world wide and on demand. According to FAO (2000), approximately 1000 users per year requested information from the FAO statistics data base in the 1980s when it was held on mainstream computers and the internet version available through the World Agricultural Information Center (WAICENT) had about 60, 000 users session per month as at the year 2000. ICTs also spread knowledge and information about good practises in other areas. A good example of such practises is the Drumnet project in Kenya. The project has a centre where free information is provided to smallholder farmers about current prices of commodities on a daily basis (Opala, 2004). Cybershepherd is another project in Senegal where ICTs are used to provide information to pastoralists about resources in the transhumance zones and to track and monitor the course followed by selected shepherds and their flocks from one point to another in the forestry pasture zone (Munyua, 2004).

Digital technologies also assist in predicting areas of food insecurity and vulnerability so that action can be taken by government to reduce the likelihood of an emergency (Hamelink, 1999). Therefore, information that is properly disseminated and applied can save lives and improve livelihoods. Use of ICTs can avail information to women, the poor, non-literates and people hitherto isolated due to geographical remoteness or difficult terrain, as satellite communication makes it possible to connect rural telephone at appropriate band width and at reasonable cost (IFAD, 2002). Similarly, ICTs can bring to users, technologies with more and adaptable content. Such contents, according to Bhatnaager and Schware (1999), must be accessible and relevant to the needs of rural dwellers, including women. ICTs serve as tools in strengthening women's voice and influence in agricultural policy making. This involves women groups lobbying for such things as land rights, labour laws and right to investment; often sharing information and networking, using ICTs. ICTs are helping rural women, the youth, disabled or even displaced persons to express their needs and concerns about agriculture and rural development issues directly to the government, media, politicians and donor agencies.

1.1.4 Women and the use of ICTs

Results emanating from ICT-based projects and studies in developing countries are mixed. While the results are encouraging and promise to improve access to and sharing of information among women, they also reveal some interesting issues. For example, Sebatim women in Dakar, Senegal, starting with a single computer, were able to expand their computer service business by using internet to search for new clients. They were also able to

place their children in community telecenters for job creation. Also, by using their network of partners and e-mail, these women were able to receive additional training and participate in overseas trade fair. In this way, they increased the visibility of their community and could trap prospective business opportunities (Munyua, 2004). Rural women in Kano, northern Nigeria, use radio cassettes to record their dialogue on development challenges which is in turn broadcast by Radio Kano. Government officials have responded positively to this development and the process has given women a real voice in state affairs (Opoku-Mensah, 2000).

The Fantsuam Foundation in southern Kaduna State, Nigeria, has a project to improve healthcare and education, primarily for women through shared access to ICT facilities. The project aims to support rural communities in setting up their own community learning centres. It uses a mixture of new and traditional ICTs (internet, intranet, radio and books). Its concentration is on delivering healthcare information requested by rural women (Hafkin and Odame, 2002).

In India, animal owners are using internet kiosks to talk to veterinarians. The booths offer online medical advice for livestock farmers in remote locations. This has successfully helped the inhabitants of India's 600, 000 villages who own farm animals and pets but most are without trained veterinarians (Pilcher, 2004).

In spite of all these, women farmers still have limited access to ICTs due to limited education, low level of income, non involvement and marginalisation in ICT projects. In ICT sites surveyed in Senegal, it was revealed that women were generally not consulted during the preparatory, acquisition, installation and ICTs exploitation phases (Thioune and Sene, 2001). The studies further revealed that even where traditional technologies such as telephone and radio were used, the same tendencies to marginalise the women exist, as 29 and 71 percent of ICTs users were female and male respectively.

According to Rathgeber (2002), "feminist" philosophers interested in science have observed that female cognitive structures differ from those of men, with implications for women's attitude and approaches to the use of ICTs. This differentiation was demonstrated in Malaysia where an inquiry into the behaviour of girls and boys in schools revealed that there is a significant differentiation between them in relation to the use and the attitudes adopted towards ICTs (NorAzen *et al.*, 2000). In Uganda, girls could not get access to the limited number of computers installed in schools (under a worldlink programme) because of the socio-cultural norm that "girls don't run", "boys ran and got to the computers first and refused to give them up to the girls" (WOUGNET, 2004). In India, girls were known to be

pushed away by the aggressiveness of the boys and prevented the girls from using the computers at a programme "Hole in the Wall" (Mitra, 2001).

Therefore, the issues of access and adequacy of ICTs among users pose serious concern for most users in sub-Saharan Africa in general and for women farmers in Nigeria in particular. If the computers were enough to go round for all intended users, the struggle over the computers among users, as earlier illustrated, would not have arisen. Having sufficient ICTs for intended users and indeed the women farmers is critical as information and technologies hold out a unique opportunity for women farmers to be more visible, less isolated and part of the network that links people together worldwide.

1.2 Problem statement

In Nigeria, men and women play different roles in rural and agricultural development. In the study area for example, women participate in the agricultural labour force, food processing, agribusiness and other consumer-related activities. As producers, women's work on the farm helps them to feed their families, although this goes beyond farming alone, as women farmers in the region are also involved in marketing, gathering of non timber forest products and craft making. In spite of the significance of women's involvement in agricultural production and at the home front, they lack access to reliable and comprehensive information on improved agricultural practises that can enhance their productive and reproductive capacities. This is because access to information is correlated with access to economic or political power (Hafkin and Odame, 2002). Therefore, women need to be empowered to increase agricultural production through access to information on improved agricultural practises as women farmers need information in all aspects of agricultural production like crop and animal production, marketing, input delivery, post harvest, processing and storage, among other areas.

The conventional extension methodology through which information on improved agricultural practises is availed to farmers relies heavily on face-to-face training and learning methods of information dissemination. Such conventional methods are also weak in addressing women farmers' non adaptation of technologies, heavy workloads, poor access to education and training and the busy schedule/multiple chores of women farmers. The limited coverage of the conventional extension system and the few number of female agricultural extension agents expected to cover the over 60% of Nigerian farmers who are women with some of them located in remote and sometimes hard to reach rural areas make the agricultural extension coverage of most of the women farmers very difficult Therefore, the challenge is to find a creative way of reaching out with information on improved agricultural practises to

more women farmers wherever they may be. This brings to the fore the need to appropriately incorporate the use of ICTs in availing agricultural information to the women farmers. This is because ICTs have the potential of getting vast amounts of information to the rural population and the extension service organisations in a more timely, comprehensive and cost effective manner.

However, studies conducted by NAERLS/PCU (2002), Arokoyo *et al* (2002), Arokoyo (2003) and Olowu *et al* (2004) revealed that, despite the capacity of ICTs to assemble, process and share information among agricultural information providers, seekers and users in an interactive manner, women farmers, who perform most of the agricultural tasks have limited access to ICTs. Even those who have access have differential use. If that is the case, women farmers in North-Eastern Nigeria are also likely to have limited access to ICTs. This limited access and differential use further widens the information gap, thereby creating a digital divide, while the use of ICTs remains marginal. This is even with the presence of the Agricultural Development Programme (ADP)-sponsored extension delivery system that is responsible for the information needs of farmers. At inception in 1980, the extension agent (EA): Farmers' ratio ranged between 1:2000 and 1:3000. This was expected to come down to 1:800 and 1:1000 by the project completion date and subsequent withdrawal of the World Bank support. This target was never achieved. According to NAERLS/PCU (2003), the ratio in the study area remains between 1:1650 and 1:1800. This is even worse for the Women in Agriculture (WIA) programme, with vacancies in several extension blocks expected to be filled by female agents. Socio-cultural factors such as restriction in contact between male agricultural extension agents and female farmers could further undermine women farmer's access to information on improved agricultural practises.

Therefore, to facilitate and enhance access to agricultural information among women farmers, there is a need to determine women farmers' use of ICTs by investigating their subjective norms, behavioural control and past experiences. It is against this background that the study sought answers to the following research questions:

1. What are the socio-economic characteristics of women farmers in North-Eastern Nigeria?
2. Are women farmers aware of ICTs?
3. What is the level of awareness of ICTs by women farmers in North-Eastern Nigeria
4. What are the socio-cultural factors that affect the use of ICTs among women farmers?
5. What are the benefits and constraints in use of ICTs experienced by women farmers ?
6. Are there differences between the use of old and new ICTs among the women farmers?

7. Are there differences in the use of ICTs between rural and urban respondents?
8. What is the attitude of women farmers in the study area towards use of ICTs?
9. What are the ICTs preferences of women farmers?
10. What is the level of use of ICTs among women farmers in the study area?

1.3 Objectives of the study

The general objective of the study was to determine the use and non use of ICTs among women farmers in North-Eastern Nigeria. The specific objectives were to:

1. investigate the socio-economic characteristics of women farmers,
2. ascertain awareness and sources of awareness of ICTs among women farmers,
3. assess the benefits and constraints experienced by women farmers in the use of ICTs,
4. determine the socio-cultural factors that affect use of ICTs among women farmers,
5. find out the differences in the use of old and new ICTs among the respondents,
6. assess the differences between the use of ICTs among secluded and non- secluded respondents,
7. ascertain the differences in use of ICTs among rural areas and urban respondents,
8. determine the attitude of women farmers in the study area towards the use of ICTs and their ICTs preferences, and
9. ascertain the use of ICTs among women farmers in the study area.

1.4 Hypotheses of the study.

The hypotheses of the study, stated in null form, are as given below:

1. There is no significant relationship between women farmers' socio-economic characteristics and use of ICTs.
2. There is no significant relationship between women farmers' awareness of ICTs and use of ICTs in the study area.
3. There is no significant relationship between women farmers' cosmopoliteness and use of ICTs.
4. There is no significant difference in the awareness of old and new ICTs among the respondents.
5. There is no significant difference in the use of old and new ICTs among the respondents.
6. There is no significant difference in the use of ICTs between women farmers in seclusion and those of them that are not in seclusion.
7. There is no significant difference in the use of ICTs between women farmers in rural areas and those in urban areas.

8. There is no significant relationship between women farmers' attitude towards ICTs and their use of ICTs.

1.5 Significance of the study

The study was stimulated by the need to enhance access to information on improved agricultural practises among women farmers who apparently form the bulk of the rural producers in North-Eastern Nigeria. This is because their information need is grossly underserved despite their potentials and peculiarities (Yahaya, 2002). Therefore, different intervention strategies are needed to expose them to agricultural information and innovation to enhance their productivity and improve food security. The study is a compendium of empirical evidence that can be used to improve access and arouse the desire of women farmers to use ICTs. This can also improve their livelihood and create employment opportunities for them and members of their families, as they can be engaged as telecenter managers, subject matter specialists, translators, information technicians and trainers.

The study also seeks to fill the gap in information on the use of ICTs in the study area. This empirical evidence from the field will no doubt be of immense benefit to researchers and other scholars interested in the study of women farmers. The study will also help government policy planners, staff of Non-governmental Organisations (NGOs) and other stakeholders in designing ICT framework that will meet the needs and peculiarity of women farmers. This is because Nigeria cannot afford to be left out, at the digital abyss but has to join the "moving train" and surf the global wave of technological changes that are capable of transforming rural areas and be truly part of the global villages.

1.6 Scope of the study

This study was delimited to women farmers in North-Eastern Nigeria and women (both rural and urban) whose major source of livelihood is agriculture. The study only considered women farmers' use of ICTs and did not consider other factors such information needs, media use pattern and access to ICTs.

1.7 Operational definition of some terms used in the study

Women Farmers: All females of ages 18 years and above who engage in farming activities that include land clearing, planting, weeding, harvesting, processing and animal husbandry, either on their own farms or on farms belonging to relations.

ICTs: Items like radio, television, telephone, fax, video, the internet, computer and computer-based technologies used to facilitate communication among users.

Social participation: Membership in organised social groups like cooperatives, farmer groups, religious organisations and community development programmes, and includes their attendance at meetings, holding leadership position and payment of dues in the groups.

Cosmopoliteness: Frequency of visit to urban areas.

Secluded women: Women who operate their farms through managers, relations or managers

Attitude towards use of ICTs: Predisposition to respond favourably or unfavourably, while displaying one's feelings towards use of ICTs

ICTs preferences: Ranking of ICTs in order of their importance.

Use of ICTs: All acts of listening to, reading, operating by self or proxy or by paying to access ICTs for the purpose of getting information on agricultural practises.

CHAPTER TWO

LITERATURE REVIEW

2.1 Women in agriculture and rural development

The United Nations International Decade for Women which was marked in 1985 has helped to stimulate official awareness of increased impoverishment of women farmers and the central role they can play in the economies and agricultural development of third world countries. This is because agricultural planners have hitherto stereotyped women farmers as consumers rather than producers. However, studies by Butt *et al* (2006) and Ogunlela and Mukhtar (2009) revealed that women farmers in Asia, Latin America and the Middle East comprise half of the agricultural labour force in those regions. In Pakistan, for example, women farmers participate in all farm operations related to crop production such as sowing, transplanting, weeding and harvesting as well as in post harvest operations such as threshing and storage. All these are carried out by women farmers in addition to their normal domestic chores of cooking, cleaning and house maintenance.

In the opinion of Adekanye *et al* (2009), the continent of Africa has been referred to as the region of women farming *par excellence.* Compared to other regions of the world, including Europe, Asia and the Far East, women in Africa are more involved in agriculture (Boserup, 1970, cited by Adekanye *et al*, 2009).

Several studies over the last four decades, including those by such international organisations as ECA (1990), FAO (2001), UN (2005) and the World Bank (2003) have indicated that women in agriculture contributed some 60-80% of the labour input in African agriculture .This is especially so for the production, processing and trade in food commodities There are, of course some regional differences in the types of crops grown and the socio-cultural factors such as keeping women in seclusion. Women labour inputs in agriculture is extremely important for such essentially "women crops" such as cassava, rice and maize in Africa. There is also the contribution of women farmers through long hours that they spend working on family farms.

Based on the level of involvement of the African women in agriculture and the rural economy, they are farmers in their own right, growing several crops and keeping livestock. In Nigeria, women farmers also spare time to help on their husbands' farms particularly at the peak periods of planting and harvesting. Food processing is traditionally a woman's work in Nigeria, even when in purdah (full seclusion) most of the women are involved in agriculture by proxy and undertake food processing for income-generating purposes within the confines of the family compound. These are carried out by the women farmers in addition to caring for

children. This has made most women farmers in Nigeria to work all day long. A typical woman farmer in Nigeria wakes up at dawn, prepares food for the day and the children for school; she leaves for the farm in the morning, and there she will work till late in the afternoon. After the day's farm work, she goes fending for water, firewood and vegetables to prepare food for the family. In the event any of the children is not well, the woman farmer may not sleep at all, although that will not deter her from getting up at dawn the next day to continue the routine.

Besides performing their roles as individuals, women farmers also play significant roles in developing and maintaining social cohesion in rural communities as groups and associations through which they contribute to rural development and transformation. These groups serve as platforms on which the women identify their needs and organise themselves to participate in local representative and decision-making bodies (ECA, 1990). The associations serve as catalysts for mobilisation within the communities. Women farmers also participate in several income-generating, educational and information dissemination activities through these associations and groups. The women are as well taught literacy and numeracy skills, family planning, child care, health and nutrition (ECA, 1990). Some of the groups embark on physical development projects like road construction building and rehabilitation of schools, health centres, market stalls, churches and mosques, as well as maintaining community sanitation. All these are in addition to the fact that these groups serve as channels and base for development agencies to penetrate the rural areas for smooth operation of their programmes and projects.

In the opinion of Dunmade (1990), women in Nigeria have embraced the idea of group formation, especially cooperative societies, because of the importance of cooperatives in increasing their credit worthiness and placing them in a position of strength to support income-generating-activities out of their pooled resources. Cooperatives provide thrift, credit, labour, supplies, marketing, food production and saving facilities for members.

The roles that women farmers play and their position in meeting the challenges of agricultural production and rural development are quite dominant and prominent. According to the UN (2005), women constitute 60-80 percent of agricultural labour force in Nigeria, depending on the region, and women farmers produce two-thirds of the food crops. Based on available evidence and statistics, the role of women in agricultural production and rural development in Nigeria cannot be trivialised. Rural and national development can hardly be achieved if this important and substantial segment is neglected. However, the various gender

discrimination, social inequality and exclusion experienced by women in agricultural practises tend to undermine their contribution to agriculture and rural development.

2.1.1 Concept of gender

According to Buckland (1996), gender is a concept used in social sciences to look at the roles and activities of men and women. These are often socially defined set of roles, responsibilities, obligations and acceptable behavioural restrictions shaped by tradition and beliefs of a particular culture. In the opinion of Buckland (1996), while women contribute between 60-80% of agricultural production in developing countries, women farmers are least likely to benefit from agricultural extension services and technologies that could improve their production due to poor understanding of women's roles in agricultural production. However, since the declaration of the international decade for women by the United Nations in 1985 and 2011, there has been a paradigm shift in the way women farmers are perceived. It is now known that women farmers are a visible and important component of the forming households with some of them having full control over resources and decision making in agricultural production.

A common assumption is that, gender focuses only on the status of women in the society, but while gender analysis gives insight into issues affecting women, it is focused mainly on relationship of both men and women to the social and economic structure of a society. Gender is not necessarily about women, although it makes it possible to learn more about particular issues affecting women, as well as men.

2.1.2 Gender division of labour

Gender role refers to those different roles which each society assigns to both men and women. These roles define who does which work and what work both can do .Both men and women have their traditional roles or duties they perform in a society. For example, the role of fending for and feeding the family seems to be traditionally assigned to the men folk, while that of child caring, cooking and keeping the home is meant for the women. Also, due to the strong physical nature of men, they tend to perform heavy duty tasks like farm clearing and making heaps, while women perform light duty work like planting and processing. Although, there is nothing except convention and convenience that suggests that women cannot perform heavy duty tasks or that men are not able to perform light work, only that from one society to another there are separate gender roles and responsibilities assigned to men and women. These roles are socially determined; gender roles and responsibilities are different from the biological roles of men and women which are imposed by nature and depend on the sex of the individual. Child bearing, for example, is a woman's role.

In agriculture, both men and women have different tasks they perform on the farm. This division usually varies from one society to another based on the norms and culture of a particular society. According to Momsen (1991), the particular tasks performed on farms by both men and women have certain common patterns. It was noted that in general, men undertake the heavy, physical labour of land preparation and jobs which are specific to distant locations because of the rigours entrenched in activities such as livestock herding, while women carry out the repetitious, time consuming tasks like weeding, and such activities or jobs, which are located close to the home or not too distant from it such as the care of the kitchen and garden (Momsen, 1991).

Researchers and development workers have noted lately that, the roles played by women in food production are significant and cannot be overlooked. They have noted that women engage in a lot of farming practises contrary to previous opinions held as regards women's involvement in farming activities. Mehra (1995) pointed out that, twenty years of research on women's role in agriculture has provided convincing evidence that women are farmers and that their contributions to farm production and household support are very significant and important. Even in areas where it was assumed that the roles played by women were limited, some more detailed examinations show that women are intensively involved in a wide range of activities (Mehra and Esim, 1998). The United Nations (1995), Mehra and Esim, (1998) noted that women provided between 60 – 80 percent of the labour in food production and contributed substantially to cash crop production.

2.1.3 Gender roles of women in food production

The division of labour between men and women in crop production and other agricultural practises vary considerably from one region to the other and from one community to the other. Women farmers' roles, as noted earlier, vary between and within regions, countries and cultures. Each tradition seems to allot different and varying roles to women in the process of food production. According to Mehra and Esim (1998), women's roles on the farm vary by region, economic and political conditions, cultural beliefs, norms and personal circumstances, and that these roles also change over time. Bullock (1994) corroborated this assertion when he noted that the actual tasks performed by women, the kind of labour provided (either paid or unpaid labour), and the extent to which they retain the income from farm production varies greatly between and within regions and sub regions.

Momsen (1991) provided a good example of how tasks can be divided between men and women. He noted that in most cultures, the application of pesticides is considered a male task, as women are aware of the danger to their unborn children if they are exposed to such

chemicals. Boserup (1998) highlighted that the status of women varies between rural communities and sometimes between families in the same village. She noted that the use of animals for land preparation and transport is always a male monopoly and they perform those operations in which animals are employed, while women and the children perform those tasks in which human muscle power is used.

In analysing the division of labour between men and women, Dankelman and Davidson (1988, cited by Banmeke, 2003), noted that the agricultural sector in sub-Saharan Africa is such that women are generally responsible for activities such as sowing, weeding, crop maintenance and harvesting, as long as such tasks have not become mechanised, because the men usually take over such tasks when they become mechanised. The men, on the other hand, see to field preparation and clearing before planting is done. Momsen (1991) noted too that in caring for livestock, the tasks are usually shared between men and women, with the men looking after the larger animals and women the smaller ones.

Most of the research conducted on gender division of labour in agriculture revealed that women are mainly engaged in food crop production, while the men are engaged in cash crop production. Mehra and Esim (1998) highlighted that the pattern of production in sub-Saharan Africa is such that women are primarily responsible for food or subsistence crops, while men grow cash crops with a share of the labour provided by women. Similarly, men tend to do the work of large-scale cash cropping, especially when it is highly mechanised, while the women take care of the household, food production and small-scale cultivation of cash crops, requiring low level of technology. Men tend to grow cash crops and keep the income, while women use their land primarily for subsistence crops to feed their families. They went further to state that men clear the land at the onset of a cultivation cycle and women frequently do the planting, weeding, harvesting and processing of food crops with little or even no contribution from the men folk.

2.1.4 Gender inequality in agriculture

In every society, some people have greater share of valued resources such as money, property, education, land, labour and power among other valued resources than other people. According to Sociology Guide, these social resources can be grouped into three forms of capital; economic capital in the form of material assets and income; cultural capital such as educational qualifications and status; and social capital in form of network of contacts, social and professional associations. Often, these forms of capital overlap and one can be converted into the other. For example, a person from a well-off family can afford an expensive higher education and so can acquire cultural or educational capital. This pattern of unequal access to

social resources is commonly called social inequality. Social inequality is not the outcome of innate or natural differences between people but is induced by the society in which people live.

In the opinion of Frankin (2007), gender inequality is one of the most pervasive forms of inequality, particularly as it cuts across other forms of inequality. The various forms of gender inequality in agriculture can be seen in the fact that:

- It is men-and not- women who make key farm management decisions, despite the fact that women contribute 60-80 percent of labour in food production.
- Most of the women farmers are voiceless with respect to influencing agricultural policies which are aimed at improving food production and food security (Ogunlela and Mukhtar, 2009). This tends to either underestimate or ignore women farmers' roles in both production and general decision making process on issues that affect them.
- There is also inequality in access to land between men and women. In some communities, women farmers have no land ownership right. In other societies, women farmers have only usufruct right through their husband's lineage group (Ogunlela and Mukhtar, 2009). Often, lands are given to women farmers for a short period, perhaps for one growing season (Olawoye, 1989). In general, they cannot make any long-term improvement to the land such as planting perennial fruit crops or arranging irrigation facilities. In some societies where legislative and tenure changes have been made in favour of small scale farmers, women farmers continue to be marginalised as they are allocated smaller and less fertile plots than men's land.
- Women farmers have less access to credit than men. A study of women farmers' access to credit by Seekumar (2001), revealed that, access to credit among women farmers in Africa was as low as five percent in Barkina Faso and Benin Republic to only 32 percent in Zimbabwe as the highest.
- Women farmers receive little from the agricultural extension services due to the usual traditional prejudiced attitude towards women and the fact that, in some societies, socio-cultural and religious dictates tend to prevent women from attending and participating in extension training (CTA, 1993). Also, extension training and agricultural information dissemination tend to be oriented towards crops originally grown by men. Timetables for extension training do not take account of women's multiple chores.
- Social inequality experienced by women farmers manifests in feeding pattern as well. Survey conducted in Nigeria and Ghana by Richie (1977, cited by Ejambi *et al*, 2006),

revealed that, women farmers consume a smaller proportion of their food requirement than men and have little control over their labour.

2.1.5 Gender and social exclusion

These are ways in which individuals may become cut off from full involvement in the wider society. It focuses attention on a broader range of factors that prevent individuals from having opportunities opened to the majority of the population (Sociology Guide, 2011). Social exclusion is not accidental but systematic and systemic. It is a result of structural feature of the society. Social exclusion is involuntary and practised regardless of the wishes of those who are excluded.

Women farmers are excluded from accessing fertile land in most societies. They are also denied opportunities for decision making in farm management, even though they supply 60-80 percent of the labour force and produce two-thirds of the food crops (Ogunlela and Mukhtar, 2009). Some women farmers are excluded from contact with extension agents for some cultural and religious reasons.

2.2 Concept of agricultural communication

Communication is a pervasive phenomenon that does not lend itself to a single acceptable definition. Different communication scholars and writers have defined communication in different ways. Rogers (1995) defined communication as a process by which participants create and share information with one another in order to reach mutual understanding. Communication is what one does rather than what occurs on its own (Yahaya, 2003a). According to Rogers and Kincaid (1981), communication involves the exchange of ideas between two or more individuals in an attempt to arrive at a convergence in meaning. Also, Olowu (1990) defines communication as the process of transmitting information from one individual to another through a medium or channel with a purpose of effecting a change or reaction from the other. Communication requires shared meaning, otherwise the encoding by the receiver would not lead to the intended effect on the receiver.

The strategic use of communication to induce behavioural change or reaction in the receiver is dependent upon the extent to which meaning is shared between interacting parties and target clients.

According to Tiamiyu (2003), communication is the process by which the content of a message is composed, structured and transferred by sender and subsequently received and interpreted by recipients. In such a process, the receiver may misinterpret the content if care is not taken, and such communication may be ineffective. According to Marais (1979 cited by Mukhala, 2000), and Yahaya (2003a), effective communication takes place when there is

meaningful sharing of experience among the key players. Yahaya (2003a) emphasises that communication is a transactional process that has been identified for positive and economic development of the society. This assertion corroborates Soola's (2003) opinion that effective communication is a radical departure from the conventional use of media in that it aims to put the media in the hands of the marginalised inhabitants of the "traditional zones of silence" who would then use the media to find their own language or terms and transform reality in search of their own dream. Effective communication begins with the audience, the client or consumer and continues over time as a process of mutual adjustment and convergence. In communication intervention, it is important to realise the heterophilic nature of the audience, as audiences may differ in their language, knowledge, perception, and culture as well as resources at their disposal, the audience may communicate differently.

2.3 Agricultural information

Information is regarded as one of the resources needed for agricultural development. Severin and Tankard (1992) contend that information has value and enables people to do things they couldn't otherwise do. The role of information as a veritable tool for change and development can hardly be overstressed.

Burch and Starter (1991) have defined information as "the increase in knowledge obtained by the recipient by matching proper data elements of a variable of a problem. It is an aggregation or processing of data to provide knowledge or intelligence or reduce uncertainty of the user. It describes accumulated knowledge derived from all subjects in all forms and from all sources that could help the users reduce their level of uncertainty. Chapman and Slaymaker (2002) have defined information as the analysed data, often presented in a form that is specially designed for a given decision making task and transmitted to the receiver or decision maker. It means that information is a patterned or formatted data that informs. It is only information if it provides some new pattern relative to the one already known, that is, if it reduces uncertainty beyond one's existing knowledge. Some patterned data will be information to some but may not be to others, hence the concept of information having a target audience. This is particularly so because information, and indeed knowledge, is like a socio-economic variable. It is not evenly distributed throughout the society. Information is very crucial in strengthening the link and achieving the integration of various social groups so that they can develop together as a cohesive and well organised society. In the opinion of Martin (1995), information is the 'lifeblood of society'. He emphasises that with an interruption in the flow of this vital resource, society would quickly run into difficulties with business, industry, education, leisure, travel, communication, among other activities. This

will even be worse in more developed countries due to their heavy dependency on the power of communication and its technologies. According to Buckland (1991), information can be varyingly conceived as follows:

- Information as a-thing: Information is considered as such phenomena like objects and events. As a 'thing" information can be tangible as opposed to knowledge which inherently is intangible. In order to communicate knowledge, it must be expressed, represented in some physical ways as a signal or text and, communicating any of such expression, would constitute information as a thing.
- Information as a resource: This is considered to be intuitively plausible in this age of global information and communication flows. It is a very critical element in the present day information society and its virtue as a resource is comparable to oil and other raw materials.
- Information as a commodity: commodity in this case is referred to as all manners of information services, including trans-border data flows. The concept of information as commodity is quite broad compared to information as a resource because it entails the exchange of information among people and other related activities.
- Information as a constitutive-force-in-society: Information is here viewed as playing an active role in the shaping of context. Information is considered only as affected by its environment, but also an actor which affects various factors or elements within its own environment. This is because information is not only embedded within a social structure but also creates the structure by itself.

Information creates negative entropy, that is, it creates the energy to act within an individual. It is this capacity of information to accept and bring about significant changes within an individual, groups or a country that makes it so vital in the development process. Adedoyin (1990) noted that a steady flow of accurate, understandable, factual information links the scientists with the farmers, and for any true agricultural progress, farmers must know, must understand and must act .How far people progress in whatever they are doing depends largely upon their access to accurate and reliable information.

In the opinion of Aboyade (1987), adequate information would not only make for a better understanding and appreciation of the relevance of new programmes to the everyday living conditions of the people, but would also encourage a closer link between the initiator and the beneficiaries of the developmental efforts. Any system initiating a stimulating development has a responsibility to provide and disseminate information about its activities

to make the people knowledgeable about things happening around them, and also generate in them the right attitude and encourage the adoption of desirable value systems. This brings about the issues of providing "quality information." In the opinion of Burch (1986), "quality information rests" on three pillars which are as follows:

Accuracy implies that the information is free from bias and passes as much as possible the intended messages; timeliness means that the recipients can get the information when they actually need it; and relevance means whether the piece of information specifically answers the users questions of what, why, where, when, who and how. Burch (1986) further notes that what is relevant information for one user may not necessarily be relevant for another user. In other words, the relevance of any information varies distinctly among the intended users. This is why all information is said to have its target audience.

In the opinion of Ndayi (1991), information not only refers to radio or television bulletins which one receives regularly or probably the daily headlines that catch the eyes or come around any time, but rather information implies the mass of data stocked in government and company offices, files, reports, statistics, projects and all other forms of information which can assist various institutions or different individuals in decision making process. Corroborating this assertion, Aina (1995) noted that information can be defined as data for decision making, a resource that must be acquired and used in order to make an informed decision and that those who possess appropriate and timely information would make more rational decisions than those without it.

2.3.1 Typology of agricultural information

Agricultural development, like other development activities, must be hinged on information. According to Alemna (1995), information is one of the appropriate tools, which can be relied upon to increase food production. Aina (1990) classified agricultural information as all published and unpublished knowledge on all aspects of agriculture. Aina (1995), further classified information required for agricultural development into four categories. With this classification, it is apparent that agricultural information comes from different sources;

- Technical/Scientific Information: This is agricultural information emanating from research and other developmental works carried out in various research institutes and universities with the aim of increasing the agricultural productivities of the farmers.

- Commercial/economic information: This form of agricultural information covers issues such as obtaining credits, cooperatives and national prices for export commodities, among other aspects.
- Social/cultural information: This type of information centres around traditional information on agricultural practises, local cultures, background, information on farming communities, labour availability and related issues.
- Legal information: This focuses on all the legislation affecting agriculture such as land tenure, production, distribution and sale of agricultural produce.

2.3.2 Sources of agricultural information

Information sources are very crucial stimuli to both disseminators and users of information. In the opinion of Lionberger (1960), cited by Gbokoyi (2004), sources of agricultural information are people and agencies from who farm information is sought. He therefore grouped the sources into two as:

- Institutionalised sources, and
- Non-institutionalised sources

Institutionalised sources are sources such as formal and organised bodies including extension agents, researchers from research institutes, universities or agents from NGOs, among other sources. Non-institutionalised sources are sources like neighbours, friends, fellow farmers, village leaders and relations. Such sources do not adopt any formal procedure in sourcing or disseminating farm information.

According to Williams (1984), information sources can be classified into three categories namely;

- Mass media: radio, newspaper, television and posters,
- Government agencies which include extension services and cooperative organisations,
- Salesmen and suppliers of equipment, insecticide, fungicide and fertiliser used on the farm,

In the same vein, Magnire (1994), cited by Yomi and Odefadehan (2006), opined that information sources attract two connotations, namely;

- The store or the location in which information is kept, which may be personal or impersonal, private or public, passive or interactive, stored locally or remotely to which delayed or access may be available and access may be difficult or easy to arrange, and

- Information could be obtained from books, electronic and printed media/materials, conference proceedings, dissertations, internet, training or through interpersonal interaction.

2.3.3 Agricultural information users

Agricultural information user community, as defined by Kaniki (1995), cited by Banmeke (2003), is said to consist of all persons whose nature of work involves some part or the whole of the field of agriculture or its products, and as a result of this, require agricultural information to accomplish their work. This definition shows that any individual whose work is related in whatever form to agricultural activities is categorised as an agricultural information user.

In Africa, a lot of people use agricultural information, as agriculture is interdisciplinary in nature and a large percentage of the population resides in the rural areas and is mainly involved in agriculture. According to Aina (1995), agricultural information users include policy makers and planners, researchers, extension workers, educators and students, agricultural librarians and information specialists, agro-based industries and service staff and farmers.

According to Banmeke (2003), many people are involved in the use of agricultural information, hence, the importance attached to it. Agricultural information therefore, needs to be properly generated, effectively disseminated, adequately repackaged and utilised appropriately in order to achieve increased agricultural productivity Messer (1994). Most definitions of communication involve the transfer of information by verbal or non-verbal means. An important dimension of viewing communication is whether it is transmitted intentionally, accurately received, or perceived as intentionally or unintentionally. Stanley Roy (1995) has noted that not everyone would consider that every communication has to involve an intention. Therefore, communication entails the passing or exchange of information through a system to the people. This leads to the issue of effective communication which can be said to be a situation that arises whenever a fact or information that is intended for a people gets to them and is well understood. In the opinion of Oladeji (1999), effective communication can be said to constitute a dynamic process that involves constant change of ideas and interaction among people for the solution of problems.

According to Liebenau and Backhouse (1990), effective communication takes place when there is a high degree of correspondence between a sender's intention and the way it is interpreted by the receiver and when there is an appropriate response. Therefore,

communication is very crucial for any development process to be effective and successful .Olowu and Yahaya (1993) asserted that the success of any laudable development programme and the attainment of desirable and worthwhile socio-economic status depends, to some extent, on the communication system adopted, as it is the system that is adopted that either make news, facts, figures and opinions available to the public so they can judge the programme as successful or otherwise. This shows that communication is very vital in order to ensure the success of most developmental programmes. Agricultural communication, as noted by Adaolekun (1985), is an aspect of communication that is as old as agriculture itself, especially if it means the exchange of information about agriculture between and among people, in this case farmers. Agricultural communication has also come to be accepted as an organised or conscientious way of communicating agricultural information in a systematic manner for effective agricultural development.

2.4 Communication technology and agricultural development

The history of the relationship between communication technology and agricultural development dates back to the farm forum introduced in the United Kingdom in the 1930s to transfer agricultural information and advice to farmers (Mowlana and Wilson, 1988). During the same period, Australia and New Zealand used radio to educate children of farmers (Hornick, 1988). This was done to complement face-to-face communication in dissemination activities by the industrialised nations. In non-industrialised nations, there were, by contrast, neither enough trained teachers and field agents nor adequate finance to bear the cost of dissemination activities. Consequently, attempts to repair knowledge and skill deficiencies among the people of developing world with face-to face communication seemed implausible. Communication scholars argued for the use of mass media either as a substitute for unavailable teachers and field agents or as a complement to interpersonal communication. This resulted in the creation of hundreds of mass media-based projects around the world during the 1950s, 1960s and 1970s (Mowlana and Wilson, 1988). Agriculture being the main occupation of people in non-industrialised societies was a major focus for information transfer programmers, using modern communication technologies. Traditional media and the new ICTs play major roles in diffusion of information to the rural communities. Traditional media have been used very successfully in developing countries like Nigeria, and rural radio in particular, has played a major role in delivering agricultural messages. According to Ozor (2007), print media, video, television, films, slides, pictures, drama, dance, folklore, group discussions, meetings, exhibition and demonstration have been used to speed up the delivery of extension services.

For the purpose of this study, a review of some of the information and communication technologies is presented in the following sections:

2.4.1 Folk media

The folk media consist of a variety of forms such as puppetry, stories, beats, dance, poems and praise singing, among other media. They serve as vehicles for communication and entertainment. According to Melkote (1991), folk media is a community action system embedded in culture which existed before the arrival of mass media and still exist as a vital mode of communication in many parts of the world, presenting a certain degree of continuity despite changes. In the opinion of Ranganath (1975), cited by Melkote (1991), traditional media is a living expression of the lifestyle and culture of a people evolved through the years. Also, Roling (1990) has expressed the view that folk media have not received the attention they deserve in modern communication efforts. According to him, the traditional methods should be re-examined and utilised where appropriate, if dissemination of information to the grassroots is to have the desired impact. This is because the modern media are urban-based and cater primarily for the few elitist groups (Braimoh, 1984 cited by Yahaya, 2003b). Creative use of folk media, in cultures where they are popular and well entrenched, can be a subtle and effective way of introducing development ideas and messages. It may however, require skilled crafting of development messages into the fabrics of the folk media. It may be difficult to organise, and requires close working relationship between development workers and folk media artiste.

2.4.2 Use of radio

Radio is the oldest communication technology used for the transfer of agricultural information. The number of radio receivers per 1000 population in developing countries is said to be far greater than that of any other modern media (Mowlana and Wilson, 1988). Several studies (Olowu and and Igodan, 1989; Mohammed and Wonasa, 1993, Yahaya, 1995; and Olowu *et al.*, 2004), give credence to radio as a major source of information in Nigeria. According to Ifejika *et al* (2007), the importance of radio to rural farmers is attributed to its merits such as affordability, low cost of maintenance, ease of operation, wider reach, availability and localisation of programmes. It has wider coverage and is readily available even among very remote rural populations. In the words of William Sweeney, cited by Yahaya (2003a:104).

> *Radio is still the most potent communication innovation since the print press. It has a large (sic) audience than that of any other mass medium. The large-scale manufacture and distribution of inexpensive*

battery operated transistor radio have brought much of the world's population into an international community network.

Radio, therefore, seems to be a very appropriate technology for motivating farmers and for drawing their audience to new agricultural production ideas and techniques. In addition to the above benefits, Sasidhar (2005) contends that radio can relay critical information such as disaster preparedness, weather and market information. Programme production is relatively simple and local stations can easily create their own content.

Radio is a realistic and liberal medium in terms of affordability and content relevance to the needs and characteristics of Nigeria rural population. This is further accentuated by the fact that radio programmes can provide information, promote, educate, and elicit feedback in a participatory process. Thus, radio can be used to create and encourage diverse audience participation, act powerfully on their imagination through its ability to create situations at different times and places (Moemeka, 1990).

Group and household radio listening is very common in many parts of Northern Nigeria. Such a group is called the radio listening club. Many of such groups are also used by government and NGOs as medium to channel development concerns to women who are often members of the radio listening clubs. The radio listening club is a strategy in which radio and radio forums are used by women to get information, education, training in areas of agriculture, health care, family life and market prices, among other areas. In radio listening clubs, women farmers come together to listen to any radio programme that is of interest to them, They in turn record their views on a topic of interest and other areas of difficulty to them and subsequently send the tape to the producer/ radio station for onward broadcast. In this way, women radio listening clubs have led to government officials responding to their needs and concerns (Opoku-Mensah, 2000). Also, the radio listening clubs have made women feel a sense of empowerment as their voice is heard. In this way, some of them have become educators of other women in areas of crop cultivation, marital strife and HIV/AIDS awareness campaign among others. As excellent as radio is, it is weak for providing detailed knowledge and training as it is audio only.

2.4.3 Use of television

The advent of television was considered the magic solution to communication problems in rural areas, as word and sound are complemented by still and moving images. FAO (1998) refers to television as a highly persuasive and effective communication medium that has become a tool designed to increase awareness about specific development problems and stimulate local discussion and possible solution. According to Olowu (1991), television

has the potential of increasing farmers' knowledge in the 21st century Nigeria. The problems of television are cost of hardware, cost of maintenance and inadequate source of power in most rural areas, thereby restricting television usage to the urban areas.

2.4.4 Use of videos

Videos are tapes that have the ability to recall or show past events recorded on tapes to present to the clientele through cassette player or television. Videos appeal to both senses of sight and hearing. The various types of videos are the Compact Disc (CD), Video tapes and Digital Versatile Disk (DVD), among others. Videos as communication tool can be vitally useful in improving extension contact and impact of training on the clientele. In the opinion of Talaba (1989, Spencer 1991 and Oduko 1996, cited by Adeogun *et al* (2007), video could be used to complement efforts of village extension agents in effectively sustaining contact with farmers. Other qualities of video use are the fact that video is simple to use, can be used where electricity is not available and can easily be produced and distributed to as many farmers as possible. Video can be used to mobilise and motivate people, especially when rural people watch success stories of other rural area or villages where similar programmes were executed in the past. Also, rural people could be stirred when they see themselves in video or performing certain activities in the video clip,

2.4.5 Print media

Amidst the glamour and promises of electronic media, the role of the print media in information transfer tends to be underrated. Diverse application of the print media has shown that printed material can be effective in informing both literate and non-literate farmers (FAO, undated). The use of photos, novels, illustrated booklets and posters may benefit both literate and illiterate alike. Other uses of printed materials include comic books, comic strips, flyers and newspapers. Chartrand *et al* (1983) cited by Mowlana and Wilson (1988), have identified newspaper as the first mass medium. Well designed and carefully written for the intended audience, printed materials can provide a virtually important and cheap source of reference for extension and for the literate among the rural population. According to Yahaya (2003b), printed materials can be taken home, consulted and kept as a permanent reminder. So, content erosion is minimal compared to other mass media channels. It can form part of life long asset.

2.4.6 The internet

The much talked about ICTs and the information revolution that has spanned the globe is brought about by the power of the internet or internet in convergence with other media to accomplish dissemination functions. Internet offers unprecedented access to

information. According to FAO (1998), the internet emerged in the early 1960s within the context of the cold war, from research funded by the United States Department of Defence. It was designed as a decentralised computer network that was less vulnerable to nuclear attack than a centrally controlled system. A "decentralised fail safe" system was devised whereby computer sent pockets of information from one computer to another across the United States. Alternative computer routes allowed the information to reach its destination in the event that one or more routes were destroyed. Soon, new nodes or routes were added to connect researchers located at the universities and colleges. A large community of users beyond the military began to use the network, which became increasingly personalised since computer could "talk" with each other through electronic mail. This popular utilisation of network foreshadowed what the internet would become an instrument of connectivity, not just of machines but also of people.

The internet has become the global "people network" for communicating and sharing information. It consists of two powerful tools, e-mail and the worldwide web (www) (FAO, 2000). In the opinion of Amodu (2007), the Internet brings new information resources and can open up new communication channels for remote rural communities if properly harnessed. As many technologies before it, the internet potentially enables rural communities to receive outside information and knowledge that can spur development. But unlike the other media before it, the intern*et al*lows the user to be a sender, a receiver and narrow caster in a bi-directional or, indeed a multi-directional flow, thus opening up a new vista for rural communication. However, internet access is likely to be available only to a small proportion of the people in the poorest countries for the immediate future. This may be due to poor ICT infrastructure, poverty and illiteracy, among other factors.

2.4.7 Use of telecentres

The definition of a telecentre is as varied as the services that such centres can offer. Smaller telecentres usually include basic internet services and may also include access to fax, telephone and photocopier, among other services. There are also instances where the internet is used in combination with traditional information technologies like radio and television to broadcast information over a wide area at low cost. However, Roman and Colle (2001), cited by Kenji (2004), have defined a telecentre as a place where the public can access computer, the internet and other technologies that help them gather information, create, learn and communicate with others. According to Carvin and Surman (2006), telecentres go by different names in different places from information kiosk, telecottage, community access point, community multi-media centre, infocentre to infoplaza among other names.

Telecentres are designed to produce a combination of ICT services, ranging from basic telephone or e-mail services to full internet/world wide web connectivity (Gomez, Hunt and Lamoureux, 1999 cited by Kumar and Best undated). Telecentres have gained prominence as centres for bringing the benefits of ICTs to poor communities where the technological infrastructure is inadequate and the cost of individual access to these technologies is relatively high. The telecentres also provide opportunities for access to information, thereby overcoming the barriers of distance and location, bridging the digital divide and creating economic opportunities, while fostering social cohesion and interaction among users.

The digital dividend clearing house, categorises telecentres into three types based on organisation that funds or manages them as:

(a) For profit telecentres: launched by entrepreneurs for profit, it ranges from the pure commercial cybercafé to the social enterprises,

(b) Non-profit telecentres: setup by foundations, international agencies, NGOs and other civil society organisations. Such telecentres rely on donor funding to cover their investment costs. According to Proenza (2001), many of these NGO-run telecentres are cybercafés in disguise. Such telecentres, in the opinion of Proenza (2001), do not offer more valued services than a typical cybercafé. The revenue from the cybercafé is used as staff salary and other operation costs, and

(c) Government telecentres; Initiated by government or government agencies and where social good objectives are combined. Such centres are aimed at dissemination of information in the areas of e-governance, encouraging next of civil participation, in addition to providing public access to ICTs.

2.5 Concept of attitude

An attitude is an organised predisposition to think, feel and behave towards a reference or cognitive object (Kerlinger, 1973). It represents one's attraction to and aversion for persons, things or ideas. Attitude has its roots and foundation in emotions, knowledge and experience. An attitude is a mental and neural state of readiness, organised through experience, exerting a directive or dynamic influence upon the individual's responses to all objects and situations with which it is related. Kareem (2000) has opined that an attitude is an impressionistic conception of a person, which tends to influence one's perception of objects, events and people. Several social psychologists (Eagly and Chaiken, 1993, Olson and Zanna, 1993 and Fazio, 1995), view attitude as the evaluation of people, objects and ideas. Attitudes

are evaluative in that they consist of positive or negative reactions to a given object, event or idea.

From the definitions, it is observed that attitudes are privately formed and organised through experience, which exerts direct or dynamic influence on behaviour. Therefore, one's attitude can interfere with one's use of technology, experience and comprehension of information. Hence, attitude summarises past experience and predicts or guides future actions.

2.5.1 Sources of attitude formation

Attitudes are acquired from direct contact with the objects of the attitude. It may also be learned through interacting with others holding the same attitude. Attitudes are also influenced by the mass media. This is what is exploited in advertisements, owing largely to attitude being a good predictor of consumer behaviour. According to Berger and Mitchell (1989), to change behaviour, advertising must first change attitude.

Olson and Zanna (1993) have expressed the view that some attitudes are inadvertently formed by chance conditioning. This is a situation where one builds an attitude, positive or negative, towards a particular object, event or idea, following one or two bitter or sweet experiences. Tesser (1993) has posited that some attitudes are linked to the gene. Evidence of this conclusion came from the fact that identical twins share more attitude than fraternal twins, even when the identical twins were raised in different homes and never knew each other.

2.5.2 Components of an attitude

There are three ways in which attitudes are expressed:

- **Affective component:** an attitude based more on emotions and values than on objective appraisal of the positive and negative, is referred to as an affective-based attitude (Coon, 1995). This is typical when one is attracted to something based on emotion, but such emotions cannot be rationalised in terms of facts and figures.
- **Cognitive component**: consists of one's attitude and beliefs about the attitude object. The function of such an attitude is objective 'appraisal', meaning that objects are classified according to rewards and punishments that they can provide. The purpose of this kind of attitude is to classify the pluses and minuses of an object, so that we can quickly tell whether it is worthwhile to have anything to do with it or not.
- **Behavioural component**: also known as the action components of an attitude, is an attitude based on observation of how one behaves towards an attitudes- object.

According to Dary Bem's (1972, self perception theory, cited by Ajzen, 1985), under certain circumstances, people do not know how they feel until they see how they behave. Behaviours are, therefore, the outward expression of attitudes. That is, attitudes are inferred from behaviour.

People's attitudes (towards social issues) determine their behaviour. According to Fazio (1995), one key factor is knowing whether the behaviour one is trying to predict is spontaneous or is deliberative and planned. It depends on one's behaviour intention. Attitudes will predict spontaneous behaviour only when they are highly accessible to people. Attitude accessibility is defined as the strength of association between an object and evaluation of it (Fazio, 1990). If an object is highly accessible, then one's attitude readily comes to mind whenever one encounters the object. However, if accessibility is low, then one's positive or negative feeling about it comes to mind slowly. Accessibility also influences how easily people change their attitude. The more accessible an attitude is, the more easily it comes to mind and the harder that attitude is to change (Fazio, 1990). It is then assumed that highly accessible attitudes will be more likely to predict spontaneous behaviours. And when attitude is inaccessible, people are more influenced by situational variables, such as how noticeable or within reach the objects are.

According to Eagly and Chaiken (1993), it is only when one has to decide how to act on the spot without time to think it over that accessibility matters. Given enough time to think about an object, idea or event, even people with inaccessible attitudes can bring to mind how they feel in a deliberative and planned manner. In the opinion of Fishbein and Ajzen (1980), cited by Ajzen (1985), when people have time to contemplate how they are going to behave, the best predictor of their behaviour is their intention, which is in turn determined by their attitude towards the specific behaviour, their subjective norm and their perceived behavioural control.

2.5.3 Attitude measurement

There are several approaches to the measurement of attitudes, three of which are presented in the following paragraphs:

(a) **Direct method*:*** In direct method, individuals are simply asked in a straightforward way to express their attitude towards a particular issue. For example, a respondent might be asked in an open-ended interview what his/her thoughts are about a particular object, event or idea.

(b) **Social distance scale***:* The social distance scale indicates the degree to which one respondent will be willing to have contact with another person, that is, the respondent is

asked to state his/her willingness to admit members of a particular group to various levels of social closeness. These levels may range from "would exclude from my country" to "would admit to marriage in my family". According to Coon (1995), this has been very useful as a measure of attitudes toward groups.

(c) **Attitude scale***:* Attitude scale is the most common method of attitude measurement. It consists of statements expressing various possible views on an issue. Respondents are then asked to agree or disagree with each item on a 5-point scale by ranking from "strongly agree" to "strongly disagree". By computing scores on all items, a respondent can be rated for overall acceptance or rejection of a particular issue. Attitude scale was used in this study, to measure the attitude of women farmers in north-eastern Nigeria towards the use of ICTs.

2.6 Diffusion of innovations and use of ICTs

Diffusion is the process by which an innovation is communicated through certain channels over time among members of a social system (Rogers, 1995). Kelby (2003) emphasises that diffusion is a complex iterative process that takes place over time and depends on a number of interrelated social, economic, and political factors in a given social system. Therefore, the understanding of the culture, the local environmental and the individual actor is a pre-requisite to understanding how new ideas and techniques are diffused

Diffusion of any new idea or technology is always accompanied by an aura of uncertainty, especially if the idea or object threatens to make significant changes to the status quo. The newness of the innovation forces social agents to critically examine its quality and how it relates to their situation; this is the innovation decision process and Rogers (1995) categorises the steps an individual passes through from awareness of an innovation to the formation of an attitude toward the innovation. These steps are: knowledge, persuasion, decision, implementation and confirmation. According to Davis (1989), this is also the stage when members of a social system will form an attitude, positive or negative, towards the innovation based on their perceived usefulness and perceived ease of use of the technology, under normal circumstance.

Begazzi, Davis and Warshaw (1992), cited in the Wikipedia (2008), that:

Because new technologies such as personal computers are complex and an element of uncertainty exists in the minds of decision makers with respect to the successful adaptation of them. People form attitudes and intension towards trying to learn to use the new technology prior to initiating effort directed at using. Attitude towards usage and intention to use may be ill formed or

lacking in conviction or else may occur only after preliminary strivings to learn to use the technology evolve. Thus, actual usage may not be a direct or immediate consequence of such attitude or intentions.

This is because attitude formation and the intention to act may not be based only on perceived ease of use and usefulness of the innovation but also on other factors like the adopter's subjective norm, nervousness and whether she has a phobia for the technology in question or not.

2.6.1 Characteristics of an innovation

Different innovations have different probability of adoption and hence different adoption rates (Perry, 2006). In his diffusion model, Rogers (1995) highlighted five key attributes of an innovation as compatibility, complexity, observer-ability, relative advantage and trialability. According to Roman (2003), compatibility, complexity and relative advantages are the most important attributes of ICTs innovation.

(a) **Relative advantage**: with relative advantage, the innovation is expected or believed to confer some level of relative advantage over the other technologies preceding it. For example, if a woman farmer perceives that, the use of ICTs such as the internet will save her time and cost, she may choose to send e-mails instead of writing letters or travelling.

(b) **Compatibility:** indicates the perceived match of the innovation with the value system and the social norms of the potential adopter. How the innovation is perceived and used within the social system will greatly determine the potential adopter's attitude towards the use of the technology. Compatibility is also linked to the issues of content, that is whether the technology can be adapted to the social system and whether the content of the ICTs is relevant to adopter's needs or not.

(c) **Complexity:** is the perceived degree of difficulty in the adopter's understanding and use of the innovation. The adopter's perception of his/her ability to use the technology or not will definitely influence the person's use of such technology.

2.6.2 Adopter categories

The innovation decision process is comprised of the interaction between knowledge of the innovation, attitude formed towards the use of the innovation, the decision to adopt or reject the innovation, and finally, the implementation of the innovation. All of these processes take some time. This time lag is also the period when the potential adopters undergo some psychological analysis of the pros and cons of the innovation to them.

During this period, many factors of persuasion like change agents, opinion leaders, the mass media, friends and relations, among others, influence the adopters' attitude either favourable or unfavourable, towards the innovation. However, all members of a social system do not complete this decision making process at the same time. Based on this, Rogers (1995) outlined five adopter categories as innovators, early adopters, early majority, late majority and laggards on account of their rate of adoption of innovations. He reiterates the point that innovators and early adopters have greater exposure to mass media, high-level of education, less risk aversion, are cosmopolitan in outlook and have favourable attitude towards innovations.

CHAPTER THREE

THEORETICAL AND CONCEPTUAL FRAMEWORK

3.1 Introduction

This study is based on theories of behaviour. The principal concept is on how the theories can predict behaviour and the influence of behaviour towards a given object, event or person. The theories attempt to predict why individuals behave the way they do under certain circumstances. Based on these theories, the study attempted to predict the use of ICTs among women farmers in North-Eastern Nigeria. It shows how women farmers' socio-economic characteristics, awareness of ICTs, benefits and constraints in the use of ICTs as well as attitude towards the use or non-use of ICTs could influence the use of ICTs thereby improving their livelihood.

3.2 Theoretical framework

The study is based on the following theories of behaviour:

1. Theory of Reasoned Action,
2. Theory of Planned behaviour, and
3. Social Cognitive Theory.

3.2.1 Theory of reasoned action

The theory of reasoned action provides a framework for the study of behaviours that relate to the use of technology. According to Ajzen and Fishbein (1980), the most important determinant of a person's behaviour is behavioural intent. The individual's intention to perform certain behaviour is a combination of attitude toward performing the behaviour and the influence of others that are important to the person. The individual's attitude towards the behaviour includes behavioural belief, and the evaluation of behavioural outcome, subjective norms, normative beliefs, and the motivation to comply.

A person's behaviour (in this case use of a technology), consists of a belief that the particular behaviour will lead to a certain outcome, and an evaluation of the outcome. If the person perceives the outcome of use of the technology as beneficial, the person will have a positive attitude towards the use of the technology but if the person perceives the outcome as non-beneficial, the person will have a negative attitude towards the use of the technology. The technologies in this context are ICTs. Also, if relevant or significant others perceive use of ICTs as positive and the individual is motivated or desires to meet the expectations of those relevant or significant others, then a positive subjective norm is developed. This will positively influence the use of ICTs being the behaviour in question. Conversely, if relevant or significant others perceive the use of ICTs as negative, and the individual wants to meet

the expectations or the desires of these "significant others", a negative subjective norm will be developed. Therefore, the intent to use the ICTs depends on the product of measures of attitude and what the respondents think one stands to lose or gain by using ICTs. If the expectation is positive, then the individual is most likely to use the technology. In the opinion of Glanz *et al (*2002), a positive product indicates behavioural intent.

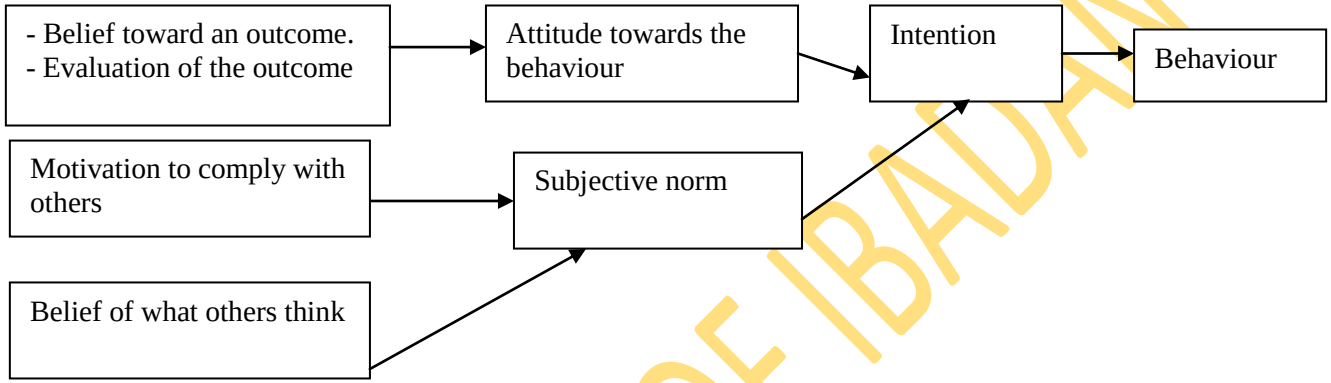

Figure 3.1: Theory of reasoned action
Source: Ajzen and Fishbein (1980, P 63)

This theory is limited by its assumption that behaviour or indeed use of a particular technology is within the volitional control of the individual concerned. This poses a problem for people who feel they have limited or no control over their behaviour. The following theory addresses this issue.

3.2.2 Theory of planned behaviour

Ajzen (1985) describes behaviour as a continuum from one of little control to one of great control. To overcome this, Ajzen proposed the theory of planned behaviour (Schifter and Ajzen, 1985).The theory was developed by Ajzen (1985) to predict behaviour in which individuals have incomplete volitional control. The theory of planned behaviour adds a third determinant to behaviour, that is, perceived behavioural control which is one's ability to use, or mastery of the use of the technology, to the other determinants of behaviour explained under the theory of reasoned action. Perceived behavioural control is the extent to which a person feels able to enact or perform a particular behaviour. It has two aspects: Control belief which is how much a person has control over the behaviour. This primarily has to do with one's ability or inability to afford the use of the technology when desired or when the need arises and control power or how confident a person feels about being able to perform or not perform the behaviour, which explains how confident the woman farmer is or otherwise in her ability to use the technology. If a person holds a strong control belief about exchange of factors that will facilitate behaviour, then the individual will have high-perceived control over such behaviour. However, if a person holds strong control belief that impedes the behaviour, the person will have low perception of control. This operation can reflect past experiences, anticipate upcoming circumstances, and the attitude of the influential norms that surround the individual (MacKenzie and Jurs, 1993).

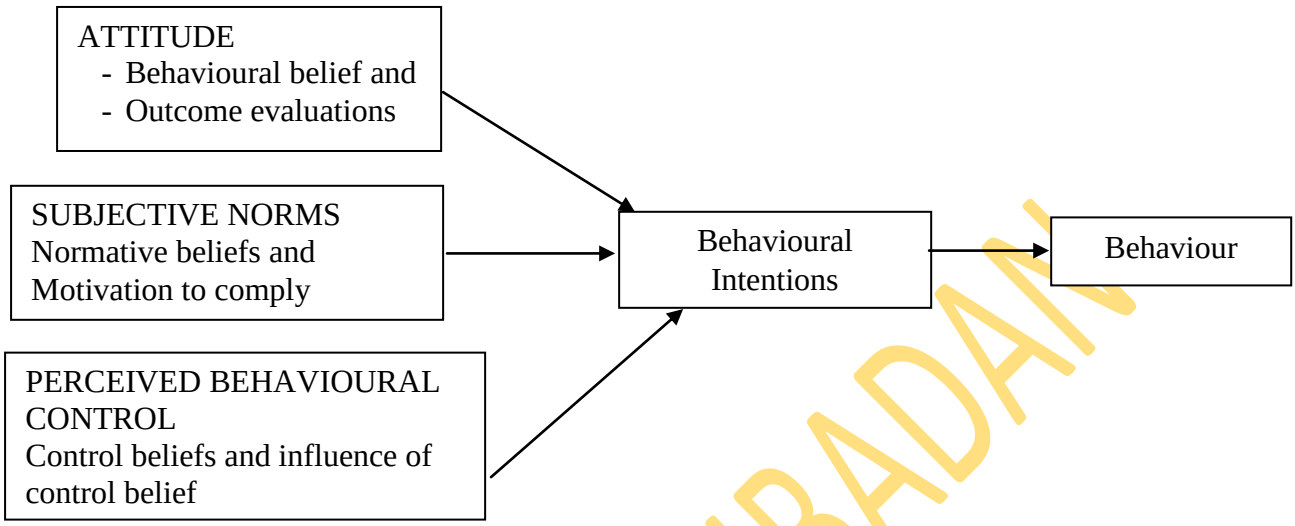

Figure 3.2: Theory of planned behaviour
Source: Ajzen (1985, p 65)

3.2.3 Social cognitive theory

The social cognitive theory defines human behaviour as a triadic, dynamic and reciprocal interaction of personal factors, behaviour and the environment (Bandura, 1989). According to the theory, an individual' behaviour is uniquely determined by each of the three factors.

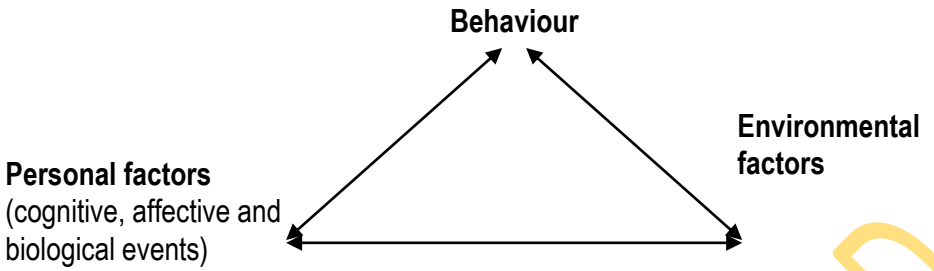

Figure 3.3: Social cognitive theory
Source: Triadic Reciprocal of Human Behaviour (Bandura, 1989, P. 32).

Based on the framework, the personal factor-behaviour interaction involves a bi-directional influence of one's thoughts, emotions, biological characteristics and behaviour. For example, a woman farmer's expectations and beliefs about her perceived ease or difficulty in the use of ICTs and her intentions will shape and direct her behaviour. However, the behaviour that is carried out will affect one's thoughts and emotions. The interaction therefore, occurs out of the influence of nature, that is, the biological factors such as sex, temperament and genetic pre-disposition, among other factors, and the influence they have on behaviour.

Similarly, a second bi-directional interaction occurs between environment and personal characteristics (Bandura, 1989). In this interaction, human personal characteristics such as beliefs, affective and cognitive competence are nurtured and modified by the social and physical environment. Conversely, humans evoke different reactions on their social and physical environment.

A third bi-directional interaction occurs between behaviour and the environment. Bandura (1989) contends that individuals are both products and producers of their environment. A person's behaviour can be determined by environment, thereby influencing the way in which she experiences the environment through selective attention. Based on individuals' experience with the environment, humans select the activities they participate in from a vast range of possibilities. Therefore, a person's behaviour will influence the aspect of the environment to which she is exposed such as when an aggressive person creates a hostile environment. Bandura (1989) has expressed the view that this reciprocal interaction does not imply that all sources of influence are of equal strength. The interaction between the three factors will differ based on the individual, the particular behaviour under examination and the specific situation in which behaviour occurs.

Considering the three theories of behaviour that were reviewed in this study, the social cognitive theory is the one that actually captured women farmers' use of ICTs. The theory consists of interaction of personal factors, behavior (as determined by attitude and environmental factors). Thus social cognitive theory forms the basis of the conceptual frame work for the study.

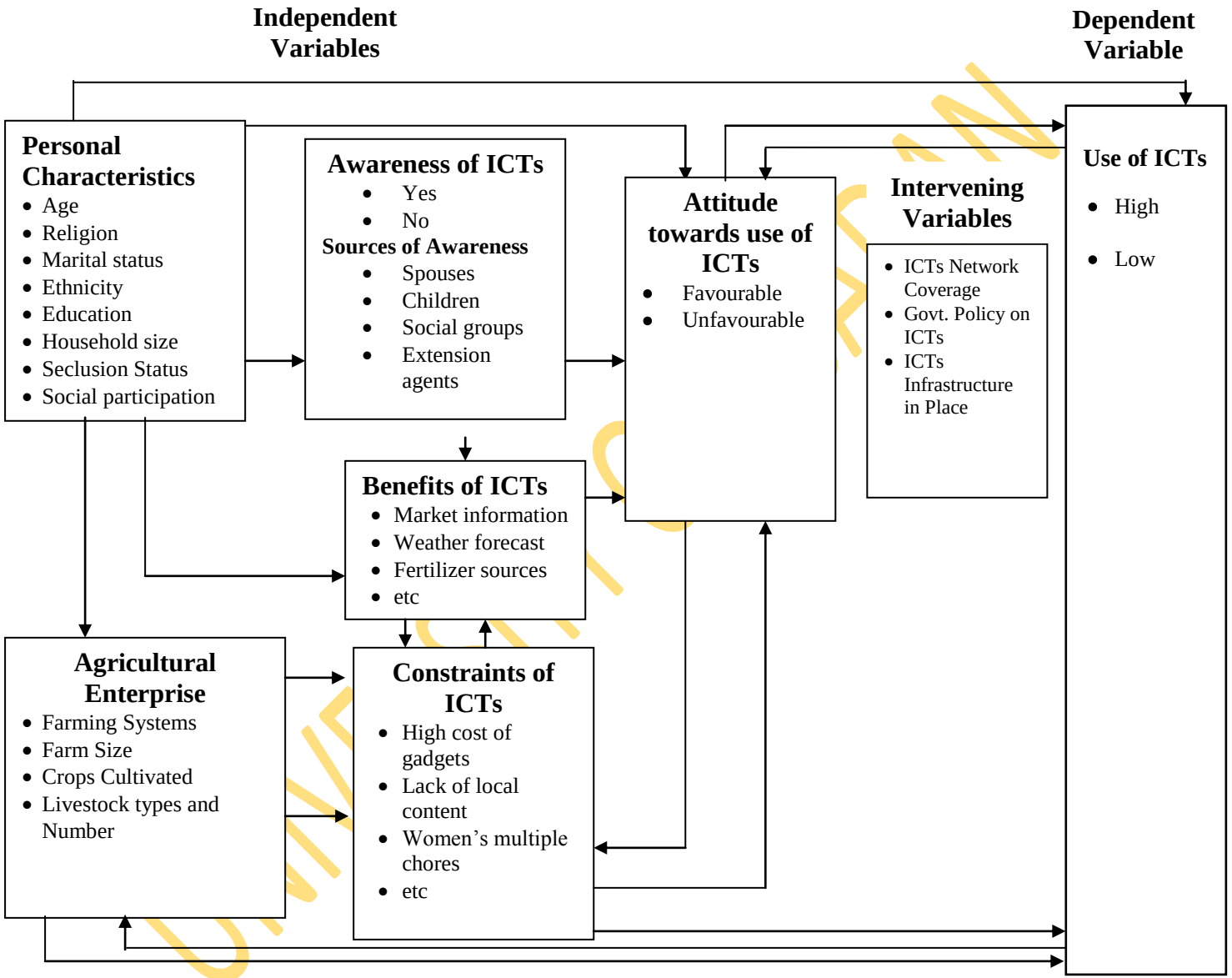

Fig. 3.4: Conceptual Framework of Women Farmers' use of ICTs

3.3 Explanation of the conceptual framework

The framework presupposes that women farmers' personal characteristics can directly influence their use of ICTs as either high or low use. In the same vein, women farmers' personal characteristics such as education, household size and social participation, among other characteristics, can directly influence their awareness of ICTs. Awareness is created, women farmers interact with members of their various social groups, family or agricultural extension agents. Awareness of ICTs through the sources stated can influence the women's' benefits of use of ICTs as well as make the respondents form attitude either favourable or unfavourable towards use of ICTs. The attitude so formed can influence either low or high use of ICTs. Conversely, a particular woman's use of ICTs is capable of influencing her attitude either positive or negative towards use of ICTs

Women farmers' personal characteristics like age, seclusion status and social participation, among other personal characteristics, is capable of influencing the benefits derived from use of ICTs. For example, age will directly influence women farmers' perception of benefits. This assumption stems from the fact that older people may be less adventurous and less favourably disposed towards trying new things, as opposed to younger one (De Bono, 1993). Hence, older farmers may have low expectation of benefits derived and less favourable attitudes towards use of ICTs. Yahaya (1995) revealed that secluded women farmers have high information needs to enhance their knowledge or skill about farm practise. This is because women farmers in seclusion may not have direct access to other sources of information as their non-secluded counterparts. Secluded women farmers may have favourable attitudes towards the use of ICTs. Inversely, women farmers' attitude either favourable or unfavourable can still affect the benefits they anticipate in the use of ICTs, while women farmers' benefits in the use of ICTs is affected by and affects the constraints experienced. For example, if a particular woman farmer is desirous of listening to a particular radio programme, say a broadcast on current marketing prices of crops, she may buy battery to power her radio set or visit a neighbour's house to listen to the broadcast. However, the woman can still experience loss of signal from the source of the programme midway into the broadcast. It then means that, even after overcoming some constraints in anticipation of the benefits derived from use of ICTs, other constraints can still come between the woman and the programme.

The constraints in use of ICTs such as high cost of ICTs, lack of local contents, shortage of time allotted to agricultural programmes and difficulty in operating ICTs, among other constraints, can directly influence women farmers' attitude either favourably or unfavourably towards the use of ICTs and subsequently the constraints women farmers'

experience. Women farmers' constraints experienced in the use of ICTs may influence their agricultural enterprise. For example, a particular woman farmer may abandon the adoption of a particular farming technology, if she realises that due to constraints experienced, she was not getting sufficient information on the technology any longer. This abandoned adoption can make the woman to change her farming system or even reduce her farm size. In the same vein, the agricultural enterprise of the woman farmer, be it crop cultivation and/ or livestock keeping, as well as the size of her farm and whether she is involved in wet or dry season agriculture will all determine her use of ICTs either low or high.

The women farmers' agricultural enterprise is also influenced by their personal characteristics such as age, marital status, seclusion status and religion, among other personal characteristics. For example, the cultivation of sesame seed is seen as an exclusive of the old women among the Higgi people of Adamawa State, while a Muslim woman will not keep pigs as Islamic tenets forbid that. Also, the use of a particular ICT by a married woman, be she in seclusion or not, will be directly influenced by her husband's opinion. The agricultural enterprise can also affect the benefits they drive from use of ICTs and their use of ICTs. Conversely, women farmers' use of ICTs, the constraints they experience in use of ICTs as well as the benefits they derive influence women farmers' agricultural practises. All these are operating within the environmental sub-system the Framework.

3.4 Assumptions of the framework

In order to make use of the conceptual framework, some assumptions were made and these include:

- that government policies on ICTs were constant throughout the period of the study
- that women farmers, whether they use ICTs or not, have attitudes towards use of ICTs
- that ICTs support facilities and signals are evenly distributed across the study area
- that Women farmers' use of ICTs depends on their awareness of the ICTs

CHAPTER FOUR

METHODOLOGY

4.1 Area of study

The study was conducted in North-Eastern Nigeria. The area is made up of six states namely: Adamawa, Bauchi, Borno Gombe, Taraba and Yobe. The area has an annual rainfall of between 700 mm and 1550 mm and has between three and six months of rainfall a year, with August and September as the wettest months, while the driest months are February and March when relative humidity is about 13 percent (Adebayo and Umar, 1999).

Adamawa and Bauchi states were randomly selected for the study out of the six states that make up North-Eastern Nigeria (Figure 4.1). Adamawa State lies between latitude 7^{o} 28'N and 10^{o} 55'N of the Equator and Longitude 11^{o} 30'E and 13^{o} 45' E of the Greenwich Meridian, with a population of 3, 168, 101 (2006 National Population Census of Federal Republic of Nigeria Official Gazette, 2007). Adamawa State is bounded in the north by Borno State, to the east by the Republic of Cameroon, in the south by Taraba and in the west by Gombe and Borno states.

Bauchi State, on the other hand, is located between Latitude 9^{o} 03'N and 12^{o} 03'N of the Equator and Longitude 8^{o} 50' and 11^{o} 00 E of the Greenwich Meridian, with a population of 4, 706, 909 (2006 National Population Census, Federal Republic of Nigeria Official Gazette, 2007). Bauchi State is bounded in the north by Kano and Jigawa states, in the south by Taraba and Plateau states, in the east by Gombe and Yobe states and by Kaduna State in the west

Agriculture offers the source of livelihood to a majority of the population through subsistence traditional farming. According to Sajo and Kadams (1999), the major crops grown in the areas include millet (*Eluesine coracana*), groundnut (*Arachis hypogea*), Maize (*Zea mays*), sorghum (*Sorghum bicolor*), rice (*Oryza sativa*), Yam (*Dioscorea* spp), cowpea (*Vigna unguiculata*), soyabeans (*Glycine max*), beniseed/sesame (*Sesamum indicum*), cassava (*Manihot esculenta*), cotton (*Gossypium* spp) and sweet potato (*Ipomea* batatas), vegetables such as carrots (*Dacus carota*), Tomatoes (*Lycopersicon lycopersicum*), spinach (*Amaranthus* spp), garden egg (*Solanum melongena*), onion (*Allium cepa*), sorell/roselle (*Hibiscus sabdariffa*), and okra (*Abelmoschus esculentum*), among other crops are also grown intensively in the area during the dry season. In addition to crop farming, some farmers keep livestock such as cattle, sheep, goats, pigs and poultry.

4.2 Study population

The population of this study comprises women farmers in North-Eastern Nigeria.

4.2.1 Agricultural Development Programmes (ADPs) in the states

Extension services in both Adamawa and Bauchi States are directly overseen by the states' Agricultural Development Programme (ADP). Administratively, the state ADPs are divided into extension zones, blocks and cells. Adamawa State ADP consists of four zones (Gombi, Guyuk, Mayo-belwa and Mubi) and 44 extension blocks. Bauchi State ADP, on the other hand, consists of three zones thus: Northern (Azare), Central (Miya) and Western (Nabardo) zones with 40 extension blocks

4.3 Sampling procedure and sample size

A multi-stage random sampling technique was employed to select respondents for the study thus:

Stage I: Two out of the six states in North-Eastern Nigeria were randomly selected for the study

Stage II: All the seven ADP zones in the two states were included in the sample for the study

Stage III: Twenty five percent of the extension blocks in each zone were then selected

Stage IV Both registered and unregistered women farmers from rural and urban areas were sampled for the study from the selected blocks. This selection was based on the list of registered women farmers obtained from the respective WIA block extension agents and the list of unregistered women farmers determined through a snowball technique.

Stage V: Fifteen percent of the women farmers in each stratum were randomly selected for the study (Table 4.1).

Table 4.1: Sampling procedure and sample size

States	Zones	No. of blocks in each zone	25% of blocks sampled	Population in selected blocks		15% of population in sample blocks	
				Registered	Unregistered	Registered	Unregistered
	Mubi	9	2	217	98	33	15
	Gombi	9	2	120	73	18	11
Adamawa	Mayo-Belwa	17	4	260	85	39	13
	Guyuk	9	2	188	102	28	15
	Total	44	10	785	358	**118**	**54**
	Azare	15	4	327	107	49	16
	Miya	9	2	244	87	37	13
Bauchi	Nabardo	16	4	362	120	54	18
	Total	40	10	933	314	**140**	**47**
	Grand Total	84	20	1718	672	**258**	**101**

Sample size = 359

4.4 Instrument for data collection

The study used both quantitative and qualitative methods of data collection.

For the quantitative method, an interview schedule was developed, pre-tested and administered on the respondents. The items in the interview schedule measured women farmers' socio-economic characteristics, awareness of ICTs, sources of awareness of ICTs, attitude towards use of ICTs and use of ICTs. For the qualitative data, Focus Group Discussion (FGD) and In-depth Interview (IDI) guides were developed and validated. The FGD and IDI were used to determine the socio-cultural factors that affect women farmers' use of ICTs, benefits of, and constraints to use of ICTs and their ICTs preference.

4.4.1 Validation of instrument

In order to ensure the validity of the instrument for data collection, it was subjected to both face and content validity with the assistance of experts in agricultural extension, rural sociology and language and communication arts. This was achieved by seeking the opinion of these experts on the representative-ness and adequacy of the items designed to measure the variables of the study. This procedure assisted in designing items that covered all the objectives of the study, while at the same time capturing the content of what was being assessed in the research.

4.4.2 Pre-testing of instrument

The measuring instrument for the study was pre-tested to determine its reliability. The pre-test was conducted with 40 women farmers selected from Kaltungo Zone in Gombe State as Gombe State was not included in the sample for the study. The instrument was administered twice to the same respondents at intervals of three weeks. The pre-test was conducted between April and May 2009, that is, about two months before the actual data collection in July and August, 2009. This gave ample time for all necessary modifications in the instrument.

It was observed that so much time was spent with each respondent due to the number of items in the interview schedule. However, the duration was reduced when some questions were re-stated and others expunged after the reliability test was conducted. It was also observed that the female extension agents enjoyed a lot of cooperation from the women farmers. This is because the women farmers are used to the female extension agents, so they freely provided the needed information without undue pressure from the interviewers.

4.4.3 Reliability of instrument

The reliability test for the instrument was conducted, using the test re-test method (Kerlinger, 1973).The results of the two tests were correlated, using the Kudar-Richardson formula (KR-20) to determine the reliability of the interview schedule. A reliability coefficient of r=0.897 was therefore obtained.

Also, an item analysis was conducted to increase the reliability of the measuring instrument. This was done to determine whether or not an item in the measuring instrument discriminates exactly the same way that the overall scale is expected to discriminate. This involved correlating the score for each item in the measuring instrument with the overall scores obtained from the total test. In the item analysis, any item that did not give a high correlation (r=0.48 and above) was considered ambiguous and was reframed or totally discarded.

Based on the item analysis, the interview schedule was reviewed and twenty-one of the 50 attitudinal statements were removed. These items were expunged because they have low correlation with the scores of the overall scale, ranging between r=0.01 and r=0.35.

4.5 Data collection procedure

Data for this study were collected by the researcher with the assistance of Women-in-Agriculture (WIA) block extension agents and Subject Matter Specialists (SMS) in Adamawa and Bauchi states.

Two research assistants (WIA SMSs) and four enumerators (WIA extension agents) were recruited in each state and trained to administer the interview schedule. These research assistants and enumerators are specialists who are familiar with the women farmers and the socio-cultural terrain of the various ADP zones in the states. The enumerators and research assistants had academic qualifications ranging from Higher National Diploma to Master's degree in agriculture-related fields. A training session was organised for the research assistants and enumerators in Adamawa and Bauchi states respectively. During the training session, the participants familiarised themselves with the measuring instruments through role playing. The training lasted for about four hours in each state.

The interview schedule was administered to the respondents in their homes, in group meetings and on farms during rest periods. The interviews were conducted with permission from the husbands in most cases. Data for this study were collected between March and August 2009.

4.6 Measurement of variables

The independent variables in this study are the socio-economic characteristics of the respondents such as ethnic background, age, marital status, seclusion status, religion, educational attainment, family size, social participation, agricultural activities and other major occupations. Other independent variables are women farmers' awareness of ICTs, their sources of awareness, attitude towards use of ICTs, socio-cultural factors that affect use of ICTs, benefits and constraints to use of ICTs and ICTs preferences. The dependent variable of the study is women farmers' use of ICTs

4.6.1 Age

The age of the respondents was measured by asking them to provide their actual age in years. Those who could not give their accurate age were requested to state spectacular event (s) that happened during their birth, from which an estimate was thereafter made.

4.6.2 Ethnic group

Respondents were asked to specify their ethnic groups.

4.6.3 Marital status

The marital status of the respondents was determined by asking them to indicate the most appropriate option that reflects whether they are married, single, widowed or divorced.

4.6.4 Seclusion status

The respondents' seclusion status was determined by asking them to indicate appropriately whether they are in seclusion or not in seclusion

4.6.5 Religion of respondents

The respondents were asked to indicate the religion they practise by ticking from the religious practises provided as Christianity, Islam, Traditionalist and others (specify).

4.6.6 Educational attainment

The respondents were asked to indicate the highest level of education they had attained from the options presented as: none, adult literacy/ Quranic school, Primary school Certificate, Junior Secondary School Certificate (JSSC) Secondary school certificate (SSCE/TC II) , OND/NCE, HND/B.Sc. and others (specify).

4.6.7 Household size

In determining household size, the respondents were requested to give the actual number of people staying with them and are "eating from the same pot".

4.6.8 Other occupations.

Respondents were requested to specify their other occupations besides farming

4.6.9 Type of agriculture

Respondents were asked to indicate the type of agriculture they are involved in from a. Crop agriculture, b. Livestock agriculture and c. Both crop and livestock agriculture

4.6.10 Farm size

Farm size of the respondents was determined by asking them to estimate the farm size cultivated by them. This was later converted into hectares

4.6.11 Types of crops cultivated

Respondents were asked to indicate the types of crops they cultivate by ticking appropriately among a. cereals, b. legumes, c. root crops and d. vegetables

4.6.12 Livestock types and numbers kept

Respondents were asked to indicate the types and number of livestock they kept.

4.6.13 Social participation index

Participation in social groups was determined by asking the respondents whether they belong to a social group or not; whether they are officials; extent to which they attend meetings; whether they pay monthly dues and special levies. Their responses to these issues were added to construct the social participation index.

The response options in social participation variables were scored as follows: Participation in association was scored as:

Membership Yes = 1 point
No = 0 point
Office holder Yes = 1 point
No = 0 point

Level of participation:

Meeting Attendance:

More than once a month = 5 points
Once a month = 4 points
Once 2-3 months = 3 points
Once 4-5 months = 2 points

Once a year = 1 point

Pay Monthly Dues Yes = 1 point

No = 0 point

Pay Special levy Yes = 1 point

No = 0 point

The maximum social participation score obtainable was 65 points, while the minimum score was 0 point. The index was categorised based on above and below the mean classes as low or high social participation.

4.6.14 Location of residents

Respondents' were asked to indicate appropriately whether they reside in urban or rural area.

4.6.15 Respondents' cosmopoliteness

The respondents' cosmopoliteness was determined by asking rural respondents to indicate how frequently they made trips to urban centres from a list of options provided to them. The frequencies of visitation in the list included:

More than once a week = 6 points

Once a week = 5 points

Once in two weeks = 4 points

Once in three weeks = 3 points

Once a month = 2 points

Once in several weeks = 1 point

4.6.16 Awareness of ICT

Respondents were presented with a list of six old ICTs: radio, television, video newspaper and extension bulletin/posters, and four new ICTs: computer, internet, Global System of Mobile telephone (GSM-phone) and Compact Disk Read-Only-Memory (CD-ROM) respectively. They were asked to indicate Yes for ICTs they are aware of and no for those they are not aware of. This gives a minimum score of zero and a maximum of six points for the old ICTs, while a minimum of zero and a maximum of four points were obtained for the new ICTs. Based on these, the respondents awareness was categorised into high and low levels.

4.6.17 Sources of awareness of ICTs

Respondents' sources of awareness of ICTs were ascertained based on membership of social group/friends, relations and agricultural extension agents. They

were asked to indicate Yes or No as the case may be for individuals through whom they became aware of the various ICTs.

4.6.18 Attitude towards use of ICTs

Women farmers' attitude towards use of ICTs was determined, using, a 3-point Likert type attitudinal scale. The rating scale contained 27 items which were scored in a descending order for all positive statements as follows:

Agree = 3 points

Undecided = 2points

Disagree = 1 point

Negative statements were scored in reverse order thus:

Agree = 1 point

Undecided = 2points

Disagree = 3 points

Based on this, an overall score for women farmers' attitude towards use of ICTs was determined. An individual woman farmer could obtain a maximum score of 81 points and a minimum score of 27 points.

The respondents were then dichotomised as having unfavourable or favourable attitude towards use of ICTs.

4.6.19 Socio-cultural factors that affect use of ICTs

Socio-cultural factors affecting the use of ICTs was assessed by conducting a Focus Group Discussion (FGD) and In-depth Interview (IDI) with key informants in each of the agricultural extension blocks in the study area.

4.6.20 Benefits and constraints to use of ICTs

Women farmers' benefits and constraints experienced in use of ICTs were assessed during the FGDs and IDIs in each extension block sampled for the study. The benefits and constraints were then harmonised and incorporated into the interview schedule where the respondents were able to assess the benefits and constraints each on a three-point scale as follows;

4.6.20.1 Benefits of ICTs use

Women farmers' benefits of ICTs use were determined on a 3-point scale of high benefit, slight benefit and no benefit. The rating scale contained 12 items which were presented to the women farmers for assessment of their reactions as follows High benefit = 3 points, Slight benefit = 2 points and no benefit = 1 point.

Then, a maximum score of 36 points and a minimum of 12 points was obtainable.

4.6.20.2 Constraints to ICTs use

Constraints experienced by women farmers in use of ICTs were assessed on a 3-point scale of great constraint, slight constraint and no constraints. The rating scale contained 13 items. The items were presented to the women farmers for assessment of their reactions as follows; Great constraint = 3 points, Slight constraints = 2 points and no constraint = 1 point. Maximum and minimum scores of 39 and 13 were obtainable respectively.

4.6.21 Preferences for ICTs

Respondents' ICTs preferences were ascertained by asking them to rank, during the FGDs, a pair of ICTs at a time, i.e. pair-wise ranking. This was done for all possible pairs that could be formed. The ICT with the highest frequency of preference was accepted as the most preferred, while the one with the least frequency was the least preferred.

4.6.22 Use of ICTs

Respondents' use of ICTs was ascertained by asking them to indicate Yes for those ICTs they use and No for those they don't use. Also, respondents' frequency of use of ICTs was measured as:

More than once a week = 6
Once a week in week = 5
Once in two weeks = 4
Once a month = 3
Once in 2-3 months = 2
Once in 6months-1 year = 1

Based on the frequency of respondents' use of ICTs, a maximum score of five and a minimum of zero points were tenable. The respondents were then grouped into high and low use of ICTs.

4.7 Data analysis and analytical tools

The data collected for the study were coded and analysed, using the Statistical Packages for the Social Sciences (SPSS).

4.7.1 Descriptive statistics

Descriptive statistics such as frequency counts, percentages and means were employed, using tables, pie charts and bar charts to present the data.

4.7.2 Inferential statistics and testing of research hypotheses

Inferential statistics like Chi-square, Pearson's Product Moments Correlation (PPMC), T-test for difference and logit regression model were used to interpret the data.

The eight hypotheses generated for the study were tested as follows:

Hypothesis 1

There is no significant relationship between socio-economic characteristics of the respondents and their use of ICTs. Socio-economic characteristics such as age, marital status, religion practised, educational attainment, family size, residence status, social participation and registration status were tested, using Chi-square (χ^2) to determine the relationship (contingent coefficient) that exists between identified socio-economic characteristics and use of ICTs.

Hypothesis 2

There is no significant relationship between women farmers' awareness and use of ICTs.

Chi-square contingency coefficient was used to determine the relationship that exists, if any, between women farmers' awareness and use of ICTs.

Hypothesis 3

There is no significant relationship between women farmers' cosmopoliteness and use of ICTs. This hypothesis was tested, using PPMC coefficient.

Hypothesis 4

There is no significant difference in awareness of old and new ICTs among the respondents'. T-test for difference between mean was used to analyse the difference in the mean awareness of old and new ICTs.

Hypothesis 5

There is no significant difference in the use of old and new ICTs among the respondents. T-test for difference between mean use of old and new ICTs was used to test the hypothesis.

Hypothesis 6

There is no significant difference in use of ICTs between women farmers in seclusion and those of them that are not in seclusion. The mean scores of secluded and non secluded women farmers' were determined and T-test statistic was used to test for differences in their use of ICTs.

Hypothesis 7

There is no significant difference between use of ICTs among women farmers in rural areas and those in urban areas. The mean scores of use of ICTs for women farmers in rural areas and women farmers in urban areas were determined and T-test statistic was used to test for differences in their use of ICTs.

Hypothesis 8

There is no significant relationship between women farmers' attitude towards use of ICTs and their use of ICTs. This hypothesis was tested, using the PPMC correlation coefficient between women farmers' attitude towards use of ICTs and use of ICTs.

Logit regression analysis was used to determine the extent to which each of the independent variables contributed in explaining the variance in women farmer' use of ICTs. The regression equation is represented as:

$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \ldots\ldots\ldots\ldots\ldots\ldots b_nX_n + U$

Where

Y = Use of ICTs (Dependent variable)

X1 to X12 = Independent variables

a = Regression constant

b = Regression coefficient or slope

X_1 = Age

X_2 = Educational attainment

X_3 = Social participation

X_4 = Agricultural activities

X_5 = Marital status

X_6 = Ethnic group

X_7 = Religion

X_8 = Seclusion status

X_9 = Awareness

X_{10} = Cosmopoliteness

X_{11} = ICTs support facilities available

X_{12} = Attitude towards use of ICTs

U = unexplainable variable

CHAPTER FIVE

RESULTS AND DISCUSSION

5.1 Women farmers' socio-economic characteristics

5.1.1 Age

Age is an important factor in the study of women farmers' use or non use of ICTs because it reflects the physical strength for farm work and the psychological disposition for imbibing behavioural change or otherwise. The mean age of the respondents was 41.0 ±12.6 years. Figure 5.1 shows that majority (37.0%) of the women farmers were between the ages of 41 and 50 years, 32.0% were between 31 and 40 years and only14.7% were above 50 years of age. The trend was the same in rural and urban areas. This shows that most of the women farmers are above 40 years of age but less than 50 years. This result is in line with the findings of Nwachukwu (2000) and Ogunbameru *et al* (2006), that most women farmers are below 50 years of age. Also, Akinbile (2007), Gana *et al* (2009) and Olaleye *et al* (2009) all found that most of the female farmers are more than 40 years and that only a few farmers are older than 50 years of age.

In corroborating this position, Akinola *et al* (2007), observed that women farmers are active within the age of 31- 50 years. This is an advantage as far as technological awareness and adoption is concerned. Akinola (2003) asserts that young and active women farmers are prone to change compared to the older ones who usually expect maintenance of the status quo.

This therefore, shows that younger women participate in agricultural activities more than the older women. Hence, more attention should be focused on this category of women farmers when attempting to improve women farmers' productivity.

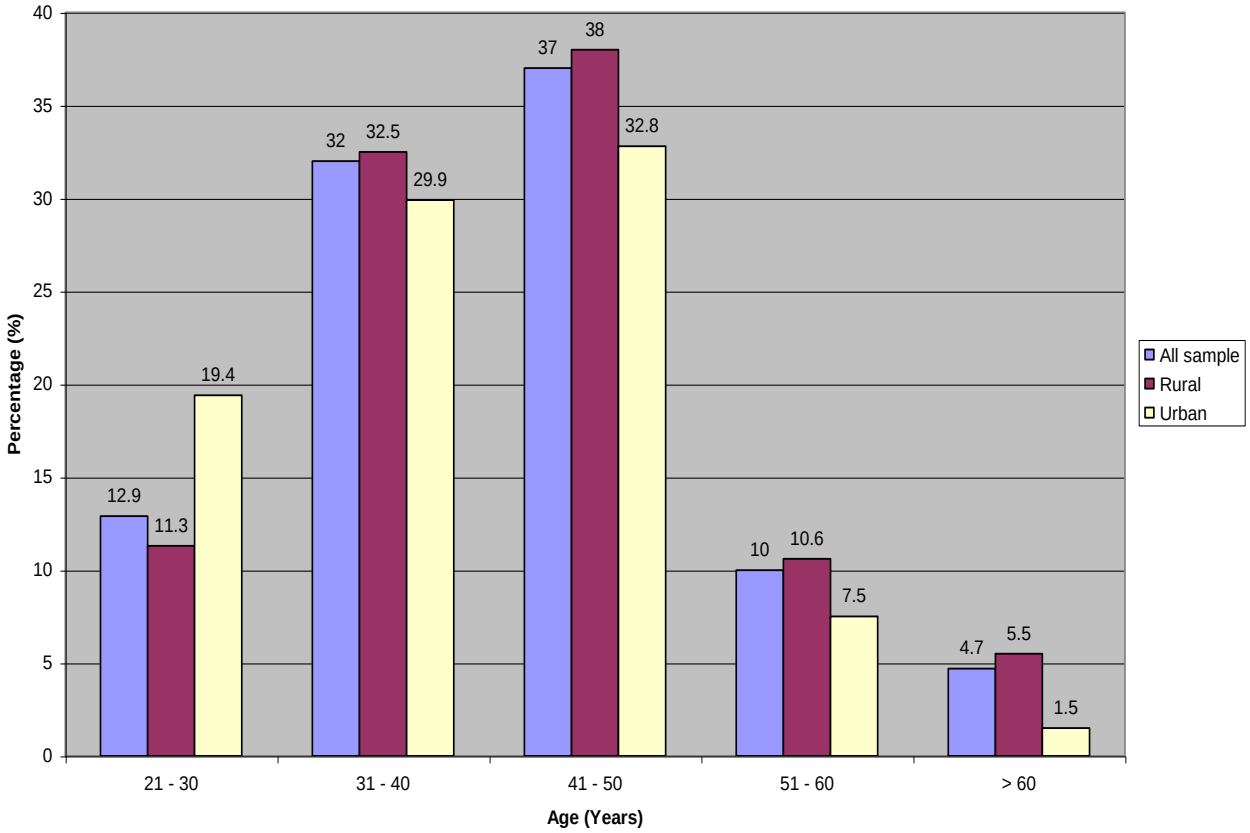

Figure 5.1: Age distribution of respondents in years

5.1.2 Marital status

In both rural and urban communities, marriage is a respected institution. Marriage bestows on people social status, recognition and makes persons to be considered responsible (Ahmed, 2000) Figure 5.2 reveals that majority of the respondents (86.6%) were married, while 2.5%, 8.4% and 2.5% were divorced, widowed and single respectively. This trend was common to both rural and urban areas, as majority of women farmers from both areas 86.6% and 92.5% respectively were married. This result is in consonance with the findings of other researchers. Yahaya (2002), Banmeke (2003) Ogunbanmeru *et al* (2006) and Olaleye *et al* (2009) all reported that majority of women farmers were married. This finding underscores the importance women farmers attach to being married, as it is perceived to confer respect on individuals and reinforces family ties. In addition, the women farmers are involved in farming because they are responsible for the well being of not only themselves but also of other members of the household. Such women farmers do rely on their husbands and children for farm inputs like land, labour and information on improved farm practises.

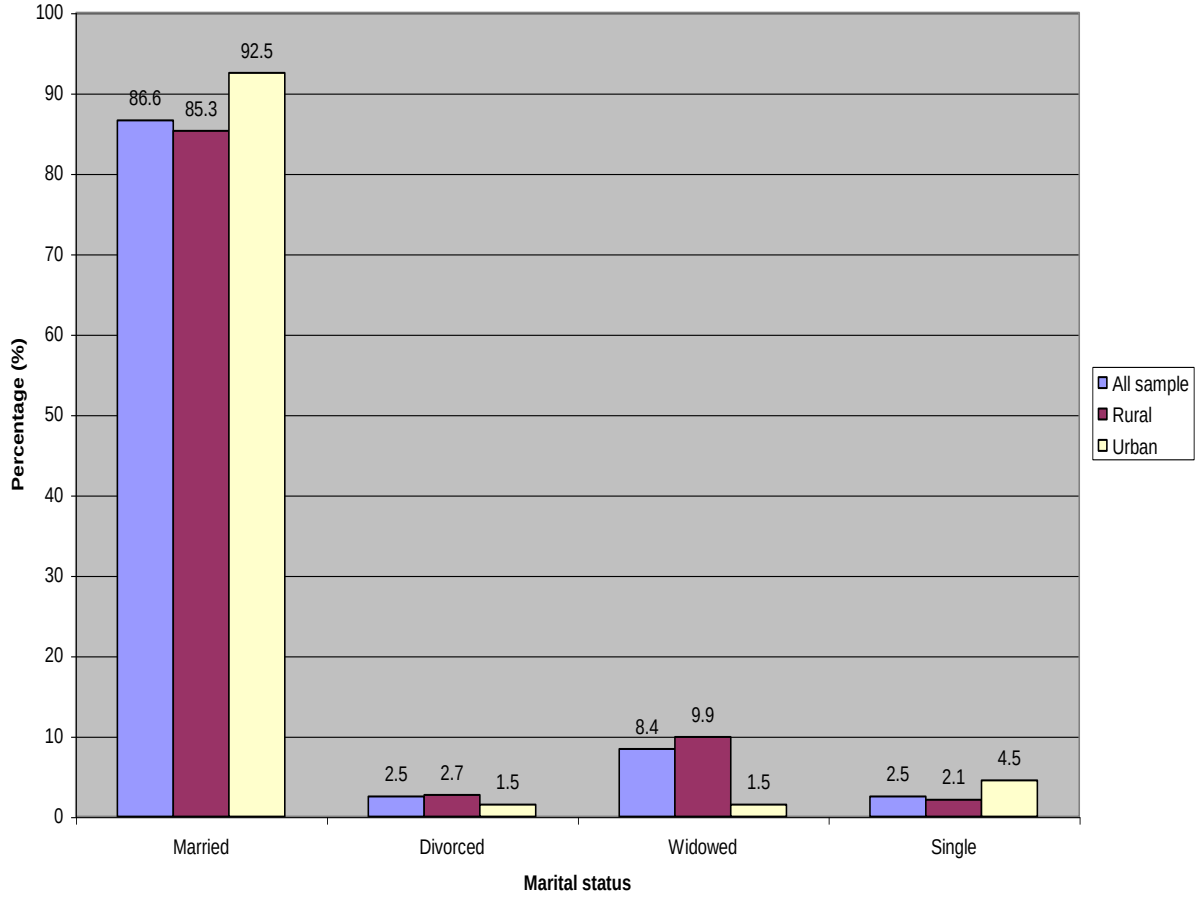

Figure 5.2: Distribution of respondents by marital status

5.1.3 Educational attainment

Education is a variable that broadens the mental horizon, influences the totality of the mind and predisposes farmers to new ideas (Fakoya 2000).Adequate education could enhance women farmers' understanding of use of ICTs and sources of information on improved farm practises. Figure 5.3 shows that 85.2 % of the respondents have attained some levels of formal education; this pattern was common among both rural (83.2%) and urban (95.5%) respondents. Despite the high proportion of respondents with some level of education, more than half of the respondents; 53.7%, 53.8% and 53.7% among all rural and urban respondents respectively acquired only primary and adult level of education. In the same vein, most (63.1%) of the respondents with some levels of education acquired only primary level of education and below. The situation was common to both rural and urban areas as majority of the women farmers from both areas 64.6% and 56.3% respectively have not attained beyond primary school level.

Several scholars, Yahaya (1995), Olaleye *et al* (2009) and Gana *et al* (*2009*) found separately that majority of women farmers have no formal education. However, this is contrary to the finding of this study which revealed that most of the women farmers are educated but not beyond primary school level. In the same vein, Banmeke (2003) found that 52.0% of women farmers in south-west Nigeria have formal education and 53.2% of them were not educated beyond primary school level. Also, Ogunbameru *et al* (2006) and Idrisa *et al* (2008) both found high proportion of non-formal and primary level of education among farmers in Borno State. This difference may be attributed to the fact that the present day generation of women farmers is mostly the products of the Universal Primary Education (UPE) launched in 1978 which made the attainment of primary education compulsory among school age children.

It should therefore, be borne in mind that these women farmers have low level of education when designing technology or involving them in developmental programmes because educational level of women farmers as posited by Gana *et al* (2009), contributes to the level of production in terms of adoption of new technologies and input utilisation. This perhaps justifies why Quisumbing and Meinzen-Dick (2001), observed that many poor countries mostly in sub-Saharan Africa had low level of education and that improving their education would probably be the single

most important policy instrument in order to increase agricultural productivity and reduce poverty.

The low level of education among the women farmers could be addressed by encouraging those of them without any form of education to enroll for adult literacy classes. Those with primary level of education could consequently be encouraged to attend secondary school to acquire Senior Secondary School Certificate (SSC). In Niger State, for example, there are day secondary schools for married women. Women farmers who acquired SSC are encouraged by their spouses and the State government to attend higher institutions of learning such as colleges of education, polytechnics or universities, among other higher institutions. Accessing higher levels of education would make the women better farmers, wives and mothers as it is said, "educate a woman and you educate a nation".

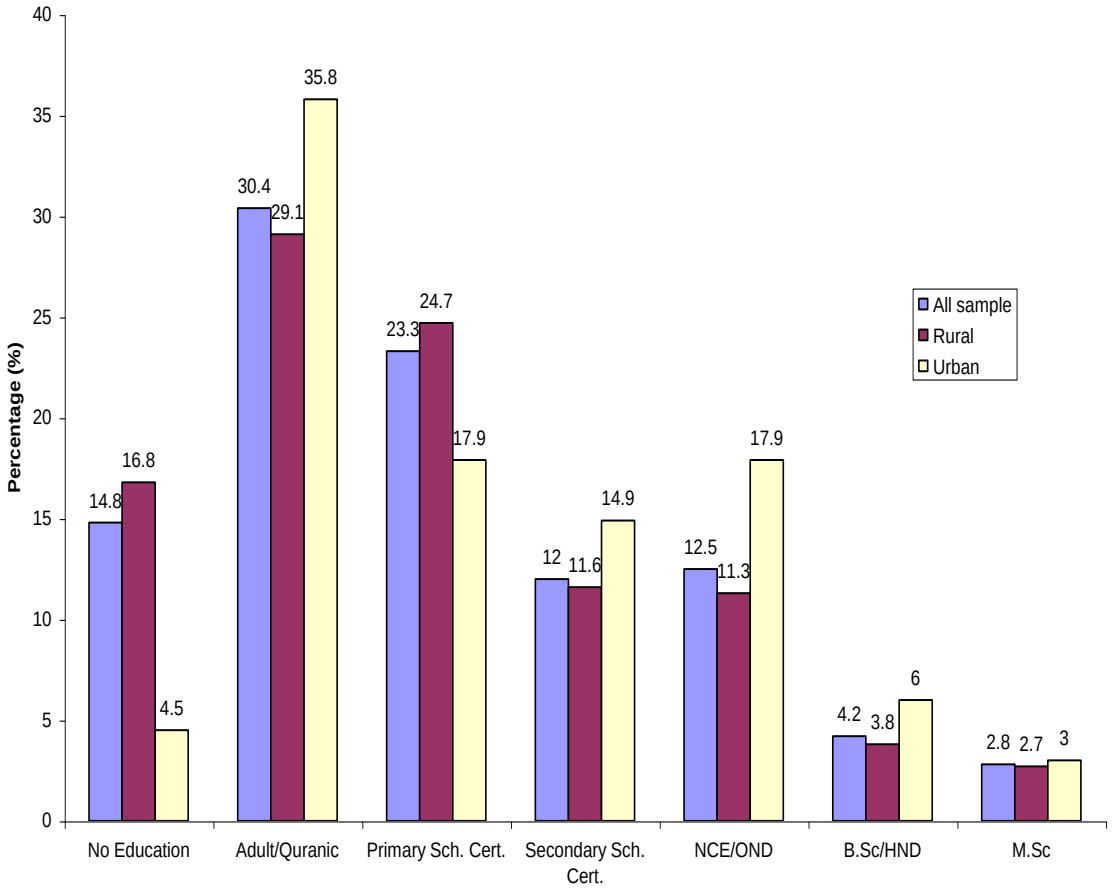

Figure 5.3: Respondents' distribution by educational level

5.1.4 Religion of respondents

Religion is the mode of worship of the people. Religious injunctions and dictates often play important role in the ways of life and occupation of the people. This could influence women farmers' adoption and use of technology, especially when it relates to behavioural change practises. Figure 5.4 indicates that majority of the women farmers (59.6%) are Christians, while 40.1% and 0.3% are Muslims and traditionalists respectively. However, more Adamawa respondents (89.5%) compared to 32.1% from Bauchi State are Christians. This finding revealed a high proportion (67.4%) of the Muslim respondents in Bauchi State. This result corroborates Yahaya's (2002) finding that most of the women farmers in Bauchi State are Muslims. The result further confirms the dichotomy in religious spread among the various states of northern Nigeria. This finding has no direct implication on use of ICTs among women farmers in the study area. Test of hypotheses of the study revealed that, there is no significant relationship between religion practised by women farmers and their use of ICTs.

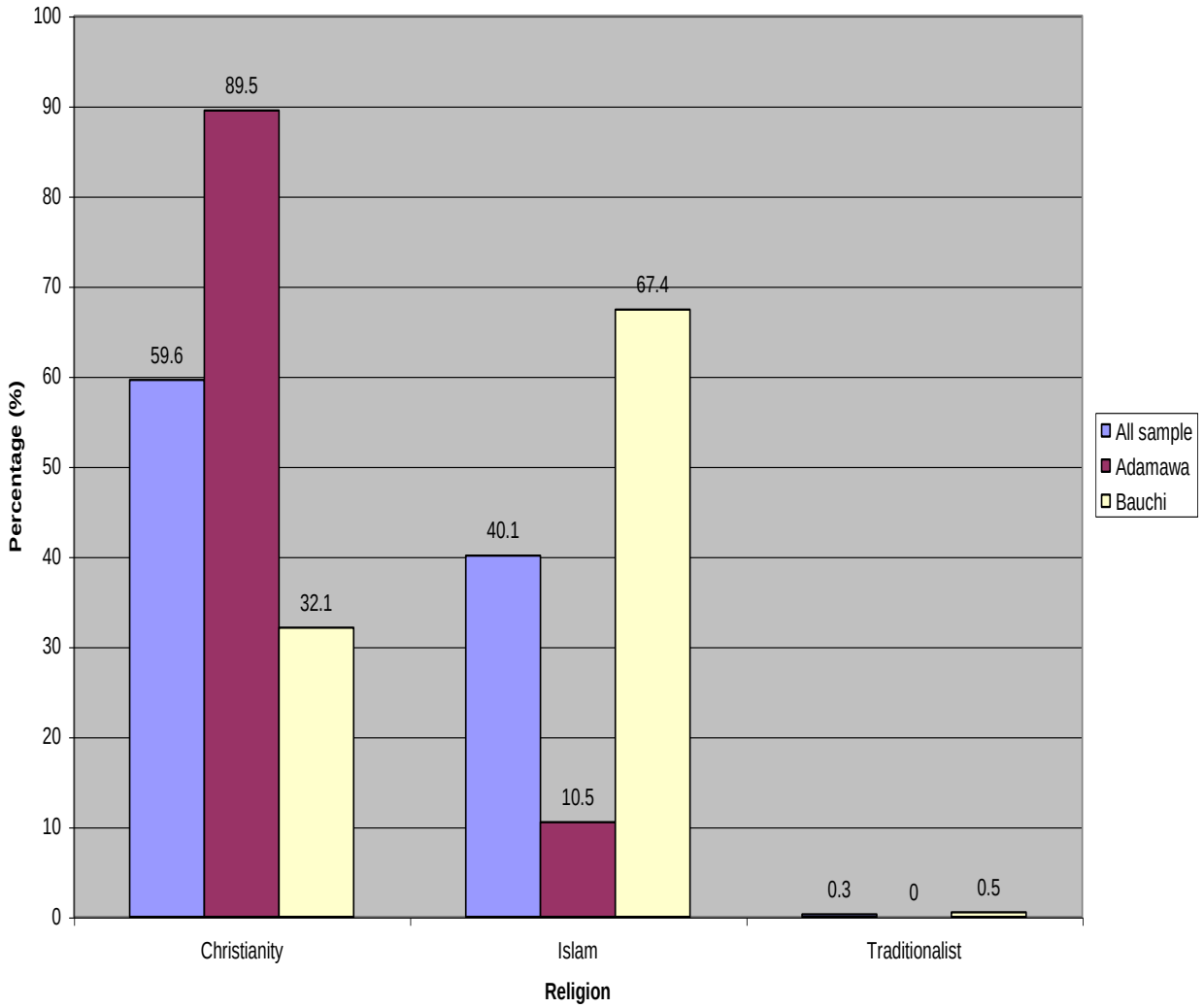

Figure 5.4: Respondents' distribution by religion

5.1.5 Seclusion status

This is based on the concept of Islamic religion that denotes restriction in movement of married Muslim women. A secluded Muslim woman is allowed to go out only under a particular necessity and with prior knowledge of her husband (Yahaya, 1995).The essence of seclusion, according to Abubakar *et al* (2006), is to preclude women from interacting with other men except their husbands and children. Figure 5.5 shows that fewer (32.9%) respondents were in seclusion. However, most (57.8%) of the respondents in Bauchi State and a few (5.8%) in Adamawa were in seclusion. This finding is in line with the fact expressed in Figure 5.4 that there are more Muslims in Bauchi than Adamawa State, since it has been established that women seclusion is an Islamic phenomenon. In the opinion of Abubakar *et al* (2006), women farmers in Kebbi State, who receive extension advice from agricultural extension agents only, do so, on the farm as it is not possible at home and through media channel of any sort because of *Kulle* (seclusion). Also, Konnas (1975), cited by Abubakar *et al* (2006), expressed a similar view when he found limited mobility among Hausa women farmers in Zaria due to *kulle*. However, Yahaya (1995) posits that the practise of women seclusion in states of northern Nigeria has not hindered occupational performance of the women in agriculture and the pursuance of their legitimate businesses as men do. The women farmers manage their own farms and also hire labour to execute farm activities. Therefore, there is need to craft a way of availing information on improved agricultural practises and other productivity enhancing inputs to the secluded as well as the non secluded women farmers.

For information on improved agricultural practises to be readily available to the women farmers, especial their secluded counterparts, there should be an advocacy to that effect by faith-based NGOs, since, seclusion is a religious phenomenon. Also, the various state ADPs should design and use bold and catchy posters and leaflets for distribution to secluded women farmers and their proxies so that they can learn and discuss based on the posters and leaflets. The WIA block extension agents should also consider teaching women farmers at the religious group meeting points, since some of the secluded women farmers do attend religious group meetings.

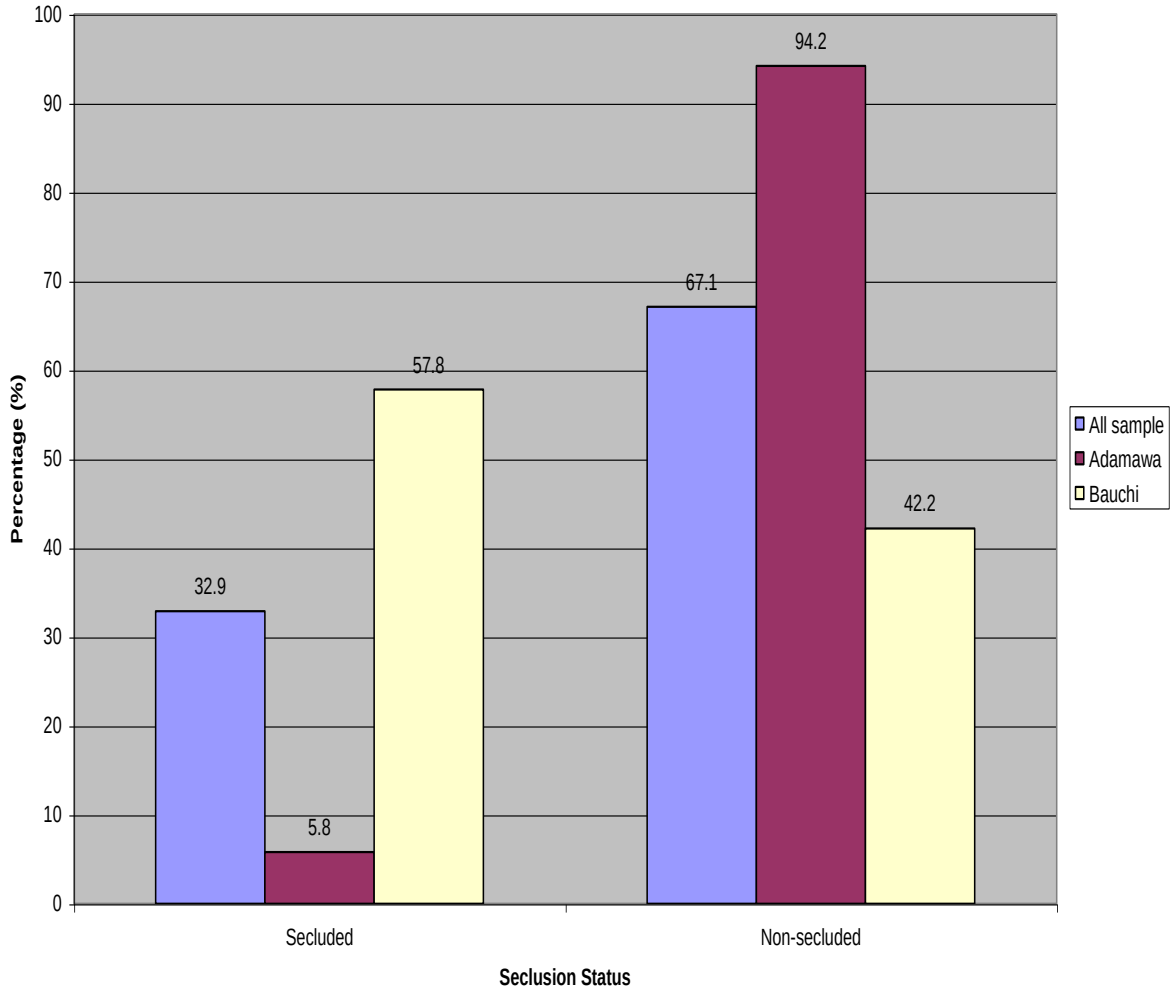

Figure 5.5: Respondents' seclusion status

5.1.6 Household size

The size of a household and the household income determine the welfare and exposure to new ideas and technology among members of such households. The mean household size is 8 ± 5. Table 5.1 indicates that majority of the households (53.8%) have between 7 and12 people, while 30.9% have between 1 and 6 people and 15.3% have 13 people and above. This trend is common to both rural and urban areas as majority of the respondents from rural (52.7%) and urban (58.2%) areas have between 7 and 12 people per household. This finding corroborates Odebode and Mungong (2001) and Ndaghu (2008) who also reported an average of 7 and 12 people as the average family size among farming households. The result is not different from the modal household size of 6 and 10 found by Banmeke (2003), in a study of women farmers in south-west Nigeria. When designing development programmes for women farmers, it will be wise to target them with the knowledge in focus that, these women farmers are members of households rather than treating them as individuals in isolation.

This result has no direct implication on use of ICTs among women farmers in the study area. Test of hypotheses of the study revealed that, there is no significant relationship between household size and women farmers' use of ICTs.

Table 5.1: Distribution of respondents' by household size

Household size	All sample (n=359)	Rural (n=292)	Urban (n=67)
1 – 6	111 (30.0)	96 (32.9)	15 (22.4)
7 - 12	193 (53.8)	154 (52.7)	39 (58.2)
13 and above	55 (15.3)	42 (14.4)	13 (19.4)

$\overline{X} = 8 \pm 5$

Figures in parentheses are percentages

Source: Field Survey 2009

5.1.7 Respondents ethnic groups

Table 5.2 shows that Adamawa State respondents were from 24 different ethnic groups, while Bauchi State respondents were from 10 different ethnic groups. Majority (15.1%) of Adamawa State respondents are Bachama, while Hausa constituted majority (17.1%) of the ethnic groups in Bauchi State. Only Hausa and Fulani, 2.3% and 9.9% in Adamawa State as well as 11.7% and 17.7% in Bauchi State respectively are common to both states. The diversity in ethnic background of the respondents is a reflection of the great socio-cultural diversity that characterises the study area. In designing technological intervention or development programme for women farmers in the study area, such socio-cultural diversity must be brought to focus if the programmes are to succeed. This is because women farmers, though physically close, are very far apart socially and culturally.

Extension programmes and technologies designed for these different social groups should be locality-specific with each programme designed in accordance with the peculiarity and need of the specific social group. The call for locality specific programmes stems from the fact that what worked well in one community may not in another.

Table 5.2: Distribution of Respondents by Ethnic Groups (n=359)

	ADAMAWA				Total	BAUCHI			Total
Ethnic Groups	**Gombi**	**Guyuli**	**Mayo Belwa**	**Mubi**	**F (%)**	**Azare**	**Miya**	**Nabardo**	
Bachama		20		6	26 (15.1)				
Bura	2	2	2	2	8 (4.7)				
Chamba			2		2 (1.2)				
Chibok	1				1 (0.6)				
Fali	1	2		6	9 (5.2)				
Fulani	4		7	6	17 (9.9)	8	3	10	21 (11.2)
Gaanda	2	2	3		7 (4.1)				
Gariwa						6	3	3	12 (6.4)
Gude		2	2	6	10 (5.8)				
Guduri						6	2	10	18 (9.6)
Gusawa									
Hausa			4		4 (2.3)	20	8	5	33 (17.7)
Higgi	3		4	7	14 (8.1)				
Hona	4			3	7 (4.1)				
Jarawa						7	9	8	24 (12.8)
Jonjo		2	3		5 (2.9)				
Jukun	1				1 (0.6)				
Kanakuru			1		1 (0.6)				
Kanuri						3	2	7	12 (6.4)
Kilba	4		2	5	11 (6.4)				
Lala			1		1 (0.6)				
Lunguda	2	8	4		14 (8.1)				
Marghi	3	1		4	8 (4.7)				
Mbula		2	5	1	8 (4.7)				
Mumuye			2		2 (1.2)				
Ngobba	2	2			4 (2.3)				
Njenyi				2	2 (1.2)				
Poisawa						5	6	5	16 (8.6)
Siyawa						5	7	10	22 (11.8)
Tarok							7	9	16 (8.6)
Warjawa						5	3	5	13 (6.9)
Wurkum			3		3 (1.7)				
Yandan			7		7 (4.1)				
Total	**29**	**43**	**52**	**48**	**172 (100)**	**65**	**50**	**72**	**187 (100)**

Figures in parentheses are percentages

Source: Field Survey 2009.

5.1.8 Other occupations besides farming

Women farmers are involved in several activities besides farming. These help them to earn extra income and other benefits to enable them feed their family members and better their well being. Table 5.3 indicates that trading business is the other occupations of majority of the population (31.2%), while 17.0% and 1.4% were involved in civil service and private employment respectively. The spread was the same in rural (29.4%) and urban (33.9%) areas where majority of the women farmers were involved in trading/ business. However, more urban respondents 28.8% and 33.9% were involved in civil service and trading/business respectively than rural respondents, among which 14.9% and 29.4% were civil servants and traders/business women respectively. The high proportion of those in civil service among urban respondents may be due to the availability of opportunities for joining the service in the urban as compared to rural areas. Also, those already in the service go into farming to avoid the traps of hunger and poverty that accompany the ever-increasing cost of living in the urban areas. In the same way, the high proportion of urban respondents involved in trading/business can be attributed to the availability of more business opportunities in the urban areas compared to rural areas. Another central issue in this finding is the fact that there is no boundary to occupation any longer, as women farmers, be they in rural or urban areas, were involved in several other occupations besides farming. In the opinion of Olawoye (2002), even occupations previously thought to be urban are now found in rural areas and vice versa.

Table 5.3: Distribution of respondents by other occupation besides farming

Occupations	All sample (n=359)	Rural (n=292)	Urban (n=67)
Civil service	61 (17.0)	44 (14.9)	17 (28.8)
Trading	112 (31.2)	86 (29.4)	20 (29.4)
Private employed	5 (1.4)	2 (0.7)	3 (5.1)

Figures in parentheses are percentages

Source: Field survey 2009

5.1.9 Registration status

Table5.4 reveals that majority of the women farmers (70.2%) were registered with the women in agriculture group. The pattern was the same for rural and urban areas as 73.8% and 56.7% of the respondents fall in this category respectively. More respondents were registered, registration status serves as channels and basis for distribution and sale of farm inputs to the women farmers. Also, there were more registered respondents in rural compared to urban areas. This may be due to the fact that there is greater homogeneity in the rural areas, with closer ties and greater face to face contact where everyone knows everybody as opposed to urban farmers where relationships among the heterogeneous communities may just be casual and farmers tend to source for inputs as individuals.

Table 5.4: Distribution of respondents' registration status

Status	All sample (n=359)	Rural (n=292)	Urban (n=67)
Registered	252 (70.2)	138 (73.8)	38 (56.7)
Non-registered	107 (29.8)	77 (26.2)	29 (43.3)

Source: Field survey 2009

5.2 Women farmers' agricultural activities

5.2.1 Farm size under cultivation

The mean farm size was 3.4 ± 2.7 ha. Table 5.5 indicates that majority of the women farmers (63.2%) had farm sizes ranging between 1 and 3ha while 28.9%, 4.5% and 3.1% had farms of less than a hectare, between 3.1 and 6 ha and larger than six hectares respectively. Table 5.5 further reveals that more urban (53.7%) than rural (23.3%) respondents had farm sizes of less than one hectare. This may be due to the great competition over land in urban areas and the fact that women farmers could not access large areas of land. Another explanation could be women farmers in urban areas may be involved in some activities that take most of their time other than farming. This result corroborates the position of Olawoye (2004) that farmers in Nigeria are operating on subsistence level. In the same vein, Idrisa *et al* (2008) found that over 70% of the women farmers in Borno State are small scale farmers who cultivate less than four hectares of land.

The small scale farm holdings among women farmers in the study area could affect their efficiency of input utilisation and possibly lower their productivity. However, the test of hypotheses in the study revealed that there is no significant relationship between farm size and use or non-use of ICTs among women farmers in the study area. This result contradicts the finding of Onu (2006), which asserts that farm size significantly influences both farmers' adoption decision and accessibility to extension services. This finding may be true to the extent of intangible or non material technologies but it is common expectation that farmers with large farm size would commit a lot of resources to the farm project and would normally want to take advantage of material intervention such as hiring of tractor, travelling to source improved seed and fertiliser among other technologies. When the intervention borders on non-tangible technologies such as agricultural programmes that are available through the ICTs, farm size may not be a determining factor in sourcing or use of such information.

Table 5.5: Distribution of respondents' farm size

Farm size	All sample (n=359)	Rural (n=292)	Urban (n=67)
0 – 1ha	104 (28.9)	68 (23.3)	36 (53.7)
1 – 3ha	227 (63.2)	203 (69.5)	24 (35.8)
3.1 – 6ha	17 (4.8)	11 (3.8)	6 (9.0)
> 6ha	11 (3.1)	10 (3.4)	1 (1.5)

Figures in parentheses are percentages

Source: Field survey 2009

$\overline{X}$ = 3.4± 2.7ha

5.2.2 Type of agricultural enterprises

Figure 5.6 shows that majority of the women farmers (64.3%) were engaged in mixed farming, while 27.1% and 8.6% were solely involved in crop and livestock farming respectively. The high proportion of respondents practising mixed farming was common to both rural (65.4%) and urban (59.7%) respondents. However, more urban respondents practised only livestock farming (20.9%) compared to 5.8% among rural respondents who in turn were more into crop production (28.8%) than urban respondents (19.4%).The high proportion of respondents engaged in mixed farming is possibly influenced by the complementary roles of crop and animal production in traditional agriculture. This finding corroborates that of Abubakar *et al* (2006), who found that 48.0%, 40.0% and 12.0% of the women farmers in Zuru practise mixed, crop and livestock farming respectively. Also, the preponderance of livestock keeping among urban respondents may be that livestock farming requires small land areas (a critical resource in most urban areas) compared to crop production which requires large areas of land to practise. Other reasons for the result may be the proliferation of poultry and fish farming in urban parts of Nigeria in recent times. It is also in the urban areas that women farmers have access to veterinary services and ready market for their produce.

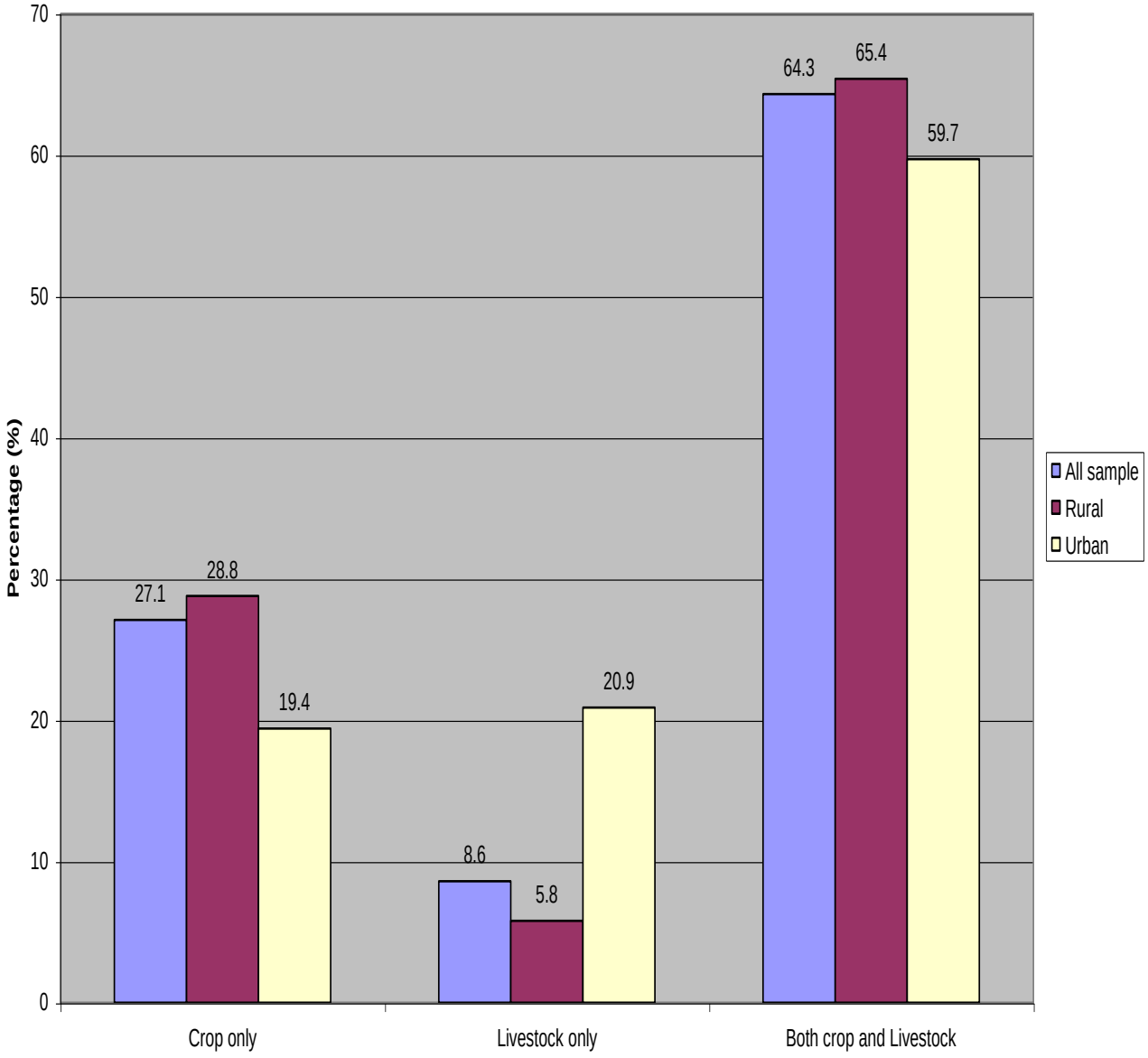

Figure 5.6: Distribution of respondents' agricultural enterprise

5.2.3 Types of crops cultivated

Table 5.6 reveals that cereals were respondents' most cultivated crops (93.0%), while 57.7%, 13.6% and 5.6% cultivated legumes, vegetables and root crops respectively. The indication that cereal was the modal crop is common to both rural and urban respondents, though more rural (99.7%) and less urban (64.7%) respondents were in this category. Also, fewer rural (13.6%) and more urban (19.4%) respondents cultivated vegetables. This result was because cereals such as maize, sorghum, rice and millet are the major staple for most of the inhabitants of the study area. Also, it does not require physical strength to cultivate cereals like maize, millet and sorghum as well as legumes like cowpea, ground nuts and bambara nuts compared to root crops like cassava, potatoes and yams. Besides, the vegetation of the study area is predominantly guinea and Sahel savannah which support the growth of cereals and legumes unlike root crops. Also, the high proportion of urban compared to rural respondents engaged in the cultivation of vegetables in the study area, could be due to the proliferation of vegetable home gardening among Nigerian urban dwellers since early 1990s.

Another plausible explanation for this finding is the assertion by Koopman (1993) and Olawoye (1989) that women farmers are more responsible for subsistence crops which are termed "female crops", while the men are more responsible for cash crops which are termed "male crops". It should be expected that women farmers would be more involved in the production of food crops than cash crops.

Table 5.6: Distribution of respondents by type of crops cultivated

Type of Crops	All sample (n=359)	Rural (n=292)	Urban (n=67)
Cereals	334 (93.0)	291 (99.7)	43 (64.2)
Legumes	207 (57.7)	189 (64.7)	18 (26.9)
Root crops	20 (5.6)	20 (6.8)	0 (0.0)
Vegetables	49 (13.6)	36 (12.3)	13 (19.4)

Figures in parentheses are percentages

Source: Field survey 2009

5.2.4 Livestock production

Table 5.7 shows that most of the women farmers kept poultry (58.5%) and goats (57.7%), while (28.1%), (13.9%) and (11.4%) kept sheep, cattle and pigs respectively. The pattern was the same among rural respondents with poultry (61.0%) and goats (59.6%) and urban respondents having 47.8% and 49.3% respondents in the same category. Poultry dominated the livestock holding because it is considered a "female animal" except in large-scale poultry farms where men were involved as well. Also, the high proportion of respondents involved in goat production could be due to the fact that goat keeping is less tasking when compared to sheep and cattle keeping which often requires herding or intensive feeding when kept at home. Urban respondents do not keep pigs. This may be because most urban respondents are Muslims and Islamic tenets forbid pork consumption and use of piggery products.

In the opinion of Okali and Sumberg (1985), cited by Banmeke, (2003), a large proportion of the rural population of which women farmers constitute an appreciable part, are into livestock rearing. The involvement of women farmers in livestock in Nigeria could enhance food security and income generation.

Table 5.7: Distribution of respondents by livestock production

Livestock	All sample (n=359)	Rural (n=292)	Urban (n=67)
Cattle	50 (13.9)	42 (14.4)	8 (11.9)
Goat	207 (57.7)	174 (59.6)	33 (49.3)
Sheep	101 (28.1)	77 (26.4)	24 (35.8)
Poultry	210 (58.5)	178 (61.0)	32 (47.8)
Pig	41 (11.4)	41 (14.0)	0 (0.0)

Figures in parentheses are percentages

Source: Field survey 2009

5.3 Social participation

Social participation is the membership and extent of participation in social groups. This participation is measured in terms of official position held in groups, meeting attendance, payment of dues and special levies.

5.3.1 Membership of social groups

Figure 5.7 reveals that majority (88.3%) of the respondents were members of social groups. Table 5.8 also indicates that membership of religious groups were the highest (49.9%), with 44.6%, 40.4%, 35.7%, 13.9% and 1.1% being members of women farmers' groups, women farmers' cooperatives, women *adashe* group, women age group and market women groups respectively. The trend was common among both rural and urban respondents. However, more rural (16.1%) compared to urban respondents (4.5%) were members of women farmers' age group. This is because closer ties exist among rural as compared to urban farmers. This finding tallies with the earlier findings by Yahaya (1995) and Yahaya and Olowu (1998) who had reported that women farmers belong to various social groups and that they participate actively in these social groups. In the same vein, Olaniyan and Jibowo (1997) and Banmeke (2003) had also reported that women farmers belong to cooperative associations.

These findings suggest that women farmers actively participate in social groups. This is because participation in social groups usually has some beneficial attributes. Therefore, development-oriented agencies should encourage women farmers' membership and active participation in social groups.

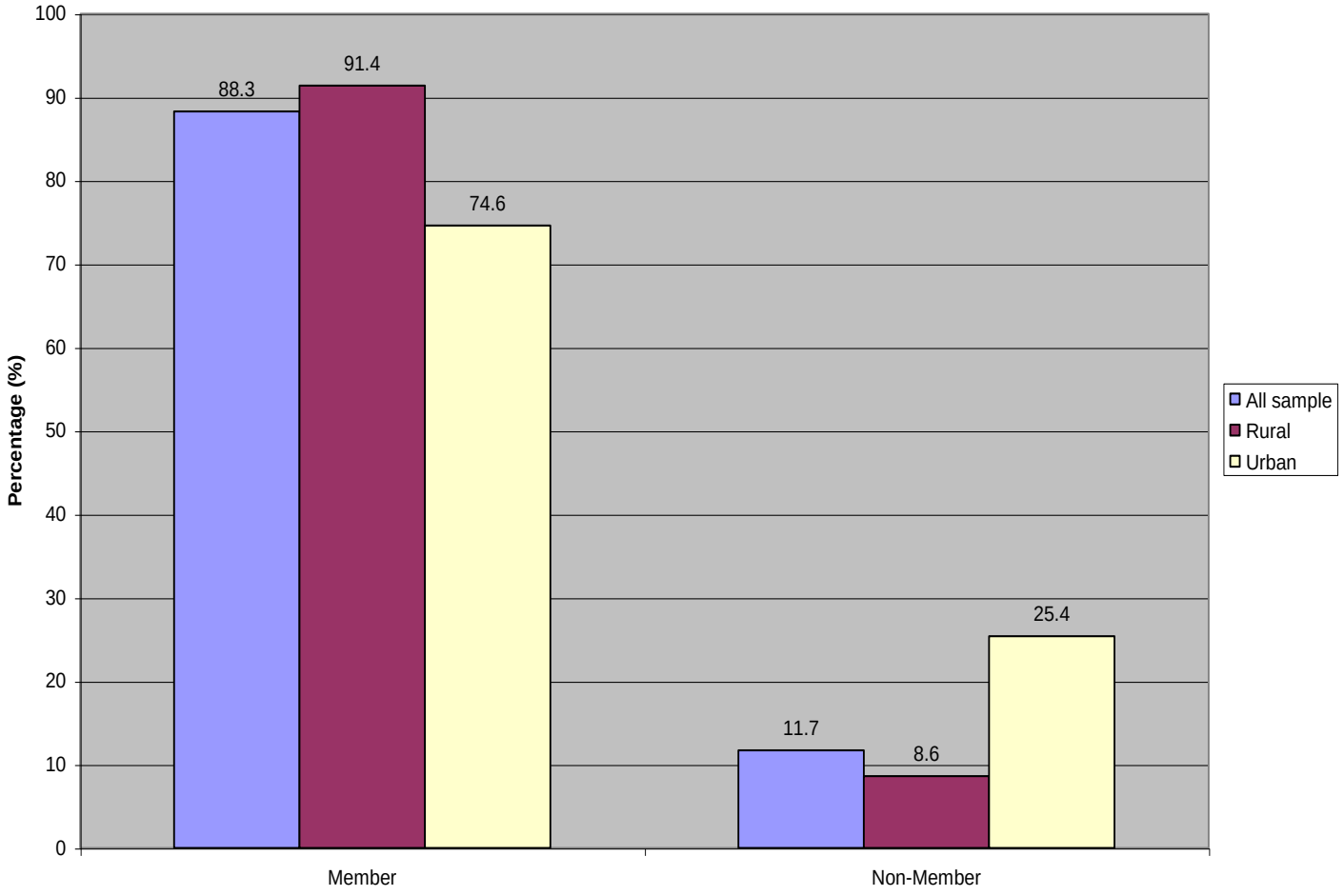

Figure 5.7: Distribution of respondents' membership of social groups

Table 5.8: Distribution of Respondents by membership of specific social groups

Social Groups	All sample (n=359)	Rural (n=292)	Urban (n=67)
Religious group	179 (49.9)	150 (51.4)	29 (43.3)
Farmers' group	160 (44.4)	136 (46.6)	24 (35.8)
Age grade	50 (13.9)	47 (16.1)	3 (4.5)
Adashe group	128 (35.7)	103 (35.3)	25 (37.3)
Cooperative group	145 (40.5)	126 (43.2)	19 (28.4)
Market women group	4 (1.1)	2 (0.7)	2 (3.0)

Figures in parentheses are percentages

Source: Field survey 2009

5.3.2 Office held in social group

Table 5.9 reveals that 32.9% were officials in religious groups, while 30.4%, 6.7%, 20.1%, 23.1%, and 1.7% were officials in farmers' group, age grade, *adashe*, cooperative and market groups respectively. The pattern was common among both rural and urban respondents, although rural respondents have more officials in age grade (7.9%) than urban respondents (1.5%). This may be because the rural respondents have greater face-to-face interactions and social ties compared to urban respondents who are usually strange neighbours where one's age mate may not be easily known and related with as well.

Table 5.9: Distribution of respondents by office held in social groups

Social Groups	All sample (n=359)	Rural (n=292)	Urban (n=67)
Religious group	118 (32.9)	98 (33.6)	20 (29.9)
Farmers' group	109 (30.4)	94 (32.2)	15 (22.4)
Age grade	24 (6.7)	23 (7.9)	1 (1.5)
Adashe group	72 (20.1)	55 (18.8)	17 (25.4)
Cooperative group	83 (23.1)	68 (23.3)	15 (22.4)
Market women group	6 (1.7)	4 (1.4)	2 (3.0)

Figures in parentheses are percentages

Source: Field survey 2009

5.3.3 Women farmers' attendance of social groups meetings

Table 5.10 shows that 30.1% of the women farmers attended religious group meetings more than once a month, while 27.0%, 8.6% 13.9%, 14.2% and 0.6% attended meetings of farmers group, age grade, *adashe* and cooperative groups at least once a month respectively. The rural respondents were more regular in meeting attendance compared to urban respondents. This explaines the high level of group loyalty among rural compared to urban dwellers.

Table 5.10: Distribution of Respondents by Attendance at Social group meetings (n=359)

Groups	More than once in a month			Once in a month			Once in 2 – 3 month			Once in 4 – 6 months			Once in a year		
	All	Rural	Urban	All	Rural	Urban	All	Rural	Urban	All	Rural	Urban	All	Rural	Urban
Religious group	30.1	37.3	1.5	6.7	6.5	7.5	1.7	1.7	1.5	0.8	0.3	3.0	0.0	0.0	0.0
Farmers group	7.0	6.8	7.5	2.7	27.4	25.4	2.2	5..5	3.0	2.0	2.4	0.0	0.8	0.7	1.5
Age grade	3.3	3.4	3.0	8.6	10.3	1.5	0.3	0	1.5	0	0	0.0	0.3	0.3	0.0
Adashe	11.4	12.0	9.0	13.9	12.7	19.4	1.7	1.7	1.5	1.4	1.4	3.0	0.0	0.0	0.0
Cooperative	8.6	10.3	1.5	14.2	17.1	1.5	2.0	1.4	4.5	0.6	0.7	0.0	0.6	0.7	0.0
Market	0.3	0.3	0.0	0.6	0.3	1.5	0.6	0.3	1.5	0.3	0.3	0.0	0.0	0.0	0.0

* All figures are in percentage

Source: Field survey 2009

5.3.4 Payment of monthly dues and special levies

Table 5.11 shows that 26.5% of members of religious groups pay monthly dues and special levies, while 24.2%, 8.9%, 15.6%, 19.5% and 1.4% of members of farmers groups, age grade, cooperative and market women groups pay monthly dues and special levies respectively. Payment of levies and monthly dues is used to judge who was a financial member or not. In fact, financial membership is very often used as a basis for sharing inputs and other benefits in most women farmers' social groups.

Table 5.11: Distribution of respondents by payment of monthly dues and special Levies

Social Groups	All sample (n=359)	Rural (n=292)	Urban (n=67)
Religious group	95 (26.5)	83 (28.4)	12 (17.9)
Farmers' group	87 (24.2)	79 (27.1)	8 (11.9)
Age grade	32 (8.9)	31 (10.6)	1 (1.5)
Adashe group	56 (15.6)	48 (16.4)	8 (11.9)
Cooperative group	70 (19.5)	63 (21.6)	7 (10.4)
Market women group		4 (1.4)	1 (1.5)

Figures in parentheses are percentages

Source: Field survey 2009

5.3.5 Number of social group in which women farmers are involved

Table 5.12 indicates the number of social groups in which different women farmers were involved .More respondents (43.2%) were involved in just one group, while 22.8%, 14.5%, 8.6% and 3.6% were involved in two, three, four and five social groups respectively. More rural (59.1%) and fewer urban respondents (43.3%) were involved in more than one social group. For example, while 4.6% of rural respondents were involved in five social groups, none of the urban respondents was involved in five different social groups. The high social participation among rural compared to urban respondents may be because social groups are a useful instrument for effecting rural changes. Women cooperatives, for example, have been useful in channeling funds to small scale producers through on-lending from commercial banks and other formal credit institutions.

In the same vein, the social groups could be used as channels for popularising the use of ICTs among the women farmers. Extension agents could use these social groups as point of contact with the women farmers, while the group leaders could assume the role of local leaders in the conventional extension methodology. This will also provide opportunity for ease of coverage of the women farmers.

Table 5.12: Distribution of respondents by number of social groups involved

No of social groups	All sample (n=359)	Rural (n=292)	Urban (n=67)
1	155 (43.2)	117 (40.1)	38 (56.7)
2	82 (22.8)	73 (25.0)	9 (13.4)
3	52 (14.5)	45 (15.4)	7 (10.4)
4	31 (8.6)	25 (8.6)	6 (9.0)
5	13 (3.6)	13 (4.6)	0 (0.0)

Figures in parentheses are percentages

Source: Field survey 2009

5.3.6 Categorisation of women farmers by social participation scores

Women farmers' social participation scores were computed based on group membership, official position held in groups, attendance of group meetings and payment of monthly dues and other levies. These were all computed for the number of groups a woman farmer was involved in. Based on the computed scores for the individuals and using the below and above the mean distribution (minimum score=0.0, mean score=11.4 and maximum score=39.0), the respondents were then categorised into women farmers with low and those with high social participation scores. Figure 5.8 indicates that most (57.7%) of the respondents had low social participation. The low social participation was common to both rural and urban respondents. This finding corroborates earlier finding by Yahaya (1995) who reported that women farmers in north central Nigeria have low social participation although they participate actively in religious groups and women cooperatives.

The participation of women in social groups is significant because such groups are important institutions in promoting the welfare of their members. In the opinion of Adekanye *et al* (2009), cooperatives and social groups are useful instruments for effective rural change through which benefits and assistance can be channeled to the women farmers.

Therefore, women farmers should be encouraged to actively participate in various social groups through the use of various incentives in order to enhance their well being and that of the society in general. This is because women farmers' participation in social groups can be used to promote the use of ICTs among group members, since most of the women farmers are a significant others to one another and have indicated members of these groups as their sources of awareness of most of the ICTs.

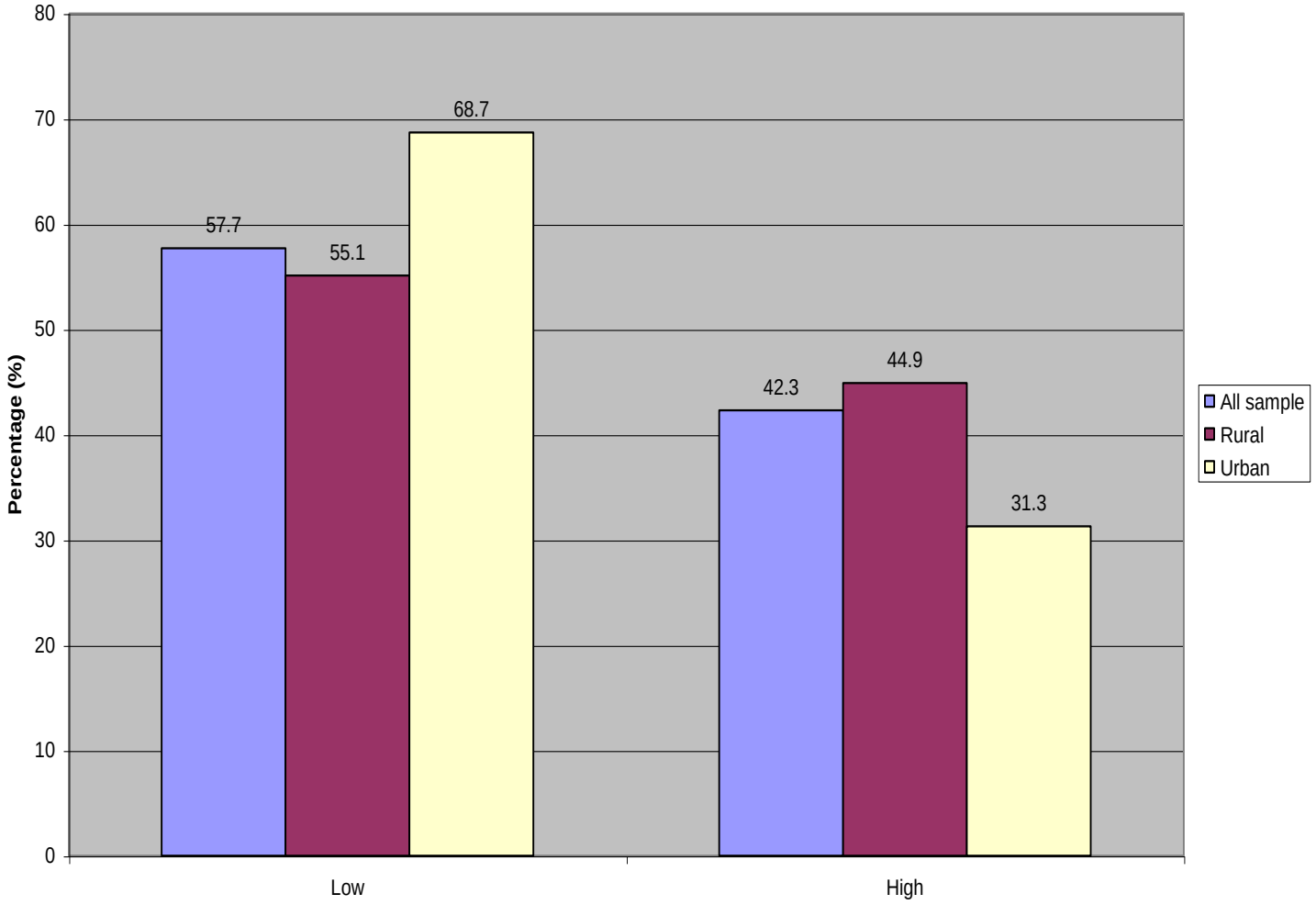

Figure 5.8: Distribution of respondents' social participation categories

5.3.7 Respondents reasons for participating in social groups

Table 5.13 shows that 54.9%, 41.0% and 40.7% and 34.5% of the women farmers participated in social groups for economic benefits, improve farming activities, improve religious activities, and for community services respectively. Only a few of the respondents 5.3%, 13.1% and 22.6% participated in social groups for social recognition, to know people and for self satisfaction respectively. This trend is common among both rural and urban respondents. This finding corroborates Jibowo *et al*'s (1995), that 86.7% of the farmers in Oyo State joined cooperative societies to learn more about agricultural activities and improve economic benefits. In the same vein, Yahaya (1995) reported that most of the women farmers in North Central Nigeria participate in social groups to improve their religious and farming activities. Therefore, women farmers should be encouraged to participate more actively in social groups through the provision of incentives that would boost their agricultural productivity and invariably improve their well being.

Table 5.13: Distribution of respondents' reasons for participating in social groups

Reasons	All sample (n=359)	Rural (n=292)	Urban (n=67)
Social Recognition	19 (5.3)	16 (5.5)	3 (4.5)
Self satisfaction	81 (22.6)	66 (22.6)	15 (22.4)
Community Development	124 (34.5)	105 (36.0)	19 (28.4)
Economic Benefit	197 (54.9)	169 (57.9)	28 (41.8)
Know People	47 (13.1)	24 (8.2)	13 (19.4)
Improve Farming	147 (41.0)	126 (43.2)	21 (31.3)
Improve Religion activities	146 (40.7)	119 (40.8)	27 (40.3)

Figures in parentheses are percentages

Source: Field survey 2009

5.4 Women farmers' cosmopoliteness

5.4.1 Visitation to urban centres

Consmopoliteness refers to rural respondents' frequency of visits to urban centres. Table.5.14 shows that, 99.0% of the rural respondents visited urban areas. Both Nwabude (1995) and Banmeke (2003) reported a high cosmopoliteness level among farmers in south western Nigeria. Also, Adebisi (1994, and Van den Ban and Hawkins, 1988, cited by Banmeke, 2003), opined that cosmopoliteness is one of the farmers' social characteristics that influence adoption of innovation. Cosmopoliteness is an important variable that can influence the exposure of women farmers to ICTs and information on improved agricultural practises. This high cosmopoliteness level among the rural respondents was expected to result in high use of ICTs and adoption of improved agricultural practises which could result in high productivity.

Table 5.14 further reveals that most of the women farmers (26.4%) visited urban centres once a month, while 22.9% visited urban areas once in several months. Also, 17.8%, 13.4%, 9.9% and 18.6% visited urban areas more than once a week, once a week, once in two weeks and once in three weeks respectively.

Several studies Olowu *et al* (1990), Agbamu (1999) and Banmeke (2003) found that farmers' cosmopoliteness is a determinant of adoption of improved agricultural practises. Women farmers' cosmopoliteness could expose them to effective use of ICTs to access improved farming technology that can boost their productivity and ease their burden.

Table 5.14: Distribution of Women Farmers' Cosmopoliteness (n=359)

Frequency of visits	Frequency	Percent
More than once in a week	52	17.8
Once in a week	39	13.4
Once in two weeks	29	9.9
Once in three weeks	25	18.6
Once in a month	77	26.4
Once in several months	67	22.9
No visit	3	1.0

Figures in parentheses are percentages

Source: Field survey 2009

5.4.2 Cosmopoliteness categories

Figure 5.9 reveals that most (58.5%) of the respondents were in the low cosmopoliteness category, while 41.5% were in the high cosmopoliteness category and only one percent of them were in the non-cosmopolite group. Also, more respondents from Bauchi (59.4%) compared to Adamawa State (56.5%) were in the low cosmopoliteness category. This may be due to the high proportion of women farmers in seclusion in Bauchi State. Seclusion tends to impose some level of restriction on women farmers' travel.

The implication of this limited travels is that the secluded women farmers would have limited contacts with the outside households which can translate to limited awareness of the ICTs, the potentials of the ICTs and their uses. The secluded women farmers may potentially be denied the benefits of contact change. This is a type of change that occurs when a person adopts a technology that is external to the social system and this is only possible if someone moves in or out of a social system. Seclusion therefore, limits women farmers' contacts and consequently limits their use of ICTs.

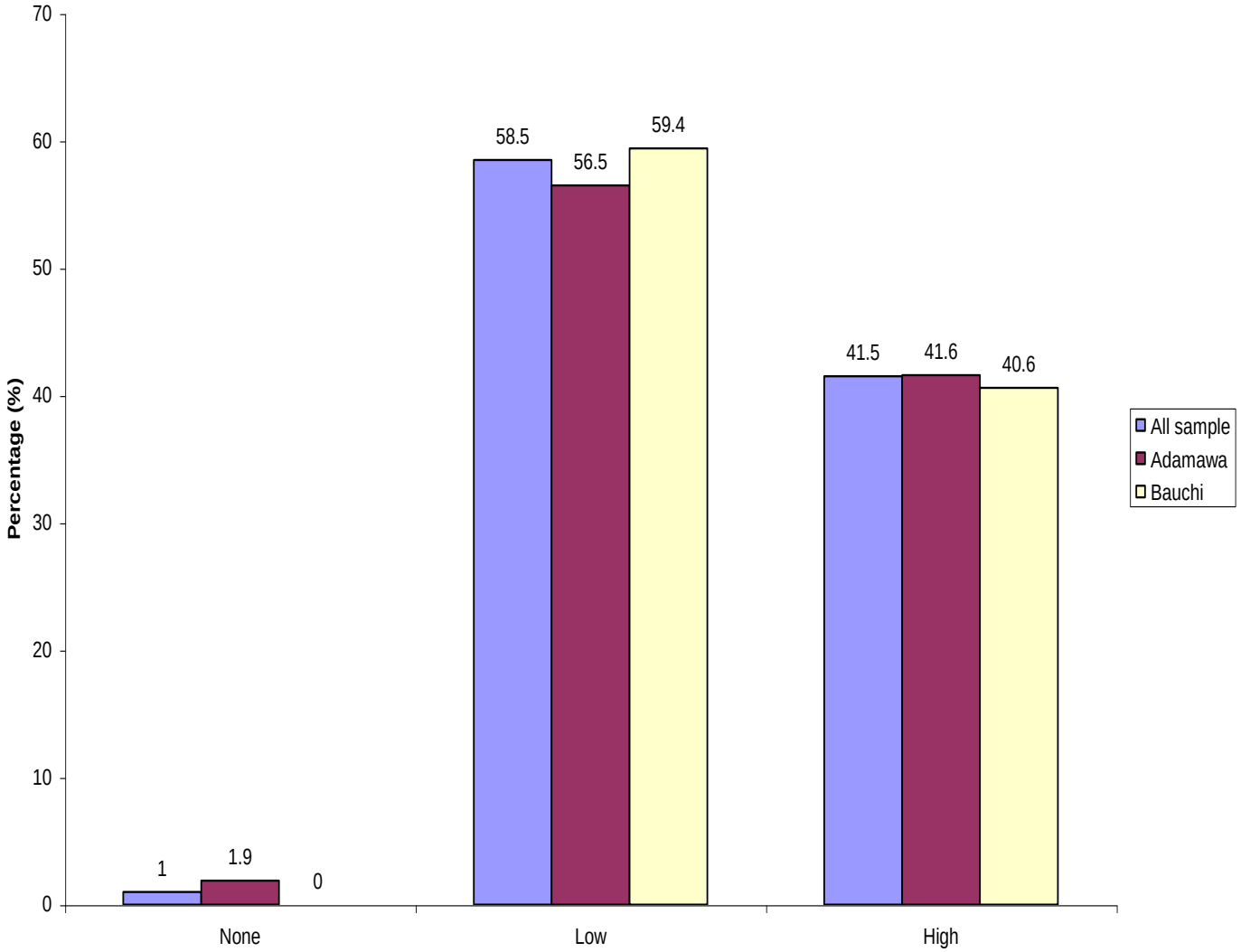

Figure 5.9: Distribution of respondents' cosmopoliteness categories

5.5. Women farmers' awareness of ICTs

Table 5.15 shows that almost all the respondents (99.2%) were aware of radio, while 77.7%, 68.8%, 57.9%, 57.1% and 53.2% were aware of television, video, newspaper, telephone and extension bulletin respectively. Table 5.8 further indicates that, of the new ICTs, respondents were most (79.1%) aware of GSM phone, while 45.1%, 35.1% and 14.2% were aware of computer, the internet and CD-ROM respectively. This trend was common to both rural and urban respondents. However, fewer rural respondents 66.4% and 56.8% are aware of old ICTs such as video and newspaper compared to urban respondents 83.4% and 70.1% respectively. In the same vein, more urban respondents 49.3% and 23.9% are aware of new ICTs such as the internet and CD-ROM compared to rural respondents 32.9% and 12.7% respectively. This result is due to the fact that, most of the ICTs have their base stations and ICTs infrastructure concentrated in the urban areas, this has made it possible for more urban than rural respondents to be aware of both the old and new ICTs.

This result is in line with the finding of Olowu and Oyedokun (1999) that, a high percentage of respondents became aware of the *Oyinladun* radio programme which made them more knowledgeable in farming activities. Awareness could expose farmers, arouse their desire and stimulate them to adopt innovation or use of technology.

Table 5.15: Distribution of respondents' by awareness of ICTs

Old ICTs	All sample (n=359)	Rural (n=292)	Urban (n=67)
Radio	356 (99.2)	289 (99.0)	67 (100.0)
TV	279 (77.7)	227 (77.7)	55 (82.1)
Telephone	205 (57.1)	171 (58.6)	39 (58.2)
Video	247 (68.8)	194 (66.4)	56 (83.4)
Newspaper	208 (57.9)	166 (56.8)	47 (70.1)
Ext. Bulletin/Posters	191 (53.2)	157 (53.8)	39 (58.2)
New ICTs			
Computer	162 (45.1)	131 (44.9)	34 (50.8)
Internet	126 (35.1)	96 (32.9)	33 (49.3)
GSM Phone	284 (79.1)	226 (77.4)	60 (89.6)
CD-Rom	51 (14.2)	37 (12.7)	16 (23.9)

Figures in parentheses are percentages

Source: Field survey 2009

5.6 Awareness categories of ICTs

Table 5.16 shows that about half (50.4%) of the respondents were in the high awareness category for the old ICTs, This is the same among rural and urban respondents. In the case of the new ICTs, more respondents (54.9%) were in the high awareness category. However, more urban (86.9%) compared to rural respondents (47.6%) were in the high awareness category. This is expected with the presumed presence of media houses, cybercafés, newspaper stands and other urban infrastructural facilities that enhance awareness of these ICTs.

Table 5.16: Categorisation of respondents' awareness

Categories	All sample (n=359)	Rural (n=292)	Urban (n=67)
Old ICTs			
Low	178 (49.6)	145 (49.7)	33 (49.3)
High	181 (50.4)	147 (50.3)	34 (50.7)
New ICTs			
Low	162 (45.1)	153 (52.4)	9 (13.4)
High	197 (54.9)	139 (47.6)	58 (86.6)

Figures in parentheses are percentages

Source: Field survey 2009

5.7 Sources of awareness of old ICTs

5.7.1 Sources of awareness of radio

Table 5.17 reveals that, spouses are the major source of awareness of radio (58.2%) among the respondents, while 54.9%, 18.1% and 17.6% had friends and members of social groups, agricultural extension agents and children as their sources of awareness of radio respectively. The trend is similar between rural and urban respondents although more rural respondents (58.9%) compared to urban (37.3%) become aware through friends and members of social groups. This is because of the strong influence of social groups on rural respondents who are always together interacting face to face and sharing the 'we feelings, ' as opposed to urban residence who normally share little or none of these ties.

5.7.2 Sources of awareness of television

Table 5.17 shows that women farmers became aware of television mostly (37.6%) through friends and members of social groups, while 35.4%, 11.7% and 7.8% became aware through their spouses, children and agricultural extension agents respectively. However, more urban (43.3%) than rural respondents (33.8%) became aware of television through their spouses than friends and members of social groups.

5.7.3 Sources of awareness of land telephone

Table 5.17 indicates that friends and members of social groups were the sources of awareness of land telephone among most (25.3%) of the women farmers. This is also the pattern among rural and urban respondents except that fewer (2.6%) rural compared to urban respondents (6.0%) became aware of land phone through the agricultural extension agents.

5.7.4 Sources of awareness of video

Table 5.17 reveals that the sources of awareness of video for most of the respondents (30.9%) were friends and members of social groups, while spouses, children and agricultural extension agents account for 28.7%, 11.4% and 7.0% respectively. The trend is common to both urban and rural areas, although there are more urban (38.4%) than rural respondents (26.4%) who became aware of video through their spouses than friends and members of social groups (28.4%)

5.7.5 Sources of awareness of newspapers

Table 5.17 reveals that agricultural extension agents were the major (31.8%) sources of awareness of newspapers among the respondents, while 28.7%, 8.6% and 28.6% have spouses, children and friends and members of social groups respectively

as their sources of awareness. The trend was the same among urban and rural respondents.

5.7.6 Sources of awareness of extension bulletin

Table 5.17 further indicates that agricultural extension agents were the major sources of awareness (31.8%) of extension bulletin. Also, 20.3%, 14.5% and 4.7% of the respondents became aware through spouses, members of social groups and children respectively. This trend was also common among rural and urban respondents.

Table 5.17: Distribution of respondents' by sources of awareness of old ICTs

Radio sources of awareness	All sample (n=359)	Rural (n=292)	Urban (n=67)
Spouse	211 (58.8)	170 (58.2)	41 (61.2)
Children	63 (17.6)	53 (118.2)	10 (14.9)
Social group/Friends	197 (54.9)	172 (58.9)	25 (37.3)
Extension agents	65 (18.1)	50 (17.1)	15 (22.4)
Television sources of awareness			
Spouse	127 (35.4)	98 (33.8)	29 (43.3)
Children	42 (11.7)	34 (1.6)	8 (11.9)
Social group/Friends	135 (37.6)	112 (38.4)	23 (34.3)
Extension agents	28 (7.8)	22 (7.5)	6 (9.0)
Land phone sources of awareness			
Spouse	45 (12.5)	36 (12.3)	9 (13.4)
Children	12 (3.3)	10 (3.4)	2 (3.0)
Social group/Friends	91 (25.3)	73 (25.0)	18 (26.9)
Extension agents	11 (3.1)	7 (2.4)	4 (6.0)
Video sources of awareness			
Spouse	103 (28.7)	77 (26.4)	26 (38.8)
Children	41 (11.4)	32 (11.0)	9 (13.4)
Social group/Friends	111 (30.9)	92 (31.5)	19 (28.4)
Extension agents	25 (7.0)	19 (6.5)	6 (9.0)
Newspapers sources of awareness			
Spouse	103 (28.7)	88 (30.1)	15 (22.4)
Children	31 (8.6)	25 (8.6)	6 (9.0)
Social group/friends	103 (28.7)	88 (30.1)	15 (22.4)
Extension Agents	114 (31.8)	96 (32.9)	18 (26.9)
Bulletins/Posters awareness sources			
Spouse	103 (28.7)	88 (30.1)	15 (22.4)
Children	31 (8.6)	25 (8.6)	6 (9.0)
Social group/friends	103 (28.7)	88 (30.1)	15 (22.4)
Extension Agents	114 (31.8)	96 (32.9)	18 (26.9)

Figures in parentheses are percentages
Source: Field survey 2009

5.8 Sources of awareness of new ICTs

5.8.1 Sources of awareness of computer

Based on Table 5.18, majority of the women farmers (22.8%) became aware of computer through members of social groups, while 17.0%, 12.5% and 7.2% were aware of computer through their spouses, children and agricultural extension agents respectively. The pattern is common to both rural and urban respondents, except that more urban (29.9%) compared to rural respondents (14.0%) were aware of computer through their spouses. This may be for the fact that urban spouses may be more exposed to these facilities than their rural counterpart.

5.8.2 Sources of awareness of the internet

Table 5.18 indicates that majority of the respondents (24.4%) that were aware of the internet did so through the members of social groups, while 12.0%, 9.5% and 2.5% got aware through their spouses, children and agricultural extension agents respectively. In comparison, more urban respondents (20.9%) were aware through their spouses than through friends and members of social groups (16.4%), while less rural respondents (9.9% became aware through their spouses.

5.8.3 Sources of awareness of GSM phone

Table 5.18 reveals that majority of the women farmers (39.0%) that were aware of GSM phone did so through their spouses, while 25.3%, 23.7% and 6.4% were aware through friends and members of social groups, children and agricultural extension agents respectively. This trend was the same for both rural and urban respondents, and more urban respondents (85.1%) were aware of GSM phone through their children compared to the 9.6% among rural respondents.

5.8.4 Sources of awareness of CD-ROM

Table 5.18 further indicates that 9.7%, 7.5%, 3.3% and 1.9% of the women farmers were aware of CD-ROM through friends and members of social groups, spouses, children and agricultural extension agents respectively. There is no difference in the pattern of CD-ROM among rural and urban respondents. This distribution is because CD-ROM is fairly unknown among both categories of respondents.

Table 5.18: Distribution of respondents by sources of awareness of new ICTs

Computer sources of awareness	All sample (n=359)	Rural (n=292)	Urban (n=67)
Spouse	61 (17.0)	41 (14.0)	20 (29.9)
Children	45 (12.5)	37 (12.1)	8 (11.9)
Social groups Friends	82 (22.8)	70 (24.0)	12 (17.9)
Extension agents	26 (7.2)	21 (7.2)	5 (7.5)
Internet sources of awareness			
Spouse	43 (12.0)	29 (9.9)	14 (20.9)
Children	34 (9.5)	28 (9.6)	6 (9.0)
Social group/friends	77 (21.4)	66 (22.6)	11 (16.4)
Extension agents	9 (2.5)	6 (2.1)	3 (4.5)
GSM phone sources of awareness			
Spouse	140 (39.0)	102 (34.9)	38 (56.7)
Children	85 (23.7)	28 (9.6)	57 (85)
Social group/Friends	91 (25.3)	77 (26.4)	14 (20.9)
Extension agents	23 (6.4)	19 (6.5)	4 (6.0)
Spouse	27 (7.5)	21 (7.2)	6 (9.0)
Children	12 (3.3)	9 (3.1)	3 (4.5)
Social group/friends	35 (9.7)	30 (10.3)	5 (7.5)
Extension agents	7 (1.9)	6 (2.1)	1 (1.5)

Figures in parentheses are percentages

Source: Field survey 2009

5.9 Respondents benefits of ICTs use

Table 5.19 shows that majority of the respondents 75.8%, 71.5%, 67.1%, 65.5%, 63.5%, 62.5% and 45.3% benefited highly from information on fertiliser sources and application, sources and procedures for credits, grants and loans, child care and nutrition, information on current market prices and location, crop pests, diseases and control and reduced travelling cost and time respectively. Most of the respondents 69.8%, 64.4% 62.4%, 60.5% and 42.0% indicated that they did not benefit from information on weather forecast, soil management, government regulation, new farming methods and information on improved seed and seedlings respectively. The implication of this finding is that women farmers benefited from information that borders on their economy, farm inputs and basic health. They did not benefit from information on highly technical agricultural activities. This may be that most of these women need an intermediary like an extension agents to further breakdown these messages.

Table 5.19: Distribution of respondents by benefits of use ICTs

Benefits	High Benefit	Slight Benefit	No Benefit
Information on current market prices and location	63.5	20.7	15.8
Weather forecast	14.5	15.9	69.6
Soil management	17.5	18.1	64.4
Improved seeds/seedlings	34.3	23.7	42.0
Crop pests, diseases and control	62.5	32.0	5.5
Fertiliser sources and application	75.8	19.8	4.4
New farming methods	21.4	18.1	60.5
Child care and nutrition	67.7	23.7	8.6
Sources and procedures for credits, grants and loans	71.3	24.8	3.9
Government regulations	21.7	15.9	62.4
Reduce travelling cost and time	45.3	16.3	38.5
HIV/AIDS	65.5	20.1	14.4

***** Figures are in percentage

Source: Filed Survey, 2009

5.10 Respondents' constraints in ICTs use

Table 5.20 reveals that majority of the women farmers 74.9%, 74.7%, 62.4%, 60.7%, 58.9%, 57.5%, 55.4% and 51.9% indicated that they experienced great constraints due to high cost of ICTs garget, shortage of time allotted to agricultural programmes, non availability/poor ICTs infrastructure, high cost of power/electricity, faulty equipment, lack of local content, multiple chores of women farmers and inability to read and understand English language respectively. Also, most of the women farmers 57.1%, 56.8%, 42.6%, 42.1% and 40.9% indicated that they experienced no constraint in use of ICTs due to inability to understand language of presentation, inappropriate programme schedule, loss of signals from source during programmes, difficulty in operating ICTs and poor reception/non availability of signals in most rural areas.

Table 5.20: Distribution of respondents by constraints to use of ICTs

Constraints	Great constraint	Slight constraint	No constraint
High cost of gadgets	74.4	10.6	14.7
High cost of power/electricity	60.4	10.0	28.7
Faulty equipment	58.9	20.2	20.9
Loss of signals from source during programmes	35.4	22.0	42.6
Inappropriate programme schedule	30.7	12.5	56.8
Multiple chores of women farmers	55.4	12.3	32.3
Shortage of time allotted to agric programmes	74.9	15.9	9.2
Inability to understand the language of presentation	26.7	16.2	57.1
Lack of local content	57.5	17.9	24.6
Difficulty in operating ICTs	30.9	27.6	42.1
Poor reception and non availability of signals in most rural areas	30.1	29.0	40.9
Non availability/poor ICT infrastructure	62.4	16.4	21.2
Inability to read and comprehend English Language	51.9	25.3	22.9

Source: Filed Survey, 2009

***** Figures are in percentage

5.11 Women farmers' attitude towards use of ICTs

This section discusses women farmers' attitude towards the use of ICTs. Respondents' attitude was measured by employing Likert type scale with response categories ranging from agree to disagree. The women farmers indicated which of the statements best described their opinion with respect to use of ICTs. Twenty seven statements were presented to the women farmers (Table 5.21) and they were asked to respond to each on the basis of agree (3), undecided (2) or disagree (1) for description of responses to each item, a minimum score of 27.0, maximum score of 79.0 and mean score of 61.0 was obtained. The scale was dichotomised into unfavourable 27-61.0 and favourable 61.1-79.0, using the below and above the mean classification. The respondents' reactions are presented in Table 5.39, showing the attitude scores, ranging from 27-81.The mean attitude score of 61.0 also supports the fact that majority of the farmers fell into the unfavourable attitude score.

Figure 5.10 reveals that majority of the respondents (52.4%) were categorised as having unfavourable attitude towards the use of ICTs. The trend was common among rural and urban respondents, although more urban (50.7%) than rural (47.3%) respondents had favourable attitude towards use of ICTs. This may be because there were more ICT infrastructure and other support facilities in the urban than rural areas.

The implication of this result is that a little over half of the women farmers had unfavourable attitude towards the use of ICTs. Peoples' attitude determines their behaviour such as the use of ICTs. Respondents with unfavourable attitude therefore, have low use of ICTs and vice versa. This may be due to the influence of the various subjective norms.

Table 5.21: Distribution of respondents' attitude towards use of ICTs

S/N	Attitudinal Statements	Agree	Undecided	Disagree
1	Erratic power supply will not limit my use of the old ICTs	191 (53.2)	46 (12.8)	122 (34.0)
2	Use of the new ICTs will not expose me to market opportunities	68 (18.9)	82 (22.8)	209 (58.2)
3	I have sufficient time to use the new ICTs	119 (33.1)	135 (37.7)	105 (29.2)
4	I cannot afford the cost of using the old ICTs	64 (17.8)	48 (13.4)	247 (68.8)
5	My use of the new ICTs will not be affected by loss of signals from source.	58 (16.2)	98 (27.3)	203 (56.5)
6	Use of the new ICTs will not facilitate farm inputs delivery	85 (23.7)	109 (30.3)	16546.0)
7	Use of the new ICTs will expose me to information on child and health care delivery	265 (73.8)	69 (19.2)	25 (7.0)
8	I have no money to pay for the use of the old ICTs	79 (22.0)	38 (10.5)	242 (67.4)
9	I have no problem mixing with men and youth at ICTs centres to use the old ICTs	166 (46.2)	70 (19.5)	123 (34.3)
10	I have no time out of my busy schedule for use of the old ICTs	113 (31.5)	41 (11.4)	205 (57.1)
11	I don't need to be educated to use the old ICTs	231 (64.3)	35 (9.7)	93 (25.9)
12	Use of the new ICTs will distract me from my domestics chores	131 (36.5)	96 (26.7)	132 (36.8)
13	Use of the new ICTs will keep me abreast with happenings in other part of the world	257 (71.6)	68 (18.9)	34 (9.5)
14	I cannot understand or interpret information from the old ICTs	79 (22.0)	55 (15.3)	225 (62.7)

S/N	Attitudinal Statements	Agree	Undecided	Disagree
15	Use of the old ICTs will increase my farm yield	232 (64.6)	82 (22.9)	45 (12.5)
16	Use of the new ICTs is of no benefit to rural women	86 (24.0)	103 (28.7)	170 (47.4)
17	Non-availability of ICTs centre around will not limit my use of the old ICTs	206 (57.4)	63 (17.5)	90 (25.1)
18	High cost of maintenance will limit my use of the old ICTs	119 (33.1)	58 (16.2)	182 (50.7)
19	Use of the new ICTs will expose me to new channels of farm inputs	243 (67.7)	86 (23.9)	30 (8.4)
20	Language barrier will hamper my use of the new ICTs	176 (49.0)	71 (19.8)	112 (31.2)
21	Use of the old ICTs will help me to keep abreast with government policies	261 (72.7)	68 (18.9)	30 (8.4)
22	Poor signal reception limits my use of the new ICTs	236 (65.7)	90 (25.1)	33 (9.2)
23	Use of the new ICTs will expose me to weather information	216 (60.2)	95 (26.4)	48 (13.4)
24	Use of the old ICTs at commercial centres is expensive for me	121 (33.7)	83 (23.1)	156 (43.2)
25	Use of the old ICTs will facilitate timely execution of my farm operations	217 (60.4)	76 (21.2)	66 (18.4)
26	Use of the new ICTs interferes with my domestic work	154 (42.9)	103 (28.7)	102 (28.4)
27	Timing of agricultural programmes on television and radio is properly scheduled for me to use of ICTs	235 (65.5)	74 (20.6)	50 (13.9)

X=60.97

Figures in parentheses are percentages

Source: Field Survey 2009

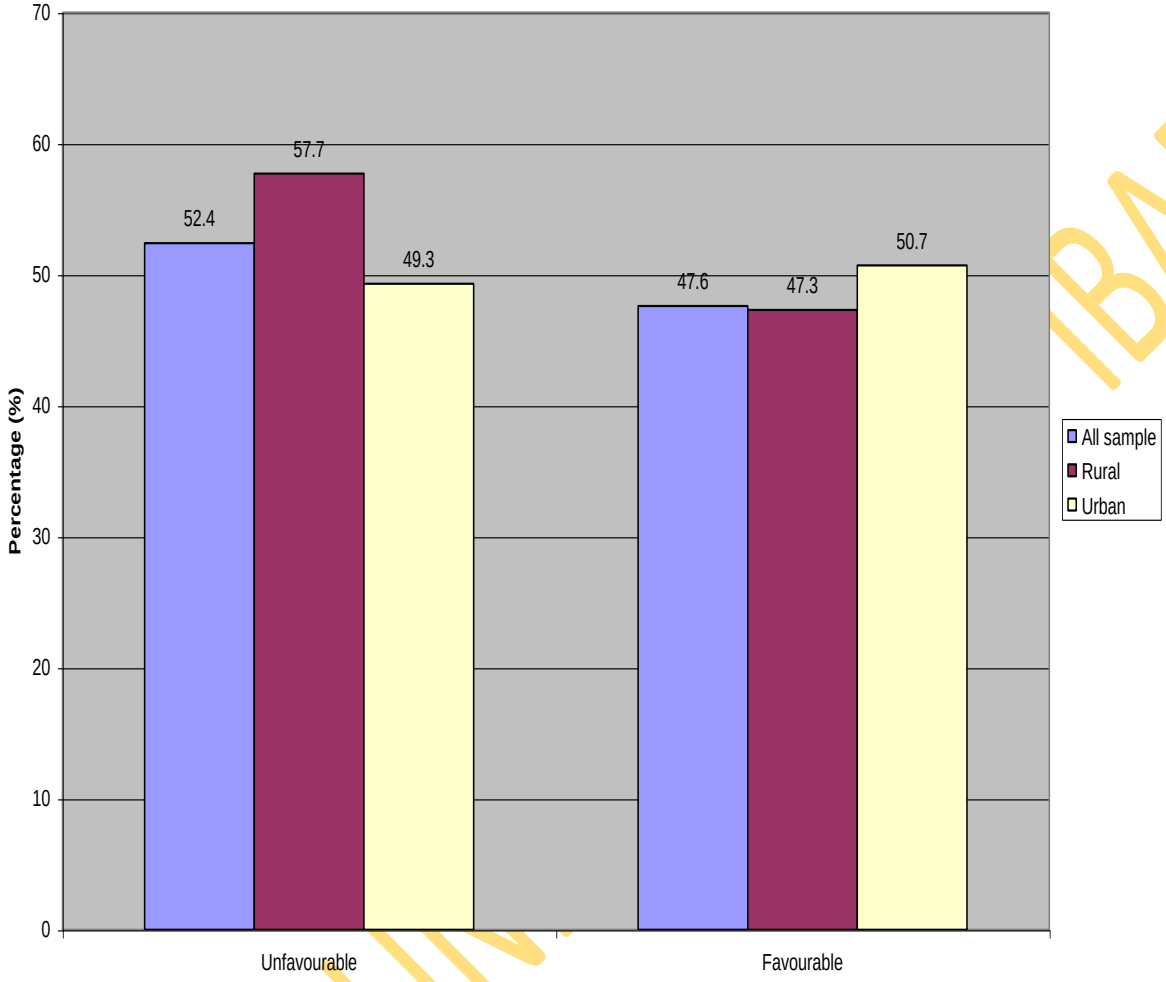

Figure 5.10: Categorisation of Respondents' Attitude towards use of ICTS

5.12 ICTs preference

This refers to women farmers' ranking of ICTs in terms of the importance of these ICTs to them. Table 5.22 reveals that the patterns of ICTs preferences were similar among rural and urban respondents for the new and old ICTs. Hence, the preferences of old ICTs among the respondents were radio > video > television > extension bulletin/poster> newspaper > land telephone. Also, the pattern of preferences for the new ICTs are GSM phone>computer>internet and CD-ROM

Table 5.22: Respondents' ICT Preferences

ICT type	All sample		Rural						Urban				
	Total	Rank	Gombi	Nabardo	Miya	Guyuk	Total	Rank	Mayobelwa	Mubi	Azare	Total	Rank
Old ICTs													
Radio	35	1st	5	5	5	5	20	1st	5	5	5	15	1st
Television	17	5th	3	4	1	1	9	4th	4	3	1	8	3rd
Land telephone	2	6th	0	0	0	0	0	6th	1	0	1	2	5th
Video	24	2nd	3	3	3	3	12	3rd	3	4	5	12	2nd
Newspaper	7	5th	1	1	2	2	6	5th	0	1	0	1	6th
Ext. Bulleting/ Posters	20	4th	3	2	4	4	13	2nd	2	2	3	7	4th
New ICTs													
Computer	15	2nd	2	3	2	2	9	2nd	2	2	2	6	2nd
Internet	7	3rd	1	1	1	1	4	3rd	1	1	1	3	3rd
GSM phone	20	1st	3	2	3	3	11	1st	3	3	3	9	1st
CD-Rom	0	4th	0	0	0	0	0	4th	0	0	0	0	4th

Figures in parentheses are percentages

Source: Field Survey 2009.

5.13. Women farmers' use of ICTs

Table 5.23 reveals that almost all of the respondents (97.8%) used the old ICTs with 97.3% and 100.0% usage in rural and urban areas respectively. In the case of the new ICTs, Table 5.23 indicates that 59.3% of the respondents used the new ICTs, with 57.2% and 70.1% among rural and urban respondents respectively. Table 5.23 further indicates that 76.0% of the respondents used both ICTs types, with the same proportion (of 76.0%) among rural and urban respondents.

Table 5.23: Distribution of respondents' use of ICTs

Use of ICTs	All sample (n=359)	Rural (n=292)	Urban (n=67)
Old ICTs	351 (97.8)	284 (97.3)	67 (100.0)
New ICTs	213 (59.3)	167 (57.2)	47 (70.1)
ICTs Total	273 (76.0)	222 (76.0)	51 (76.1)

Figures in parentheses are percentages

Source: Field survey 2009

5.13.1 Women farmers' use of specific old ICTs

5.13.1.1 Use of radio

Table 5.24 shows that almost all the women farmers (92.8%) used radio with 97.3% and 91.5% usage among rural and urban respondents respectively. This result is owing to the fact that radio listening is a very important pastime of most women farmers in the northern states of Nigeria as source of information on improved agricultural practises, religious information as well as source of entertainment. In the same vein, several studies such as; Yahaya (2002) found high ownership (92.8%) and listenership of radio (78.0%) among women farmers in northern Nigeria. Adewale *et al* (2002), in an audience survey of agricultural information dissemination in Katsina state, found that all the women farmers have radio. Also, Olowu *et al* (2005) found that over two-thirds of women farmers in Bauchi State use radio. In line with these assertions, Soola (2002) opined that radio is an important mechanism for rapid diffusion of development information in diversity of languages and to a widespread often remote geographical mass. For these reasons, the world Bank (2004) World Development Indicator (WDI) ranked radio as the most widely used ICT in Nigeria put at 200/1000 people. This evidence is based on the fact that radio is easily affordable, low cost of maintenance, easy to operate and programmes can be localised. It is also known that some women farmers interact with the broadcast stations through phone-in programmes, which fulfilled the feedback aspect of the medium, and gave credence to radio as the most preferred ICTs.

5.13.1.2 Use of television

Table 5.24 shows that 59.6% of the respondents used television while 58.6% and 64.4% rural and urban respondents used television respectively. This result corroborates the finding of Adewale *et al* (2002) and Olowu *et al* (2005) who found that women farmers in Katsina and Bauchi states respectively use television. Also, more urban compared to rural respondents use television because of the high cost of the hardware, maintenance, poor or non availability of television signal, inadequate power source for television in most rural areas have accounted for the lower proportion of rural respondents using television.

5.13.1.3 Use of land telephone

Table 5.24 indicates that only a few (7.5%) of the respondents used land telephone and fewer rural (8.6%) compared to urban (14.9%) respondents used land telephone. The low proportion of land telephone usage among rural respondents could

be due to non existence of telephone infrastructure among rural respondents and the fact that since inception land phone in Nigeria was just suited to serve the urban rich. The generally low use of land telephone among the respondents is as a result of the advent of GSM cell phones rolled out by private service providers that provided better services compared to the government-controlled land phones that were hitherto ineffective and insensitive to the desire of most telephone users in Nigeria.

5.13.1.4 Use of videos

Table 5.24 reveals that about half (50.1%) of the respondents used video. The trend is common to both rural (49.7%) and urban (54.2%).The near equal distribution in the use of video among rural and urban respondents may be due to the explosion of home videos in both English and Hausa languages; the home videos command more audience among women farmers. This high audience could be useful in improving extension contact and impact of training on farmers in rural areas. In the opinion of Adeokun *et al* (2007), video can be useful in improving extension work as messages can be reproduced to as many farmers as possible.

5.13.1.5 Use of newspapers

Table 5.24 shows that less than half (42.6%) of the respondents used newspapers. This pattern is the same for rural respondents (42.1%), while about half (50.8%) of the urban respondents used newspaper. This result is expected owing to the possibilities of the existence of more literate farmers in urban than rural areas. Newspaper is very good as a reminder which can be kept and references could be made to it from time to time to avoid content erosion.

5.13.1.6 Use of extension bulletin/posters

Table 5.24 further reveals that only 37.3% of the women farmers used extension bulletin and posters, while 36.6% and 45.8% of rural and urban respondents used extension bulletin/posters respectively. The low use of extension bulletin/posters may be due to limited contact between women farmers and agricultural extension agents and the fact that most of the women farmers may not be able to read the materials. However, in the opinion of Olowu (1991), extension bulletins/posters and other printed extension materials if well designed and carefully written, could be cheap sources of reference for literate and non-literate farmers alike. It is therefore, important that researchers and other extension experts put into consideration the peculiarity of the non-literate women farmers in the design and distribution extension materials.

Table 5.24: Distribution of respondents by use of specific old ICTs

Use of radio	All sample (n=359)	Rural (n=292)	Urban (n=67)
Yes	333 (92.8)	271 (92.8)	54 (91.5)
No	26 (7.2)	21 (7.2)	13 (8.5)
Use of television			
Yes	214 (59.6)	171 (58.6)	38 (64.4)
No	145 (40.4)	121 (41.4)	29 (35.6)
Use of land telephone			
Yes	26 (7.2)	16 (8.6)	10 (14.9)
No	333 (92.8)	51 (91.4)	57 (85.1)
Use of video			
Yes	181 (30.1)	145 (49.7)	32 (47.8)
No	178 (69.9)	147 (50.3)	35 (52.2)
Use of Newspapers			
Yes	153 (42.6)	123 (42.1)	30 (50.8)
No	206 (57.4)	169 (57.9)	37 (49.2)
Use of bulletins/posters			
Yes	134 (37.3)	107 (36.6)	27 (45.8)
No	125 (62.7)	185 (63.4)	40 (54.2)

Figures in parentheses are percentages

Source: Field survey 2009

5.13.2 Women farmers' use of specific new ICTs

5.13.2.1 Use of computer

Table 5.25 shows that only 12.5% of the respondents used computer, 16.6% among rural and 21.0% among urban respondents. This result is in line with Agwu *et al* (2008) who found a very low use of computer and other new ICTs among farmers in Abia and Enugu states of Nigeria. The low use of ICT among the respondents may be attributed to several factors such as low literacy level, non availability of ICT facilities in most rural areas, high cost of access to computer and the ignorance of most women farmers of the use of computer to access information on improved agricultural practises.

5.13.2.2 Use of the internet

Table 5.25 shows that only 8.9% of the women farmers used the internet, while 11.8% and 14.9% of the rural and urban respondents used the internet respectively. The same low use of the internet among women farmers was established by Agwu *et al* (2007) in a study of farmers' use of ICTs in Abia and Enugu states of Nigeria. As a result of the low use of ICTs among farmers and other information stakeholders, Mundy (2001, cited by Ilevbaoje (2007), observed that Africans have been lagging behind the global internet stakes. Only one out of every 9, 000 Africans outside South Africa have access to the internet compared to one in 38 in the rest of the world. However, this figure might be lower now in 2011, but all the same, women farmers in Nigeria are still not using the internet fully. The low ICT use persists despite the potential of the internet as a technology for effective information dissemination that can bridge the digital divide between the developed and the underdeveloped countries. This may be due to the low band width and poor internet infrastructure in rural areas where most of the women farmers live and work as well as the fact that most of the women farmers cannot operate the internet as the women farmers are said to be exhibiting technology fright.

5.13.2.3 Use of GSM phone

Table 5.25 reveals that 59.3% of the women farmers used GSM phone, while 57.2% and 69.5% rural and urban respondents used GSM phone respectively. The relatively high proportion of GSM phone users among urban compared to rural respondents may be due to high concentration of GSM infrastructure in urban areas and the fact that use of GSM phone is very popular among urban respondents. Women farmers in the study area use GSM phone more than they use the computer,

the internet and CD-Rom. The high use of GSM phone among the women farmers may be as a result of the launch and explosion of GSM phone by various service providers that accompanied the liberalisation of the telephone industry in Nigeria about a decade ago. The high level of use of GSM phone among women farmers is good for extension as women farmers in rural areas could use their phone to respond to agricultural programmes aired on radio and television.

5.13.2.4 Use of CD-ROM

Table 5.25 further reveals that 8.4% of the women farmers used CD-ROM comparatively 6.5% and18.6% of the women farmers used CD-ROM in rural and urban areas respectively. This result also supports the report of Agwu *et al* (2007) that farmers marginally used CD-ROM. Despite the marginal use of CD-ROM among the women farmers, Aina (1995) asserts that, with CD-ROM vast amounts of data could be searched in-house without incurring telecommunication charges. It facilitates selection of relevant materials from diverse sources worldwide. Therefore, agricultural extension agents and other development practitioners could take advantage of the fact that CD-ROM contains vast amounts of data and information on improved agricultural practises to equip themselves with necessary information for their clients.

Hence, CD-ROM can be recommended for use by the extension agencies in Nigeria in two dimensions; one, the extension agents will use the CD-ROM resource tools, that have been compiled by development organisations such HumanInfo.org to equip themselves, and two, make specific disseminated technologies available on stand-alone computers at telecentres to be accessed by the farmers.

Table 5.25: Distribution of respondents by use of specific new ICTs

Use of computer	All sample (n=359)	Rural (n=292)	Urban (n=67)
Yes	45 (12.5)	31 (16.6)	14 (21.0)
No	214 (87.5)	161 (83.4)	43 (79.0)
Use of the internet			
Yes	32 (8.9)	17 (5.8)	15 (22.4)
No	327 (91.1)	275 (94.2)	52 (77.6)
Use of GSM phone			
Yes	213 (59.3)	167 (57.2)	41 (61.2)
No	146 (40.7)	125 (42.8)	26 (38.8)
Use of CD-ROM			
Yes	30 (8.4)	19 (6.5)	11 (16.4)
No	229 (91.6)	273 (93.5)	56 (83.6)

Figures in parentheses are percentages

Source: Field survey 2009

5.14 Women farmers' frequency of use of specific old ICTs

5.14.1 Use of radio

Table 5.26 shows that most of the women farmers (79.6%) used radio more than once a week. While 5.3%, 1.7%, 0.6 and 1.1% used radio once a week, once in two weeks, once a month and once in 2-3 months respectively. This pattern is common to both rural and urban areas. However, more rural (82.5%) compared to urban (67.2%) respondents used radio more than once a week. This could be because of sole dependence of must rural dwellers on radio as the medium of contact with the outside world. As opposed to the urban residents, they have a variety of other sources they can easily switch over to.

5.14.2 Use of television

Table 5.26 further reveals that over half (54.0%) of the women farmers used television more than once a week, while 5.0%, 0.3% and 1.4% used television once a week, once in two weeks and once a month respectively. The trend was common among both rural and urban respondents, although in urban areas, no respondent used television once in two weeks and beyond, as compared to the rural respondents where respondents abound in such category. It can then be concluded that urban respondents who use television did so always. This may be due to the availability of electricity or alternative power sources in the urban areas in contrast with the rural areas.

5.14.3 Use of land telephone

Table 5.26 shows that 3.9%, 1.4%, 0.6%, 0.8% and 2.2% of the respondents used land telephone more than once a week, once a week, once in two weeks, once in a month and once in 6months- 1year respectively. This trend was common among both rural and urban respondents, though with higher frequency of those who used land phone more than once a week among urban (9.0%) compared to rural respondents (2.7%).This high frequency of use among urban respondents may be accounted for by home usage, while the staggered used among rural respondents may result from use at some places other than ones home.

5.14.4 Use of videos

Table 5.26 further shows that most of the women farmers (39.0%) used video more than once a week, while only 3.5%, 1.1%, 1.4% and 0.8% of the women farmers used video once a week, once a month, once in 2 to 3 months and once in 6 months to 1 year respectively. Though the modal category is the same for both rural and urban respondents, the result indicates a more staggered video usage among rural compared

to urban respondents. This may be because rural respondents would not have access to electricity to power the gadgets as frequent as urban respondents may have.

5.14.5 Use of newspaper

Table 5.26 indicates that the modal category (17.8%) used newspapers more than once a week, while 11.1%, 4.7%, 5.0%, 0.8% and 1.7% of the women farmers used newspapers once a week, once in two weeks, once a month, once in 2-3 months and in 6months - 1year respectively. The trends in frequency of use of newspapers are similar between urban and rural respondents. However, more urban respondents (25.4%), in contrast to rural respondents (16.1%), used newspapers more than once a week. This result corroborates Olowu and Yahaya's (2002) that Nigerian newspapers are urban-biased. This could be as a result of the low literacy level and the proportion of literate rural residents that could spare money for newspaper purchase may be too negligible for profit-seeking newspaper houses to contemplate prioritising the rural communities that are most times very difficult to access.

5.14.6 Use of extension bulletin/posters

Table 5.26 reveals that the modal category (12.3%) of the respondents use extension bulletins/posters once a month, while 5.0%, 2.2%, 5.6%, 6.1% and 5.3% of them use extension bulletins/posters more than once a week, once a week, once in two weeks, once in 2-3months and once in 6months to a year respectively. The modal frequency of use of extension bulletins/posters once a month tallies with the frequency of supply of the bulletins which are usually released monthly and quarterly in some instances.

Table 5.26: Distribution of respondents by frequency of use of specific old ICTs

Variables	All sample (n= (359)	Rural (n=292)	Urban (n=67)
Radio			
More than once in a week	286 (79.6)	241 (82.5)	45 (67.2)
Once in a week	19 (5.3)	14 (4.8)	5 (7.5)
Once in 2 weeks	6 (1.7)	4 (1.4)	2 (3.0)
Once in a month	2 (0.6)	2 (0.7)	0 (0.0)
Once in 2-3 months	4 (1.1)	4 (1.4)	0 (0.0)
Television			
More than once in a week	194 (54.0)	160 (54.88)	34 (50.8)
Once in a week	18 (5.0)	7 (2.4)	11 (16.4)
Once in 2 weeks	1 (0.3)	1 (0.3)	0 (0.0)
Once in a month	5 (1.4)	5 (1.7)	0 (0.0)
Telephone			
More than once in a week	14 (3.9)	8 (2.7)	6 (9.0)
Once in a week	5 (1.4)	3 (1.0)	2 (3.0)
Once in 2 weeks	2 (0.6)	2 (0.7)	0 (0.0)
Once in a month	3 (0.8)	3 (1.0)	0 (0.0)
Once 2-3 months	0 (0.0)	0 (0.0)	0 (0.0)
Once 6 months – 1yr	8 (2.2)	6 (2.1)	2 (3.0)
Video			
More than once in a week	140 (39.0)	116 (39.7)	24 (35.8)
Once in a week	9 (3.5)	9 (3.1)	0 (0.0)
Once in a month	4 (1.1)	2 (0.7)	2 (3.0)
Once 2-3 months	5 (1.4)	5 (1.7)	0 (0.0)
Once 6 months – 1yr	3 (0.8)	3 (1.0)	0 (0.0)
News paper			
More than once in a week	64 (17.8)	47 (16.1)	17 (25.4)
Once in a week	40 (11.1)	33 (11.3)	7 (10.4)
Once in 2 weeks	17 (4.7)	12 (4.1)	5 (7.5)
Once in a month	18 (5.0)	16 (5.5)	2 (3.0)
Once in 2-3 months	3 (0.8)	2 (0.7)	1 (1.5)

Variables	All sample (n= (359)	Rural (n=292)	Urban (n=67)
Once in 6 months – 1yr	6 (1.7)	6 (2.1)	0 (0.0)
Ext. Bulletin/Posters			
More than once in a week	18 (5.0)	14 (4.8)	4 (6.0)
Once in a week	8 (2.2)	6 (2.1)	2 (3.0)
Once in 2 weeks	20 (5.6)	13 (4.5)	7 (10.4)
Once in a month	44 (12.3)	34 (11.6)	10 (15.0)
Once in 2-3 months	22 (6.1)	22 (7.5)	0 (0.0)
Once in 6 months – 1yr	19 (5.3)	15 (5.1)	4 (6.0)

Figures in parentheses are percentages

Source: Field Survey 2009

5.15 Women farmers' frequency of use of specific new ICTs

5.15.1 Use of computer

Table 5.27 shows that the modal category (4.7 %) of the respondents used computer more than once a week, while 3.1%, 3.3%, 3.3% and 0.6% of them used computer once a week, once in two weeks, once a month and once in 2-3 months respectively. This pattern of frequency of use is common among both rural and urban respondents, although more urban respondents (10.4%), in contrast to rural respondents (3.4%), used computer more than once a week. This may be due to more ICTs infrastructure in urban areas and the likelihood of more urban respondents to have easy access to computer than the average rural respondent.

5.15.2 Use of internet

Table 5.27 indicates that 5.3% of the respondents being is the modal category, use the internet more than once a week, while 2.5%, 1.4%, 3.3% and 0.8% used the internet once a week, once in two weeks, once a month and once in 6months-1year.The trend of frequency of use is common between rural and urban respondent with more urban respondents (9.0%) in the modal category in contrast to rural respondents (4.5%). This result is traceable to the fact that internet facilities are not available in most rural parts of the study area.

5.15.3 Use of GSM phone

Table 5.27 shows that most of the respondents (47.9%) used GSM phone more than once a week, while 0.8%, 2.5%, 2.2% and 0.3% used GSM phone once a week, once in two weeks, once a month and once in 2-3months respectively. While the trend of frequency of use was common among rural and urban respondents, there were fewer rural respondents (45.9%) who used GSM phones more than once a week in contrast to urban respondents (56.7%).This may be due to non availability of GSM network services and other telecommunication facilities in most rural areas compared to the rural areas. Since the use of GSM Phone is common among rural as well as urban respondents, the popularity of GSM phone use can be exploited to make GSM phone a priority ICT for disseminating information on improved agricultural practises among women farmers.

5.15.4 Women farmers' use of CD-ROM

Table 5.27 indicates that 5.3% of the respondents, being the modal category, used the CD-ROM more than once a week while, 1.9%, 0.6 and 0.6% of the respondents use the CD-ROM once a week, once a month and once in 6months -1 year. While the use of CD-ROM among the respondents was negligible, there was less proportion of rural respondents (4.1%) in the modal category in contrast to 10.4% of urban respondents in the same category. This result is due to the fact that one's use of CD-ROM is a function of use of computer and the internet.

Table 5.27: Distribution of respondents' frequency of use of specific new ICTs

Frequency of use of Computer	All sample (n=359)	Rural (n=292)	Urban (n=67)
More than once in a week	17 (4.7)	10 (3.4)	7 (10.4)
Once in a week	11 (3.1)	7 (2.4)	4 (6.0)
Once in 2 weeks	12 (3.3)	9 (3.1)	3 (4.5)
Once in a month	12 (3.3)	8 (2.7)	4 (6.0)
Once in 2-3 months	2 (0.6)	1 (0.3)	1 (1.5)
Frequency of use of the Internet			
More than Once in a week	19 (5.3)	13 (4.5)	6 (9.0)
Once in a week	9 (2.5)	5 (1.7)	4 (6.0)
Once in 2 weeks	5 (1.4)	3 (1.0)	2 (3.0)
Once in a month	12 (3.3)	10 (3.4)	2 (3.0)
Once in 2-3 month	0 (0.0)	0 (0.0)	0 (0.0)
Once in 6 months – 1year	3 (0.8)	3 (1.0)	0 (0.0)
Frequency of use of GSM Phone			
More than once in a week	172 (47.9)	134 (45.9)	38 (56.7)
Once in a week	3 (0.8)	2 (0.7)	1 (1.5)
Once in 2 weeks	9 (2.5)	4 (1.4)	5 (7.5)
Once in a month	8 (2.2)	8 (2.7)	0 (0.0)
Once in 2-3 months	1 (0.3)	0 (0.0)	1 (1.5)
Frequency of use of CD-ROM			
More than Once in a week	19 (5.3)	12 (4.1)	7 (10.4)
Once in a week	7 (1.9)	6 (2.1)	1 (1.5)
Once in a month	2 (0.6)	1 (0.3)	1 (1.5)
Once in 6 months – 1year	2 (0.6)	2 (0.7)	0 (0.0)

Figures in parentheses are percentages

Source: Field Survey 2009.

5.16 Categorisation of women farmers' use of ICTs

Categorisation of Women farmers' level of use of ICTs: women farmers were categorised on their level of use of ICTs raw scores. It gave rise to a continuum which became a two-point scale. The score that qualifies a woman farmer into any of the two categories was determined by respondents' score using the below and above the mean categorisation calculated for the use of ICTs.

5.16.1 Categorisation of women farmers' old ICTs use

Categorisation of women farmers' use of old ICTs was also conducted based on the use of below and above the mean scores. The maximum score for the old ICTs was 6.0, minimum score was 0.0 and the mean score was 4.14. Based on the classification, table 5.28 indicates that a little over half of the respondents (50.4%) are in the high ICTs use category, while 49.6% were in the low ICTs use category. This spread is common among both rural and urban respondents. Therefore, most of the women farmers in both rural and urban areas used the old ICTs.

5.16.2 Categorisation of women farmers' new ICTs use

Respondents' categorisation by use of new ICTs was also conducted, using the below and above the mean scores. The maximum score for the new ICTs was 4.0, while the minimum and mean scores for the new ICTs were 0.0 and2.13 points respectively. In the same vein, Table 5.28 revealed that only 11.4% were in the high ICT use category for the new ICTs and 88.6% were in the low category. Comparatively, more urban respondents (12.3%) used the new ICTs than rural respondents (7.5%) This result shows that there is marginal use of the new ICTs among the women farmers.

5.16.3 Categorisation of women farmers' ICTs use total

Table 5.28 shows that 54.3% of the respondents were classified as low level users of ICTs total, while 45.7% were classified as high level users. The proportion of ICTs users is common across rural and urban areas .Mean score =19.6. Maximum score =60.0 and minimum score=00.0. Hence, most of the respondents were classified as low level ICT users.

Table 5.28: Distribution of ICT use categories

Old ICTs use categories	All sample (n=359)	Rural (n=292)	Urban (n=67)
Low	178 (49.6)	145 (49.7)	33 (49.3)
High	181 (50.4)	147 (50.3)	34 (50.7)
New ICTs use categories			
Low	41 (11.4)	36 (12.3)	5 (7.5)
High	318 (88.6)	256 (87.7)	62 (92.5)
ICTs use total categories			
Low	195 (54.3)	158 (54.1)	37 (55.2)
High	164 (45.7)	134 (45.9)	30 (44.8)

Figures in parentheses are percentages

Source: Field survey 2009

5.17 Testing of hypotheses of the study

This section presents the results of the set of hypotheses that were generated and tested in this study.

5.17.1 Testing of Hypothesis 1

There is no significant relationship between women farmers' socio-economic characteristics (such as age, marital status, religion, seclusion status, household size, educational attainment and social participation) and use of ICTs:

Each of the independent variable was attached against each of the scores for the dependent variable in line with the set hypotheses. The significance of relationships was determined at 0.05 level. To test for the relationship between variables in hypothesis one, Pearson Product Moment Correlation and Chi-square were used. The PPMC was used where the variables were measured at interval level and chi-square was used for variables that were measured at nominal and ordinal levels.

Table 5.29 shows that women farmers' age and household size were not significantly related to their use of ICTs ($r=0.065$, $P<0.05$; $r=0.079$, $P<0.05$).The null hypothesis was therefore rejected with respect to women farmers' age and household size. Table 5.16 further reveals that there was a significant relationship between women farmers' social participation and use of ICTs ($r=0.468$, $P<0.05$).This means that women farmers with high social participation score will have high use of ICTs, while those with low social participation scores will have low use of ICTs.

Table 5.29: PPMC Correlation between selected personal characteristics and use of ICTs

Variables	r-value of	p-value	Decision
Age	0.065	0.221	NS
Household size	0.079	0.134	NS
Social participation	0.468	0.000	S

Source: Computed from field survey 2009.

The result of chi-square analysis in Table 5.30 indicates that there was a significant relationship between women farmers' residence location and seclusion status (χ^2 =5.558, $p<0.05$; χ^2=8.760, $p<0.05$) and their use of ICTs. The null hypothesis was therefore, rejected with respect to women farmers' residence location and seclusion status. Therefore, women farmers in urban areas used ICTs more than their counter-parts in rural areas, and women farmers in seclusion used ICTs less than their counterpart that are not in seclusion.

Result of the chi-square analysis in Table 5.30 further reveals that there was no significant relationship between women farmers' marital status, religion, education, type of agriculture and registration status (χ^2=9.729, C=0.139; χ^2=9.900, C=0.140; χ^2=10.188, C=0.570; χ^2 = 1.809, C=0.597; χ^2= 1.595, C=0.073 respectively) . The null hypothesis is therefore, accepted with respect to marital status, religion, education, type of agriculture and registration status.

Table 5.30: Chi-Square Analysis of Relationship between selected socioeconomic characteristics and use of ICTs

Variables	χ2	df	P-value	Contingency value	Decision
Marital status	9.729	4	0.045	0.139	NS
Religion	9.900	3	0.019	0.140	NS
Education	10.188	5	0.541	0.570	NS
Resident Location	5.558	1	0.000	0.117	S
Type of agriculture	1.809	2	0.084	0.597	NS
Registration status	1.595	1	0.207	0.073	NS
Seclusion status	8.760	1	0.001	0.443	S

Source: Computed from field Survey 2009

5.17.2 Testing of hypothesis 2

There is no significant relationship between women farmers' awareness and use of ICTs: Table 5.31 shows that use of old ICTs ($r=0.653$, $p<0.05$), use of new ICTs ($r=0.493$, $p<0.05$) and total use of ICTs ($r=0.650$, $p<0.05$) were significantly related to women farmers' awareness of ICTs. The null hypothesis was rejected. It means that respondents with high awareness scores were supposed to have high use of ICTs and vice versa.

Table 5.31: Correlation analysis between awareness and use of ICTs

Variables	r-value	P-value	Decision
Use of Old ICTs	0.653	0.000	S
Use of New ICTs	0.493	0.000	S
Total use of ICTs	0.650	0.000	S

Source: Computed from field survey 2009

5.17.3 Testing of hypothesis 3

There is no significant relationship between women farmers' cosmopoliteness and their use of ICTs: Result of the correlation analysis in Table 5.32 indicates that women farmers' cosmopoliteness ($r=0.193$, $p<0.05$) was significantly related to use of ICTs. The null hypothesis was therefore rejected. This can be interpreted that the more cosmopolite the woman farmer is, the higher is her use of ICTs.

The implication of this result is that rural women farmers who visit urban areas may have high use of ICTs, as such visits are capable of improving their contacts, creating awareness and arousing their desire to use ICTs. This finding corroborates that of Alimi (1991), who founds that, increased number of extension agents' visitation to farmers and farmers' cosmopoliteness increased their access to agricultural information.

Table 5.32: Correlation Analysis between Cosmopoliteness and use of ICTs

Variable	r-value of PPMC	p-value	Decision
Cosmopoliteness	0.193	0.000	S

Source: Computed from field survey 2009.

5.17.4 Testing of hypothesis 4

There is no significant difference between awareness of the old and new ICTs: The hypothesis was tested, using T-test for difference between two means. Table 5.33 shows that there was a significant difference between mean awareness of old ICTs (mean=4.139, $p<0.05$) and new ICTs (mean=1.735, $p<0.05$).The null hypothesis was therefore rejected. This result indicates that more respondents are aware of the old ICTs than the new ICTs.

The fact that more respondents are aware of old than the new ICTs could translate to mean that more respondents used old ICTs than the new ICTs. Therefore, the old ICTs should be used to package extension messages for the women farmers for ease of understanding and assimilation.

Table 5.33: T-test analysis for differences between awareness of old and new ICTs

Pair	Mean difference	t-value	p-value	Decision
Old ICTs Awareness vs.	4.1393			
New ICTs Awareness	1.7354	34.767	0.000	S

Source: Computed from field survey 2009

5.17.5 Testing of hypothesis 5

There is no significant difference between women farmers use of the old and new ICTs: The hypothesis was tested using T-test for difference between two means. Table 5.34 shows that there is a significant difference between mean use of old ICTs (mean=14.783, $p<0.05$) and new ICTs (mean=4.816, $p<0.05$).The null hypothesis was rejected. The result of the test of hypothesis shows that the respondents used the old ICTs more than the new ICTs.

This implies that extension information meant for the women farmers should be packaged and presented to them, through the specific ICTs they use. In this way, their information needs may be adequately served and consequently improve their productivity. This is because FAO (2000) has found that directing agricultural information at the women farmers can increase their productivity.

Table 5.34: T-test Analysis for Differences between use of old and new ICTs

Pair	Mean difference	t-value	p-value	Decision
Use of old ICTs vs.	14.7827			
Use of new ICTs	4.8162	26.987	0.000	S

Source: Computed from field survey 2009.

5.17.6 Testing of hypothesis 6

There is no significant difference between use of ICTs among women farmers in seclusion and those that are not in seclusion: The hypothesis was tested, using T-test for difference between two means. Table 5.35 reveals that there is a significant difference between mean use of ICTs among secluded (mean=15.686, $p<0.05$) and non-secluded (mean=21.515, $p<0.05$) women farmers. The null hypothesis was therefore rejected. The implication is that non-secluded women farmers used ICTs more than the secluded women farmers.

Table 5.35: T-test analysis of differences between use of ICTs among secluded and non-secluded respondents

Pair	Frequency	Mean difference	t-value	p-value	Decision
Not Secluded vs.	241	21.5145			
Secluded	118	15.6864	4.017	0.000	S

Source: Computed from field survey 2009.

5.17.7 Testing of hypothesis 7

There is no significant difference between use of ICTs among rural and urban women farmers in the study: The hypothesis was tested, using T-test for difference between two means. Table 5.36 indicates that there is a significant difference between mean use of ICTs among women farmers in rural (mean=18.868, $p<0.05$) and urban areas ($X=22.797$, $p<0.05$). The null hypothesis was rejected. The implication is that more urban than rural respondents use ICTs. The fact that fewer rural compared to urban respondents used the ICTs should be borne in mind when packaging extension messages to the rural women farmers. This will help the planners and designers of extension programmes to complement the use of ICTs with other teaching methods such as use of the women farmers' groups while still encouraging them to fully imbibe the use of ICTs.

Table 5.36: T-test Analysis for differences between use of ICTs among rural and urban respondents

Pair	Frequency	Mean difference	p-value	Decision
Rural vs.	292	19.240		
Urban	67	23.119	0.000	S

Source: Computed from field survey 2009.

5.17.8 Testing of hypothesis 8

There is no significant relationship between women farmers' attitude and use of ICTs. The relationship was tested, using correlation analysis: Table 6.37 reveals that there is a significant relationship between use of old ICTs ($r=0.335$, $p<0.05$), use of new ICTs ($r=0.255$, $p<0.05$) and ICTs use total (0.322, $p<0.05$) and women farmers' attitude. The null hypothesis was rejected. This implies that women farmers with favourable (higher) attitude have high use of ICTs.

This may be explained by the theory of planned behaviour by Ajzen (1985), that a person's adoption or otherwise of a behaviour (in this case use of ICTs) will be determined by; the individuals evaluation of the expected benefits from the behaviour, perception of ability to carry out the behaviour and perception of ability to afford the cost of carrying out the behaviour. Hence, women farmers with positive evaluation of the use of ICTs in the context of the theory of planned behaviour may adopt the use of ICTs, while those with negative evaluation may not adopt the use of ICTs.

Table 5.37 Correlation analysis between attitude and use of ICTs

Variables	r-value	P-value	Decision
Use of Old ICTs	0.335	0.000	S
Use of New ICTs	0.255	0.000	S
Total use of ICTs	0.322	0.000	S

Source: Field Survey 2009.

5.18 Logit regression analysis of ICTs use and women farmers' characteristics

Logit regression analysis was conducted in order to determine specific contribution of each independent variable in explaining the variance in women farmers' use of ICTs. Table 5.38 shows the logit regression analysis of women farmers' use of ICTs with the independent variables.

The independent variables regressed include (i) age, (ii) marital status, (iii) religion, (iv) household size, (v) agricultural activities, (vi) farm size, (vii) ethnic group, (viii) seclusion status, (ix) social participation, (x) cosmopoliteness, (xi) awareness, (xii) location of residence, (xiii) benefits, (xiv) constraints and (xv) attitude. All these variables gave chi-square value of 187.747 at 0.05 level of significance. This implies that:

In order to know whether the relationship between the dependent and the independent variables in table 5.38 are important or not, partial regression coefficient (Beta value) of the independent variables and the dependent variable with effect of other independent variables was removed.

Table 5.38 shows that awareness of ICTs is the highest predictor of women farmers' use of ICTs, with a regression coefficient beta value of 0.464. The beta value of 0.464 implies that awareness of ICT contributed 46% to the use of such ICT. Other predictors were residence location with a beta value of 0.092, attitude with a beta value of 0.088, seclusion status with a beta value of 0.082, cosmopoliteness with a beta value of 0.040, agricultural activities with a beta value of 0.034, educational attainment with a beta value of 0.025, marital status with a beta value of 0.018, social participation with a beta value of 0.010, and farm size with a beta value of 0.006 respectively.

The other independent variables such as age, ethnic group, religion and household size had the beta values of -0.001, -0.003, -0.010 and-0.008 respectively. These show a negative contribution or inverse relationship between women farmers' use of ICTs and the predictor independent variables.

The significance of the beta values from Table 5.38 was revealed, using the chi-square coefficient values at p=0.05.The chi-square and the level of significance showed that only five of the 14 independent variables had likelihood of increasing women farmers use of ICTs. These variables are education (ß=0.025, $p<0.05$), social participation (ß=0.010, $p < 0.05$), awareness of ICTs (ß= 0.464, $p<0.05$), cosmopoliteness (ß=0.040, $p<0.05$) and location of residence (ß=0.092, $p<0.05$).This

finding implies that; awareness, location of residence, cosmopoliteness, educational attainment and social participation each had likelihood of increasing women farmers' use of ICTs by 46%, 09%, 04%, 2.5% and 01%.

To improve and increase the use of ICTs among the women farmers in Nigeria, concerted efforts should be made to improve women farmers' awareness of the digital ICTs as almost all of them are aware of the old ICTs. Women farmers should be encouraged to attain higher level of education; this may be achieved through distant learning, part-time and through extra mural classes among other learning systems.

Private telecommunication service providers in the country should be encouraged to expand their services to the rural areas by erecting masts, base stations internet services and other ICT infrastructure in the areas.

The logit regression equation also had a constant of -0.76. The regression equation is represented as: $Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \ldots\ldots\ldots\ldots\ldots\ldots b_{14}X_{14}$

Where Y = predicted women farmers' use of ICTs (Dependent variable)

X_1 to X_{14} = Independent variables

a = Regression constant

$b_1, b_2, b_3, b_4 \ldots\ldots\ldots b_{14}$ = regression coefficient attached to variables X_1, X2, X3, $X_4 \ldots\ldots\ldots\ldots\ldots\ldots\ldots X_{14}$.

X_8 X_9 X_{12} X_{13} +……X_{14} = Independent variables that significantly contributed to the variance of the independent variables and

X_1 = Age

X_2 = Marital status

X_3 = Religion

X_4 = Household size

X_5 = Agricultural activities

X_6 = Farm size

X_7 = Ethnic group

X_8 = Educational attainment

X_9 = Residence location

X_{10} = Seclusion status

X_{11}= Social participation

X_{12} = Cosmopoliteness

X_{13}= Awareness

X_{14}= Attitude

Table 5.38 Logit Regression Analysis of independent variables on ICTs Use

Variables	Coefficient	Standard Error	t - value	p - value	Decision
Constant	-0.761	0.159	-4.780	0.000	
Agric activities	0.034	0.024	1.439	0.150	NS
Farm-size	0.006	0.009	0.732	0.464	NS
Age	-0.001	0.002	-0.436	0.663	NS
Ethnic	-0.003	0.002	-1.767	0.077	NS
Marital	0.018	0.030	0.602	0.547	NS
Seclusion	0.082	0.073	1.116	0.264	NS
Education	0.025	0.010	2.523	0.012	S
Religion	-0.010	0.064	-0.155	0.877	NS
Household size	-0.008	0.004	-1.859	0.063	NS
Social Participation	0.010	0.003	3.051	0.002	S
Resident location	0.092	0.058	1.588	0.112	NS
Cosmopoliteness	0.040	0.010	3.846	0.000	S
Awareness	0.464	0.050	9.196	0.000	S
Attitude	0.088	0.050	1.750	0.080	NS

Source: Computed from field survey, 2009

Dependent Variable = ICT use grouped

Number of observations =359

Log likelihood function = -153.627

Restricted Log Likelihood = -247.747

Chi-squared = 187.747

Degree of freedom = 13

Significance level = 0.05

NS = Not significant

S = Significant

CHAPTER SIX
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.1 Summary of the study

Women farmers play a key role in the agricultural production of many countries in sub-Sahara Africa in general, and Nigeria in particular. They contribute some 60-80% of the labour input in agriculture and are responsible for about 70% of food production, processing and trade in food commodities. However, despite the significant contribution of women farmers to food production in both rural and urban Nigeria, women farmers remain marginalised with regard to access to important production inputs and information on improved agricultural practises. Therefore, any attempt at improving agricultural production should include this all-important category of farmers. It is on this premise that the study assessed the use and non-use of ICTs among women farmers in north-eastern Nigeria.

The objectives of the study focused mainly on determining the socio-economic characteristics of the women farmers, assessing their awareness and the socio-cultural factors that affect women farmers' use of ICTs as well as the benefits and constraints to use of ICTs. Women farmers' attitude towards use of ICTs and use of ICTs was also determined.

Hypotheses were tested to relate the dependent and independent variables. Comparison was also made from the responses of rural and urban women farmers and between their use and / or non use of new and old ICTs. The theoretical framework explained women farmers' use of ICTs as influenced by the women farmers' socio-economic characteristics, awareness, ICTs characteristics, benefits, constraints and attitude towards use of ICTs. The population of the study included all rural and urban women farmers in north-eastern Nigeria.

A multistage random sampling procedure was used to select 359 rural and urban women farmers from both Adamawa and Bauchi states. An interview schedule, focus group discussion and key informant interview guides were designed to obtain information on women farmers' use of ICTs. The independent variables measured include socio-economic characteristics (age, marital status, religion, seclusion status, household size, ethnic group, registration status, educational attainment, other occupations, agricultural activities and social participation), cosmopoliteness,

awareness, benefits and constraints, socio-cultural factors, ICTs preferences and attitude towards use of ICTs.

The statistical analyses used were both descriptive (frequencies, percentages and means) and the inferential statistics (Chi-square, PPMC, T-test and logit regression analysis. Significant level inferential statistics was decided at 0.05. The major findings of the study are as follows:

Majority of the women farmers (37.0%) were between the ages of 41 and 50 years. A large proportion of the respondents (86.6%) was married. About 54.8% of the respondents had some level of formal education, with 6o% of them not beyond primary education. Majority of the women farmers (59.6%) were Christians, more urban respondents (73.1%) compared to 32.5% among rural respondents were Muslims. Only 32.9% of the respondents were in seclusion, with more urban (52.2%) than rural (28.4%) respondents in seclusion.

Most of the respondents' households (53.8%) had between 7 and 12 people. Majority of the respondents were Fulani (10.6%) and Hausa (10.3%), with 31 other ethnic groups accounting for 79.1% of the respondents. About 32.2% of the women farmers are involved in trading besides farming. More urban respondents were involved in civil service (28.8%) and trading (33.9%) compared to 14.9% and 29.4% respectively among rural respondents. Majority of the respondents were registered women farmers and a higher proportion of rural respondents (73.8%) were registered compared to 56.7% among urban respondents.

Most of the women farmers (63.2%) had farm sizes of between 1 and 3 ha. More urban respondents (53.7%) compared to rural (23.3%) had farm size of less than a hectare. Majority of the respondents (64.3%) practised mixed farming and more urban (20.9%) compared to rural (5.8%) respondents practised mixed farming. Also more rural (28.8%) than urban (19.4%) respondents cultivated crops with cereals as the most cultivated crop (93.0%).In the same vein, fewer rural (13.6%) and more urban (19.4%) respondents cultivated vegetables. Majority of the respondents (58.5%) also keep poultry.

A high proportion (88.3%) of the respondents were members of social groups with most of them (49.9%) being members of religious social groups. Fewer urban

(4.5%) compared to rural (16.1%) are members of age grade social groups. Most of the women farmers participate more in religious (32.9%) than other social group activities and most of the respondents (57.7%) have low social participation.

Almost all (99.0%) of the women farmers in rural areas visit urban centres with most of them (26.4%) visiting once a month. Close to half of the respondents (49.7%) are in the high ICTs awareness category. Almost all (99.2%) respondents were aware of radio, while 77.0% were aware of television, 68.8% were aware of video, 57.9% were aware of newspaper, 57.1% were aware of land telephone and 53.2% were aware of extension bulletin/posters. Also, 79.1% were aware of GSM phone, 45.0% were aware of computer, 35.1% were aware of the internet and 14.2% were aware of CD-ROM.

More urban respondents were in the high awareness category for old (50.4%) and new ICTs (54.9%). Comparatively more urban (86.6%) than rural (47.6%) respondents were in the high awareness category for the new ICTs. Spouses were the major sources of awareness of radio and GSM phone among 58.2% and 39.0% of the respondents respectively. Friends and members of social groups were the major sources of awareness of television, video, land telephone, the internet, computer and CD-ROM among 37.6%, 30.9%, 25.3%, 24.4%, 22.8% and 1.9% of the respondents respectively. Also, agricultural extension agents were the major sources of awareness of newspapers and extension bulletins among 38.1% of the respondents.

Majority of the women farmers (52.4%) had unfavourable attitude towards use of ICTs. Almost all of the respondents (97.8%) used the old ICTs, with 100% usage among urban respondents. About 92.8% of the respondents used the radio, 59.6% used television, 50.1% used video, 42.6% used newspapers, 37.3% used agricultural extension bulletins and 7.5% used land telephone.

About 59.3% of the women farmers used the new ICTs. Comparatively more urban (69.5%) than rural (57.2%) respondents used the new ICTs .Also, 59.3% of the respondents used GSM phone. The frequency of use of old ICTs among the respondents are 79.6%, 54.0%, 39.0%, 17.8% and 3.9% of them used radio, television, video, and newspaper and land telephone more than once in a week respectively. For the new ICTs; 47.9% used GSM phone, 5.3% used internet and CD-ROM and 4.7% used GSM more than once in a week. Most of the respondents

(54.3%) were in the low category of ICTs users. A little over half (50.4%) were in the high user category for old ICTs, while 11.4% of the respondents were in the high ICTs user category. More urban respondents (12.3%) were in the high ICTs user categories compared to rural respondents (7.5%).

The hypotheses of the study were tested at 0.05 level of significance. PPMC analysis revealed that there was no significant relationship between women farmers age ($r=0.07$, $p<0.05$), household size ($r=0.08$, $p=0.05$) and use of ICTs. There was a significant relationship between social participation ($r=0.47$, $p<0.05$) and use of ICTs.

Chi-square revealed a significant relationship between residence location ($\chi^2=5.56$, $p<0.05$), seclusion status ($\chi^2=8.76$, $p<0.05$) and use of ICTs. Also, no significant relationship was found between the use of ICTs and marital status ($\chi^2=9.79$, $p<0.05$), religion ($\chi^2=9.96$, $p<0.05$), educational attainment ($\chi^2=-10.88$, $p<0.05$), type of agriculture ($\chi^2=1.81$, $p<0.05$) and registration status ($\chi^2=1.60$, $p<0.05$) There was a significant relationship between women farmers' awareness ($r=0.63$, $p<0.05$), cosmopoliteness ($r=0.19$, $p<0.05$) and use of ICTs.

There was a significant difference between:

Awareness of old (mean=4.14, $p<0.05$) and new ICTs (mean=1.74, $p<0.05$); Use of old (14.78, $p<0.05$) and new ICTs (mean =4.82, $p<0.05$); Use of ICTs among secluded (mean=15.69, $p<0.05$) and non secluded respondents (mean =21.52, $p<0.05$); Use of ICTs among rural (mean =18.87, $p<0.05$) and urban respondents (mean =22.80, $p<0.05$).

There was a significant relationship between women farmers' attitude and:

Use of old ICTs ($r=0.34$, $p<0.05$), new ICTs ($r=0.26$, $p<0.05$) and ICT use total ($r=0.32$, $p<0.05$). Logit regression analysis reveals that educational attainment (ß = 0.01 $p<0.05$), social participation (ß = 0.01 $p<0.05$), awareness of ICTs (ß = 0.46, $p<0.05$) cosmopoliteness (ß= 0.04, $p<0.05$) and residence location (ß =0.09 $p<0.05$) had likelihood of increasing the use of ICTs.

6. 2 Conclusions

Based on empirical evidence of the study, the following conclusions were drawn.

The women farmers were small scale farmers most of whom cultivate crops and keep animals. There was low level of formal education among the respondents, with most of them not being educated beyond primary level. This has contributed to

non-use of digital ICTs. This has no doubt compounded the low access to information on improved agricultural practises among women farmers in north eastern Nigeria.

There is high level of social heterogeneity in the study area, accentuated by the many ethnic groups and associated sociocultural diversities, which imposed some limitations on the use of ICTs.

Most of the women farmers were involved in social groups, with women religious social group as the most common. These groups were the major sources of awareness of ICTs for most of the respondents. Most of the women farmers also had low social participation, which is capable of reducing women farmers' desire to use ICTs. Almost all the rural respondents visit urban centres, which resulted in high awareness of ICTs among most respondents.

Scarcity of female extension agents and limited contact between women farmers and male extension agents due to socio-cultural reasons, made women farmers' access to improved agricultural practises in the study area difficult. Women farmers in the study area generally had unfavourable attitude towards use of ICTs.

Respondents' ICTs preferences were radio>videos>GSM phones>extension bulletin>television>newspaper> computer>internet>CD-Rom>land phone. There was significant difference in use of old and new ICTs among women farmers and also, in the use of ICTs among secluded and non- secluded women farmers, as well as between rural and urban areas. The mostly used ICTs among women farmers are radio, television, GSM phone and video.

6.3 Recommendations

The following recommendations are made on the basis of major findings and conclusions of this study.

1. Since most of the women farmers have low level of education and speaking mostly the local languages, agricultural messages meant for them should be packaged, using video and audio tapes in local languages, as it is evidenced that most of the women farmers could not communicate effectively in Hausa the perceived common language of the people. Also, use of bold and catchy posters should be emphasised in extension activities in the study areas. Such posters should be distributed beyond offices and public spots to the various women groups and households. These posters can stimulate discussions

among the women groups and family members even if they cannot read or write.

2. Extension planners and executors should take into cognisance the social diversities of the women farmers in the study area by packaging locality-specific technologies and extension messages to the women farmers. This is because these respondents are from over 33 different ethnic and socio-cultural backgrounds contrary to the erroneous impression that they are from the same background.

3. There should be a deliberate effort by the government to improve the ICTs infrastructure in the rural areas and build capacity for local intermediaries like extension agents to be able to source, decode and teach their clients to adapt and use information to improve their agricultural practises. This can be done by adopting the telecentre approach in which one agricultural telecentre is established at every state ADP zone or block and equipped with both old and new ICTs such as radio, television, audio tapes print materials, computer, fax machine, VCR machine, CD-Rom, the internet among other facilities. This may not be too difficult with the availability of satellite wireless technologies now and is already happening in many African countries. Such telecentres will be headed by experts who will train the WIA extension officers because developing their capacities to use these ICTs effectively is important for onward teaching of the women farmers to be effective in use of the ICTs to improve their productivities.

4. Though the women farmers generally cultivate small areas of land, all development efforts should be channelled towards improving their productivity on the small areas of land. Literature abounds that women farmers' challenges are occasioned by low productivity per unit area rather than inadequate farm size, after all, small is beautiful. Efforts at increasing farm size may mean adding more marginal land to the women farmers as the men farmers normally would want to hold onto the fertile lands.

5. The state ADPs should train the various women social groups on effective use of ICT tools they are aware of and that are currently being used by them so that such ICTs could be used to deliver extension messages/technologies to the

women farmers most of whom cannot be reached through the conventional extension visits due to shortage of female extension personnel and limited contact between male extension agents and female farmers in the study area.

6. Extension and indeed development effort towards improving women's access to information on improved agricultural practises should be channeled towards women-specific social groups. Where women specific groups are not in existence the agents should try and establish one as this would guard against hijack of such benefits by unintended beneficiaries.

7. Any development intervention in the use of ICTs that will involve women farmers in the study area should take cognizance of their busy schedule and carve out a convenient time for them so as to sustain their interest in extension messages or programmes.

8. Extension messages and technologies meant for the women farmers should be packaged, using ICTs such as radio, video, television and GSM-phone, because these are the ICTs that they are using already.

9. Federal Government of Nigeria should create the necessary infrastructure that could popularise and enhance the use of the relatively new ICTs among the women farmers. This can be done by encouraging the telecommunication service providers in the country to expand their services to the rural areas by erecting masts, base stations, internet services and other ICT infrastructure that could enhance women farmers' use of ICTs in the rural areas. In the event, the telecommunication operators try to evade this responsibility because the rendition of such services may not be profitable to them. They should be compelled, through legislation, to do as part of their corporate social responsibilities.

10. There is also the need by the various NGOs, government agencies and other stakeholders in extension communication to expose the women farmers to new ICTs and subsequently reduce technological fright that most of them exhibit at present. This will help them exploit, to the maximum, the benefits from use of ICTs.

6.4 Areas of further study

This study attempted to determine women farmers' use of ICTs in North Eastern Nigeria. It investigated the socio-economic characteristics, ascertained awareness, determined benefits and constraints to use of ICTs. The study investigated socio-cultural factors that affect use of ICTs, determined attitude towards use of ICTs, ICTs preferences and ascertained the use of ICTs among respondents. In trying to achieve these objectives, some other questions cropped up which may be considered in further studies such as:

1. Women Farmers' ICTs-based Information needs
2. Use of ICTs for empowerment and enhanced farm decision making among women farmers.
3. Use of ICTs among livestock farmers in North Eastern Nigeria.
4. Determinants of women farmers' information needs and their ICTs use patterns.
5. Survey of e-readiness of WIA agricultural extension agents in North-eastern Nigeria.

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APPENDIX I

University of Ibadan

Department of Agricultural Extension

and Rural Development.

Research Questionnaire

Dear Respondent

I am a research student from the University of Ibadan. We are conducting a survey on Women Farmers' Attitude towards use of Information and Communication Technologies (ICTs) in North-Eastern Nigeria .You have been selected to be one of our respondents. Please feel free to provide your honest responses to all the questions as there are no wrong answers. All information provided by you will be treated with absolute confidentiality as it will be used for research purposes only.

Thank You.

Augustine A. Ndaghu

Section A: Questionnaire Identification and Location

1. Questionnaire Number----------
2. Name of Enumerator----------
3. Name of village----------
4. Name of extension block----------
5. Name of Extension zone----------
6. State----------
7. Residence location :

Rural	
Urban	

8. If you reside in a rural area, do you usually visit urban centres?

Yes	
No	

9. If yes, how frequent do you make such visits?

More than once a week	
Once a week	
Once in two weeks	
Once in three weeks	
Once in a month	
Once in several months	

B. Social Participation

10. Are you a member of any social group or association?

Yes	
No	

11. If yes, please indicate the association (s) you belong to among the following.

Position/Office held		
Association	Membership	
	Yes	No
a. Religious group		
b. Farmers groups		
c. Age grade/peer group		
d. *Adashe*		

e. Cooperative group		
f. Others (specify)		

12. What is your level of participation in these groups?

Social groups	Official position		Attendance at meetings					Pay monthly dues		Pay special levy	
	Yes	No	More than once in a month	Once in a month	Once in 2-3 months	Once in 4-6 months	Once in a year	Yes	No	Yes	No
a. Religious group											
b. Farmers group											
c. Age grade/peer group											
d. *Adashe* group											
e. Cooperative group											
f. Others specify)											

13. Please, what influenced your decision to join these social groups?

(**a**). Social recognition	
(**b**). Self satisfaction	
(**c**). Community development	
(**d**). Economic benefits	
(**e**). To know people	
(**f**). Improve my farming	
(**g**). Improve my religious activities	
(**h**). Others (Specify)	

C. Agricultural Enterprise

14. What type of crops do you cultivate? Please indicate the type of crops you cultivate and the farm size allotted to each crop.

Crop		Farm size

15. Please indicate as appropriate the state of your livestock enterprise

			Breeds		Management system			Uses		

Section D: Awareness of ICTs.

16. Which of the following ICTs are you aware of?

Old ICTs	Awareness	
	Yes	No
a. Radio		
b. Television		
c. Telephone		
d. Video		
e. Newspapers		
f. Extension bulletins/poster		

New ICTs		
g. Computer		
h. Internet		
i. GSM-phone		
j. CD-Rom		

17. Indicate appropriately your sources of awareness of these ICTs?

	Sources of Awareness									
Old ICTs	Spouse		Children		Members of social group		Friends/Relations		Agric Extension agents	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
a. Radio										
b. Television										
c. Land Telephone										
d. Video										
e. Newspaper										
f. Extension bulletin/ posters										
New ICTs										
g. Computer										
h. Internet										
i. GSM-phone										
j. CD-Rom										

Section E: Use of ICTs

18. Do you use any ICT?

Yes	
No	

19. If yes, please indicate appropriately your use and frequency of use of ICTs

Old ICTs	Use of ICTs		Frequency of use of ICTs					
	Yes	No	More than once a week	Once a week	Once in 2 weeks	Once in a month	Once in 2-3 months	Once in 6 months – one year
a. Radio								
b. Television								
c. Land Telephone								
d. Video								
e. Newspapers								
f. Extension bulletin/posters								
New ICTs								
g. Computer								
h. Internet								
i. GSM Phone								
j. CD-ROM								

Section F. Benefits and Constraints to the use of ICTs

20. What are the Benefits you get from use of ICTs?

Benefit Types	High Benefit	Slight Benefit	No Benefit
i. Information on current market prices and location			
ii. Weather forecast			
iii. Soil Management			
iv. Improved Seeds /Seedlings			
v. Crop, pest, diseases and control			
vi. Fertiliser sources and application			
vii. New Farming methods			
viii. Child Care and nutrition			
ix. Sources and procedures for credits, grants and loans			
x. Government regulations			
xi. Reduce traveling time and cost			
xii. HIV/AIDs Prevention/Management Information			

21. What are the Constraints you experience in Use of ICTs

Constraints	Great Constraints	Slight Constraints	No Constraints
i. High cost of ICTs gadgets			
ii. High cost of power/electricity			
iii. Faulty Equipment			
iv. Loss of signals from sources during programmes			
v. Inappropriate Programme schedule			
vi. Multiple chores of women farmers			
vii. Shortage of time allotted to agriculture programmes			
viii. Inability to understand the language of presentation			
ix. Lack of local content			

x. Difficulty in operating ICTs			
xi. Poor reception and non availability/poor ICT infrastructure			
xii. Inability to read and comprehend English Language			

22. Indicate the extent to which you agree or disagree with the statements below regarding your use of ICTs?

Attitudinal Statements	**Agree**	**Undecided**	**Disagree**
1. Erratic power supply will not limit my use of the old ICTs			
2. Use of the new ICTs will not expose me to market opportunities			
3. I have sufficient time to use the new ICTs			
4.I cannot afford the cost of using the old ICTs			
5. My use of the new ICTs will not be affected by loss of signals from source.			
6. Use of the new ICTs will not facilitate farm inputs delivery			
7.Use of the new ICTs will expose me to information on child and health care delivery			
8. I have no money to pay for the use of the old ICTs			
9. I have no problem mixing with men and youth at ICTs centres to use the old ICTs			
10. I have no time out of my busy schedule for use of the old ICTs			
11. I don't need to be educated to use the old ICTs			
12. Use of the new ICTs will distract me from my domestics chores			
13. Use of the new ICTs will keep me abreast with happenings in other part of the world			
14. I cannot understand or interpret information from the old ICTs			

15. Use of the old ICTs will increase my farm yield			
16. Use of the new ICTs is of no benefit to rural women			
17. Non-availability of ICTs centre around will not limit my use of the old ICTs			
18. High cost of maintenance will limit my use of the old ICTs			
19. Use of the new ICTs will expose me to new channels of farm inputs			
20. Language barrier will hamper my use of the new ICTs			
21. Use of the old ICTs will help me to keep abreast with government policies			
22. Poor signal reception limits my use of the new ICTs			
23. Use of the new ICTs will expose me to weather information			
24. Use of the old ICTs at commercial centres is expensive for me			
25. Use of the old ICTs will facilitate timely execution of my farm operations			
26. Use of the new ICTs interferes with my domestic work			
27. Timing of agricultural programmes on television and radio are properly scheduled for me to use of ICTs			

Section G: Personal Characteristics.

23. Registration status

Registered farmer	
Non- registered farmer	

24. What type of agriculture are you involved in?

Crop cultivation	
Animal husbandry	
Both crop and animal husbandry	

25. How old are you? ----------years

26. What is your ethnic background? ----------

27. What is your Marital Status?

Married	
Divorced	
Widowed	
Single	

28. What is your religion?

Christianity	
Islam	
Traditionalist	
Others (specify)	

29. Are you in seclusion (pudah)?

Yes	
No	

30. Do you have any form of education?

Yes	
No	

31. If yes, what is your highest educational qualification?

Koranic education	
Adult literacy	
Primary school certificate	
Junior Secondary school certificate	
Senior secondary school certificate	
NCE/OND	
B.Sc/HND	
Others (specify)	

32. What is the highest educational qualification of your spouse----------

33. What is the highest educational qualification of your children----------

34. What is your other occupation?----------

35. What is your household size? ----------

Thank you for your cooperation.

APPENDIX II

University of Ibadan

Department of Agricultural Extension

and Rural Development

Focus Group Discussion Guide

On Women Farmers Attitude Towards the use of Information and Communication Technology (ICTs) in North-Eastern Nigeria.

Introduction

Greetings, I am a research student in the Department of Agricultural Extension and Rural Development University of Ibadan.

Our gathering here today is as a result of a research that I am conducting on the attitude of women farmers towards the use of ICTs in North-eastern Nigeria. We are particularly happy that you people are part of this research.

You have been carefully selected to represent the women farmers in this area. It is very important that you tell us what the situations are so that relevant recommendations can be made based on accurate information from you.

You are pleased implored to discuss the questions freely among yourselves. We urge every one of you to participate in the discussion. Also, we want you to understand that there are no wrong answers. Every contribution is important we want to know from you what the realities are. We would like to take some notes, so that we don't forget what you tell us.

Thank you for sparing your time to participate in the discussion and May God bless you all (Amen).

Augustine A. Ndaghu

A. **FGD Guide Identification**

1. State ----------

2. Extension zone ----------

3. Extension block ----------

4. Name of moderator ----------

5. Name of note-taker ----------

6. Number of participants in the FGD ----------

7. Date ----------

B. **Characteristics of the participants**

8. Proportion of the participants by:

(a) Ethnicity: I ---------- II ---------- III ---------- IV ---------- ----------

(b) Religion: Christians ---------- Muslims ---------- Traditionalists ---------- ----------

Others (specify) ----------

C. **Use of ICTs**

9. Which of the following ICTs are you aware of?

Old ICTs	**Awareness**	
	Yes (%)	**No (%)**
a. Radio		
b. Television		
c. Telephone		
d. Video		
e. Newspapers		
f. Extension bulletins/poster		
New ICTs		
g. Computer		
h. Internet		
i. GSM Phone		
j. CD ROM		

10. How often do you use these ICTs?

Old ICTs	Use of ICTs		Frequency of use	
	Yes (%)	No (%)	Regularly (%)	Occasionally (%)
a. Radio				
b. Television				
c. Telephone				
d. Video				
e. Newspapers				
f. Extension bulletins/poster				
New ICTs				
g. Computer				
h. Internet				
i. GSM Phone				
j. CD ROM				

11i. What are the reasons why you are not using ICTs?

Old ICTs	Reasons for not using
a. Radio	
b. Television	
c. Land Telephone	
d. Video	
e. Newspapers	
f. Extension bulletin/posters	

Probe further for socio-cultural factors militating against women farmers' use of old ICTs

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New ICTs	Reasons for not using
a. Computer	
b. Internet	
c. GSM Phone	
d. CD ROM	

Probe further for socio-cultural factors militating against women farmers' use of new ICTs

12. What are the Benefits in use of ICTs? (Enumerate the benefits)

13. What are the constraints in use of ICTs? (Enumerate the constraints)

14. Please indicate your ICTs preferences by comparing a pair of the ICTs at a time

Old ICTs	Radio	Television	Land phone	Video	Newspapers	Extension bulletin/posters	Computer	Internet	GSM Phone	CD ROM
a. Radio										
b. Television										
c. Land Phone										
d. Video										
e. Newspapers										
f. Extension bulletin/posters										
New ICTs										
g. Computer										
h. Internet										
i. GSM Phone										
j. CD ROM										

15. Do you have other information that you would like to tell us about your use of ICTs?

_____

_____

_____

Thank you for sparing your time with us and may God bless you.

APPENDIX III

University of Ibadan

Department of Agricultural Extension and Rural Development

Key Informant Interview Guide

On Women Farmers' Attitude Towards use of Information and Communication Technologies (ICTs) in North-Eastern Nigeria.

Greetings, I am a research student from the University of Ibadan. I am conducting a survey on the use of ICTs by women farmers in North-Eastern Nigeria. I am particularly happy that you are chosen to be one of the respondents for this study.

Please I am going to ask you a few questions pertaining to Women farmers' use of ICTs in this area. Feel free to provide honest responses to all the questions as there are no wrong answers; I am only trying to find out from you what the realities are. It is therefore, very important that you tell me what the situations are, so that relevant recommendations can be made based on accurate information from you.

All information provided by you will be treated with absolute confidentiality and be used for research purposes only.

Thank you.

Augustine A. Ndaghu

A. **Interview Guide Identification**

1. State ----------

2. Extension zone ----------

3. Extension block ----------

4. Name of Interviewer ----------

5. Type of Key Informant ----------

B. **Respondents Characteristics**

6. Age ----------

7. Position ----------

8. Number of years on the position ----------

9. Educational qualification ----------

10. Religion ----------

11. Sex ----------

C. **Use of ICTs**

12. Are women farmers in this area using ICTs?

13. If No, why do you think women farmers are not using ICTs?

a. Why are women farmers not using the old ICTs?

Probe for socio-cultural reasons inhibiting women farmers' use of the old ICTs.

b. Why are women farmers not using the new ICTs?

Also, probe for socio-cultural reasons inhibiting women farmers' use of the new ICTs.

14. Do you have others things you would like to tell me concerning women farmers' use of ICTs?

Thank you.