

**ASSESSING THE POTENTIAL OF LOCAL RADIO
FOR AGRICULTURAL COMMUNICATION IN
GHANA**

**Thesis Submitted for the degree of Doctor of Philosophy at
the University of Leicester**

By

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2008

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ABSTRACT

Assessing the Potential of Local Radio for Agricultural Communication in Ghana

By:

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This study investigated the potential of local radio as a source of agricultural communication in Ghana. The main thrust of the research was to investigate the levels of unaided recall and comprehension of agricultural radio messages among rural farmers.

The study employed the use of two methodological tools – experiments and survey. Eight experiments were conducted in eight rural communities. In all, 252 farmers were used as participants for the experiments. The experiments investigated the effects of specific production and audience factors on unaided recall and message understanding. The survey involved the use of questionnaires to gather data through interviews with 365 farmers. The survey methodology was used to profile rural radio listeners in Ghana; and to glean insights into the sources of general and agricultural news for rural farmers, the farmers' radio listening behaviours, radio programme format preferences, and their levels of adoption of radio agricultural messages.

Unaided recall and comprehension of broadcast news were found to be generally low. Two programming variables - recaps of news items and repeat broadcasts - demonstrated significant impact on farmers' unaided recall and comprehension of radio agricultural messages. Item duration was found to be very potent in influencing memory recall. Younger farmers recorded significantly higher unaided recall and comprehension scores than older farmers; and farmers with higher education performed better in free recall and comprehension of broadcast messages than those with lower levels of education.

The study found that radio is the most popular source of general and agricultural news to farmers. The farmers relied mostly on radio, extension agents and interpersonal communication for agricultural information. While the farmers reported that the extension agent was the most credible among all the sources of agricultural communication, they rated radio as the most reliable. Overall, the results of the study suggest that with effective radio programming, farmers will benefit more from radio agricultural broadcasts.

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The regional directors of agriculture for the Northern, Upper East, and Upper West regions granted me interviews and also arranged for me to interview their district directors. The interviews provided very relevant background information on issues relating to agricultural extension education in Ghana. I owe the three regional directors and the district directors of agriculture a debt of gratitude.

I am grateful also to the regional directors of Radio Savannah Tamale; URA Radio, Bolgatanga; and Radio Upper West, Wa, for granting me interviews. The regional directors also arranged for me to interview their radio programme producers and presenters on current programming of radio agricultural broadcasts. I benefited from relevant background information from those interviews and discussions. I appreciate the cooperation of the radio staff.

I am grateful also to the research assistants and field staff who assisted in the data gathering. I am particularly thankful to Mr Thomas Kambonga, Mr Klerk Alhassan, Mr Latif Abukari and Mr Yakubu Yushaw for their selfless support throughout the period

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I wish to express my gratitude to my mother for her prayers for me during the period of this academic programme.

Several other individuals, who have not been mentioned here, provided support in diverse ways towards this work. I owe all of them a debt of gratitude.

Finally, I give glory to the Almighty God for seeing me through this PhD programme.

DEDICATION

This thesis is dedicated, first and foremost, to the hardworking small-scale rural farmers of Ghana who, over the years, have demonstrated genuine and unflinching faith in the noble activity of farming.

The work is also dedicated to the local radio agricultural programme producers, agricultural experts, and agricultural extension officers who work together in designing and presenting agricultural broadcasts to rural farmers in Ghana.

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CHAPTER ONE

INTRODUCTION

1.1. Background to the Study

Poverty reduction has been a major developmental goal in Ghana since 1995. This is clearly spelt out in the country's Vision 2020 Development Plan (Government of Ghana, 2005). The document reveals that poverty reduction in the country will achieve rapid and noticeable effects if there is growth in the agricultural and agro-processing sectors. Indeed the belief that increased agricultural production will ensure increased quality of life of the people has permeated the country's development thinking since the early years of independence. La Anyane (1963), writing on Ghana's Agriculture, cited the country's Department of Agriculture Report in 1960, which stated that "...the rapid and continuous increase in the standard of living and dietary of the people can be achieved only by a corresponding increase in agricultural production" (La Anyane, 1963:161).

The link between agriculture and poverty reduction in the country is supported by the Ghana Poverty Reduction Strategy (GPRS) document. Agriculture contributes immensely to Ghana's economy, and the sector is expected to grow up to 6% per annum to support the country's effort at achieving the status of a middle income country by the year 2020 (Government of Ghana, 2005). The GPRS document states that agriculture is a valuable source of raw materials for local industries, earns foreign exchange for the country, and offers employment and income for most of the people, thereby making significant contribution to poverty reduction (Government of Ghana, 2005).

Yet farmers in most parts of the country face severe production constraints. Soils are becoming increasingly infertile as a result of poor and unsuitable land preparation techniques such as the slash and burn (Frey, 2002) and inappropriate soil and water conservation practices (Chapman et al., 2003). According to Botchie, Seini and Asuming-Brempong (2003) and Apullah (2003), in Ghana, inappropriate agricultural production methods bring about negative environmental effects such as deforestation, soil degradation and loss of biological diversity. The result is that farm families are becoming poorer, and this poses threats, annually, to food security (Ghana Statistical Service, 2000).

A major source of technology transfer to farmers in Ghana is the state-funded National Agricultural Extension Services (NAES) of the Ministry of Agriculture (MoFA, 1998; NAES, 1998). There is a general lack of adequate frontline agricultural extension agents in developing countries to ensure effective communication of agricultural messages to farmers. This situation presents problems of insufficient and irregular contact with the farmers (Chizari, Karbasioun, and Lindner, 1998; Soola, 1988). Yet, availability of the right numbers of knowledgeable agricultural extension agents constitutes an important step towards achieving a successful agricultural extension and information delivery system (Chizari, Karbasioun, and Lindner, 1998), and indeed, for increased agricultural production.

In Ghana constraints such as inadequate logistical support and lack of adequate transport, and the limited number of extension agents have made it difficult for frontline extension officers to have adequate and regular face-to-face interactions with farmers (MoFA, 1997). The extension-farmer ratio by the end of 2004 was 1: 1,400; indicating that on the average one extension agent provided technical agricultural services and information to 1,400 farmers as at 2004 (Government of Ghana, 2005). Extension education has also been criticized for employing ineffective message delivery approaches. As noted by Chapman et al. (2003), apart from failing to reach most farmers in their communities, agricultural extension services in most developing countries have also, in general, not achieved much success in communicating effectively with resource-poor farmers.

Given the limits and problems of agricultural extension systems therefore, there is clearly a potential role for certain mass media to be used to support agriculture (Rahim, 1976). Soola (1988) noted that most governments in developing countries are turning to radio for agricultural communication with the rural poor because of the realisation that extension education suffers from lack of adequate personnel and logistics.

Localised communication systems, undoubtedly, present a strong potential to the development of local communities in developing countries (Kearl, 1976). According to Kearl (1976), locally based communication media, including community or local newspapers and local radio stations, are essential if programmes of socio-economic development are to yield maximum effects. Ansah et al. (1981) reported a similar view. They expressed strong faith in the capacity of rural media to play a pivotal role

in increased agricultural production and rural development. Drawing on the lessons from one of the earliest rural newspapers in West Africa, which was set up in Mali, Ansah and his colleagues stated that if training is given to the rural people, and printing facilities are regularly provided, the rural people can effectively exchange useful ideas in development using community newspapers. Berringham (1979) identified participation in communication as a useful method for information sharing. He stated that communications media are vehicles through which social progress and democracy can be nurtured and sustained in any society.

Agricultural communication in developing countries now seeks to emphasize both the message and the social dynamics of the message transmission (Onasanya, Adidoyin and Onasanya, 2006). Rural based mass media therefore seem most likely to be able to provide new focus in agricultural communication. As the most rapid and efficient means to inform audiences, electronic mass media, in particular, can reach millions of farm families in areas which are beyond the reach of extension personnel (Rogers, 1969; 1976). The mass media reaches a large number of people (Kuponiya, 2000; Schramm, 1964, 1976), and this makes them play the dominant roles in delivering messages to the poor rural populations (Rahim, 1976). Local and rural radio stations particularly penetrate remote rural communities with their messages, and they scale the barrier of illiteracy. They are therefore useful vehicles for bringing to rural communities information, new ideas and relevant knowledge, especially in agriculture (Chapman, et al., 2003).

Local radio can expand and make available information networks for farmers so that they are able to benefit from the knowledge and skills of extension officers and also from other farmers in the communities (Chapman, et al., 2003). Local radio's strength as an extension tool, therefore, is seen in its ability to reach illiterate farmers and provide them with relevant information, technology and skills on all aspects of agriculture in their own language (Chapman et al., 2003; Kuponiya, 2000). The Local radio has therefore been identified as a potentially useful and cost-effective way to enhance knowledge and technology transfer to farmers to raise agricultural production in developing countries. For the poor rural farmer in Ghana, radio can be a vehicle for participatory communication on agricultural information and innovations. If people have access to communication media they can use them to gain further information (Chapman, et al., 2003).

In Ghana, the use of radio for agricultural communication started, on a pilot basis, in 1978, when the Upper Region Agricultural Radio (URA Radio) was established at Bolgatanga in the Upper East Region. This was supported by the Upper Region Agricultural Development Project (URADEP), a government of Ghana and International Fund for Agricultural Development (IFAD) sponsored project (Bonnah Koomson, 1994; Chapman et al., 2003, Mwinilayuri, 1991). After the completion of the project, the radio was made an arm of the state-owned Ghana Broadcasting Corporation (GBC), becoming the first public service regional radio station in Ghana (Bonnah Koomson, 1994; Mwinilayuri, 1991).

The return to constitutional democracy in Ghana, in 1992, brought in its wake a liberalisation of the air waves and the localisation of radio broadcasting (Heath, 2007). This eventually resulted in the establishment of public service local radio stations in all the ten administrative regions of the country as arms of the GBC (Heath, 2007). Three of the public service local radio stations – URA Radio in Bolgatanga, Radio Savannah Tamale (RST) in Tamale, and Radio Upper West in Wa, – are located in regions that have the highest proportions of rural farmers in the country. About 75% of the economically active adult population in the areas where these local radio stations are located are farmers (Ghana Statistical Service, 2002). These three public service local radio stations provide information to farmers as a way of complementing the efforts of the National Agricultural Extension Services (NAES) of the Ministry of Agriculture (MoFA), in addition to offering general and development-orientated news to the people (Bonnah Koomson, 1984; Chapman et al., 2003). To date, however, no comprehensive study has been conducted to investigate the level of uptake of agricultural news from public service local radio and community radio stations in Ghana. The impact and the potential of public service local radio as sources for agricultural communication therefore remain unknown.

This study, entitled “Assessing the Potential of Local Radio for Agricultural Communication in Ghana”, is the result of fieldwork conducted from April to December 2006. The study seeks to address the ultimate question: What is the potential of local radio for agricultural communication in Ghana? Its main thrust is to assess local radio’s impact as a tool for agricultural communication in Ghana. To meet its purpose, address the study objectives, and cover the entire scope, the study employed the use of two methodological approaches to gather data. Field experiments

were conducted in eight rural communities to investigate rural farmers' levels of unaided recall and comprehension of local radio agricultural broadcasts. Audience factors and programming variables that had influence on farmers' recall and comprehension of agricultural broadcasts were determined, tested and analysed. The survey method was used to glean insights into the issues that relate to communication behaviour, message preferences, perceived credibility of the radio programmes and attitudes towards radio.

1.2. Rationale for the Study

In spite of the belief in the potency of mass media channels to influence opinion and behaviour change, assessments of the actual effects of mass communication through the application of scientific means has not been adequate (McQuail, 1969). Even though the volume of research on mass media effects in the developed world in the last two decades may have countered McQuail's (1969) assertion, his view remains largely valid in the context of Africa. The power of the radio as a tool for persuasion, for facilitating modernity and for economic development (Lerner, 1958; Rogers, 1969, 1976; Schramm, 1964) and community development remains generally unexplored (Ansah, 1994). Reeves (1993) observed that when the situation in Africa is compared with Latin America, and to a lesser extent, Asia, the inadequate information and research data on communication and culture in Africa becomes vivid.

McQuail (1969) distinguished between two branches of research: the educational and informational approach; and the diffusion of innovations approach. These two branches of media research bear close relationship with this thesis research. Diffusion research, which is concerned primarily with the adoption of innovations in rural areas (Rogers, 1970) focuses on the structural determinants of adoption rates rather than on large scale effects of mass communication (McQuail, 1969). According to Jensen (2002), diffusion research has remained relevant for studies that seek to assess or measure how media messages are adopted in various cultural settings, and on which segments of the society will be early adopters of messages.

While diffusion research makes it possible to compare the basic availability and accessibility of information in different social groups and contexts, it has remained incapable of establishing the actual volume and level of information uptake from the mass media (McQuail, 1969). Inferring from McQuail's (1969) view, therefore, the

reliance on diffusion of innovations alone may not amply determine the general effect of mass media on a given audience. A measurement of the actual amount of uptake of information and knowledge from the broadcast media would provide a firm basis for assessing the media's performance as a tool for learning.

Yet the available works on the effects of radio on agricultural information delivery in Africa have tended to employ only the diffusion research approach (Okwu, Kaku and Aba, 2007; Osuntogun, Deyama, and Anyawu, 1988) without investigating the actual amount of uptake of agricultural messages from radio through controlled experiments. For example, Okwu, Kaku and Aba (2007) measured the impact of radio as a medium of agricultural information delivery to farmers in the Benue State of Nigeria through a field survey. They relied on self-reported data gathered from face-to-face interviews through the use of structured questionnaires. Their study investigated farmers' levels of radio listenership and their knowledge gain from the radio messages, the agricultural programmes that the Benue Local radio station broadcasts to the farmers, and the relevance of the messages to the information needs of the farmers. The study did not measure the amount of learning that takes place by way of farmers' memory recall and comprehension of the radio's agricultural broadcasts.

In Ghana, Chapman et al. (2003) investigated the impact of radio in disseminating messages on soil and water conservation practices among rural farmers using a radio magazine broadcast for the information dissemination. Chapman and his colleagues measured knowledge gain using the survey methodology and visits to farmers' fields to gauge the level of application of the messages the farmers had heard from the radio. The actual amount of learning that took place after the radio broadcasts was not measured through controlled experiments.

This study therefore attempts to fill a gap in the research methodological approach to measuring the effect of mass media as sources of learning and information gain by farmers. The study will attempt to investigate the general effect of radio in the delivery of agricultural messages to farmers together with an exact measurement of the amount of information learnt from the broadcast media. As mentioned earlier in this chapter, a combination of two methodologies - survey research and experiments - will therefore be used for the study. The survey research will uncover general levels of media's role as a tool for innovation diffusion, while the

experimental methodology will be used to investigate levels of comprehension and recall of broadcasts news. The combined methodological approach provides complete and adequate grounds to assess the potential of local radio for agricultural communication in Ghana.

Much research has been done in the developed world in the area of comprehension and memory of broadcast news through experiments (Bernard, Findahl and Hoiyer, 1975; Berry, 1999; Burkum, 1997; Coldevin, 1985). In the case of Africa, however, the dearth of research in this area is striking. The only known study has been the work by Stauffer, Frost and Rybolt (1980) conducted in Kenya to investigate uptake of information from a news bulletin. This thesis research attempts to employ experimental methodologies -- which have largely been used among predominantly literate societies in the developed world -- to the rural Ghanaian setting, which is predominantly illiterate. Employing the experimental methodology to investigate recall and comprehension of radio agricultural messages is an area that has remained unexplored even in the developed world where copious works on memory recall has been mainly on general broadcast news (Stauffer, Frost and Rybolt, 1978, 1980; Katz, Adoni and Parness, 1977).

This study was therefore designed to help bridge the gap between the developed and the developing world in terms of research in mass communication, especially in relation to memory recall and comprehension of broadcast news. Also, within the developing countries, it will bridge the gap between the countries of Asia and Latin America on the one hand, and Africa on the other. In Asia and Latin America, research in the use of radio for agricultural communication is copious, whereas in Africa, research in this area is beginning to blossom. This study hopefully fills an important gap by providing accurately assessed result of the amount of learning by farmers from radio agricultural broadcasts in Ghana.

1.3. Aims and Objectives of the Study

The basic aim of this study was to assess the potential of local radio for agricultural communication in Ghana. It is expected that this study will reveal the effect of programming variables and audience factors on farmers' information uptake from local radio. It will also contribute towards a better understanding of how local

radio is currently been used for agricultural communication, and how it can be made more useful for the benefit of poor rural farmers in Ghana.

The objectives were:

1. To assess farmers' level of reliance on local radio for agricultural information.
2. To investigate how attitudes towards radio and perceptions of the credibility of radio messages influence reported levels of radio listenership.
3. To assess the levels of unaided recall of broadcast news among rural farmers.
- 4 To asses the farmers' levels of comprehension of broadcast news
5. To determine which audience factors influence unaided recall and comprehension of broadcast news.
6. To determine which programming techniques influence message understanding and memory recall.

1.4. Research Questions

To meet its objectives, the study addressed the following research questions:

Survey Research

1. What are the socio—economic and demographic characteristics of the farmers?
2. What is the radio listening behaviour of the rural farmers in terms of:
 - i. Level of radio listenership?
 - ii. Radio listening periods?
 - iii. Radio programme format preferences?
 - iv. Reasons for listening to radio?
3. How effective is local radio in agricultural communication in terms of farmers' level of listenership to the agricultural broadcasts?
4. Which are the main sources of agricultural messages to the farmers?
5. What is the relationship between farmers' perceptions of source credibility, and radio listenership?

Field Experiments

6. What are the levels of farmers' unaided recall and comprehension of agricultural broadcast news?
7. Which audience factors influence unaided recall and message comprehension of agricultural broadcast news?
8. How is unaided recall related to message comprehension of agricultural broadcasts?
9. Which programming variables enhance farmers' unaided recall and comprehension of agricultural broadcast news?

1.5. Structure of the Thesis

The study is organised into ten chapters. Chapter one provides an introduction to the work. The background to the study, rationale for the study, and the study's aim and objectives are outlined. Nine research questions which the study seeks to answer in chapters six to ten are also stated. The chapter ends with a description of the structure of the thesis.

Chapter two is devoted to a discussion of the economic, agriculture and media context of Ghana. The changing fortune of the country's economy from the period of independence to the current period is discussed. The discussion brings to the fore the economic approaches adopted by the various governments. It also offers an appraisal of the successes and failures of those policies. The importance of Ghana's agriculture and its contribution to the economy of the country is discussed. The history of the mass media in Ghana is traced, and the role the media performed during the pre-independence and post-independence eras is discussed. The historical account of radio broadcasting is provided. In particular, the agitation for pluralism in broadcasting is highlighted, and the development of public service local radio is treated.

Chapters three and four provide the theoretical and empirical basis for the thesis, with the view to carving out the research questions and hypotheses for the study. Specifically, in chapter three, a theoretical discussion of the cognitive response theory was done to provide a basis for the empirical discussion of studies in unaided recall and comprehension of broadcast news in the next chapter. This discussion brings to the fore the processes involved in learning from persuasive communication. Also, chapter three discusses the diffusion theory. The role of the media in accelerating

message delivery, as prescribed and assumed by the diffusion theory, is treated, and the importance of interpersonal sources of communication in technology transfer among farmers, as proposed by the diffusion theory, is also offered.

In chapter four, findings of empirical works relating to this thesis are reviewed. The first part of the chapter draws largely on studies conducted on message recall and understanding of broadcast news. Africa is almost a barren area in studies relating to unaided recall and comprehension of broadcast news; therefore it is prudent that the chapter dwells largely on literature from the developed world. This is followed by a review of studies on the importance and use of radio for agricultural communication.

Chapter five is devoted to a discussion of the methodology and design of the study. The hypotheses of the study, which are ten in total, are formulated in this chapter. The chapter also gives an account of the data gathering process. The rationale for the use of the experimental methodology and the survey research for the study are provided.

Detailed description of the data gathering process is offered and operational definitions of the dependent variables for the experimental study is done. The problems encountered during the data gathering process are enumerated. Finally the tools for analysing the data and how the data are analysed are explained in the chapter.

Discussions of the findings of the study are contained in chapters Six to Nine. In Chapter Six the data from the survey questionnaires conducted on 365 farmers are analysed. The socio-economic and demographic characteristics of the farmers are investigated. The levels of radio ownership and radio listenership are also measured. An attempt is made to determine the relationship between the farmers' demographic and socio-economic characteristics and their radio ownership, radio listenership, and application of the radio messages. Farmers' reasons and purposes for listening to public service radio are also investigated. Farmers' attitudes toward local radio and their perceptions of the credibility of the radio and its broadcasts are measured, and how these two psychological factors relate to farmers' level of radio listenership and radio message adoption are revealed. Five research hypotheses are tested in this chapter.

Chapters Seven, Eight and Nine present discussions on the eight experiments conducted on 252 participants in eight rural communities in Ghana. Three of the eight experiments conducted in the study are discussed in Chapter Seven. These are: repeat

broadcast (once), repeat broadcast (twice) and straight talk (as a form of repeat broadcast). Two hypotheses are tested in this chapter. In chapter Eight, three more experiments – recap at the end of a broadcast, recap (preview) at the beginning of a broadcast, and distributed recaps – are presented, and one hypothesis is tested. Chapter Nine presents the last two experiments of the study. These are: delayed recall and message relevance. Two hypotheses are also tested.

Chapter Ten provides a general discussion and a conclusion to the study. In presenting the general discussions, the main findings and the hypotheses proposed for the study are treated. A discussion of the relationship between the dependent and independent variables of the study is done. The limitations of the study are stated and attempts are made at suggesting areas for further investigation for the purpose of adding to the bulk of knowledge on information uptake from broadcast news, especially in the African context and perspective. The contribution of the study to existing knowledge on recall and comprehension of broadcast news is also offered. Finally, a conclusion to the study is provided.

CHAPTER TWO

THE ECONOMIC, AGRICULTURE AND MEDIA CONTEXT OF GHANA

2.1. Introduction

The rationale for this chapter is to present the economic, agriculture and media context of Ghana. The chapter begins with a discussion on the general overview of the country. It presents a thorough discussion of the country's economy. This aspect of the discussion highlights the economic policies of the country's successive governments from the immediate post-independence era to the present, highlighting the successes, failures and challenges of these policies. An attempt is made to establish the importance of agriculture in the country's economy. The history of mass media in Ghana is traced, with emphasis on radio broadcasting. It is argued that the media in Ghana has largely been a state-monopoly until the last decade when the doors of media pluralism were flung open, allowing for liberalisation of the country's air waves. A treatment of the history of rural broadcasting and the growth of public service local radio in the country is described. The role that the local radio stations are expected to perform as sources of agricultural communication for the rural farmers is mentioned.

2.2. An Overview

Ghana lies within the tropics in West Africa. It is located between longitudes 3 degrees west and 1 degree east and between latitude 5 degrees north and 11 degrees north. The country is bordered in the east by The Republic of Togo, to the west by the Ivory Coast, and to the north by Burkina Faso. To the south of the country lies a 560 kilometre coastline, which borders the Atlantic Ocean. The country, which was called Gold Coast, took the name *Ghana* upon attaining independence in 1957. Ghana's land area is about 92, 000 square miles. In 1960 the country's population was about 7 million (La Anyane, 1963), and by the year 2000, the population was 18.9 million (Ghana Statistical Service, 2002). The country has a high fertility rate, which is reflected in the population growth rate of 2.7 percent recorded in the year 2000 (Government of Ghana, 2005).

Most Ghanaians – about two thirds - live in rural communities - communities that are below a population of 5,000 (Whaites, 2005). The country's population is concentrated in Southern Ghana, especially within the five administrative regions -- Ashanti, Western, Eastern, Central and Greater Accra -- where about two-thirds of the population live (Ghana Statistical Service, 2000). This is as a result of the migration of people from other parts of the country to southern Ghana (Whaites, 2005). The trend started several decades ago. According to La Anyane (1963), growth in the prosperity of the cocoa industry, the lucrative and booming mining ventures, good network of transport and communications, and the availability of industrial jobs, are the factors that account for the high population concentration in Southern Ghana. Migration of the youth from the rural areas to the urban centres still continues to swell up the population of southern Ghana, while significantly reducing the population of northern Ghana.

This trend, perhaps, is what prompted Al-Hassan (2007), Songsore and Denkabe (1995), and Whaites (2005) to argue that there is a north-south divide in terms of economic development and the availability of infrastructure. Whaites (2005) observed that the north is poor with no industries, and the people rely on subsistence agriculture for food and income. Al-Hassan (2007: VI) stated that “the development pattern in Ghana is characterised by a north-south divide in which the north lags behind the south”.

The country has a literacy rate of 66.2% for males and 42.5% for females. The literacy rate for urban population is 69%, and for the rural areas, it is 40.1% (Government of Ghana, 2005). Two thirds of the country's population (67%) live in the rural areas, and a third (33%) live in urban areas. The country's life expectancy by birth is 57. 5 years (Government of Ghana, 2005).

For a little over a century (from 1844 to 1957), Ghana was a British Colony. In February 1951, the first national elections under the colonial administration was organised in Ghana as part of the colonial government's plan to grant the country independence (Government of Ghana, 1994). Dr Kwame Nkrumah's Convention People's Party (CPP) won the elections and Dr Nkrumah was subsequently made the Leader of Government Business (Seidman, 1978). In 1957 when the country gained independence, Dr Nkrumah became the first prime minister. Dr Nkrumah's government was over thrown in 1966. From then on, the country came under three

military regimes and only two democratically elected governments. After the long rule by the Provisional National Defence Council (PNDC) government (December 1981-December, 2000), democratic governance was restored once again, when the Fourth Republic was inaugurated after Flt Lt Rawlings' National Democratic Party (NDC) won the 1992 general elections (Gyimah-Boadi and Jeffries, 2000). Since then, the country's fledgling democracy has continued to thrive. Ghana is currently under the leadership of President John Agyekum Kufuor and his New Patriotic Party (NPP).

There are ten administrative regions and 138 administrative districts in Ghana. The administrative regions are headed by the president's political representatives called *regional ministers*, and administrative districts are headed by *District Chief Executives*, who work as representatives of the President of Ghana at the district levels.

2.3. Historical Perspective of Ghana's Economy

The first major economic, social and development plan of the country after attaining independence in 1957 was the Seven Year Development Plan (1963/64-1969/70). This was devoted to economic, infrastructural and industrial development (Aryeetey and Harringan, 2000). It placed emphasis on the laying of social and capital infrastructure as a basis for attracting foreign aid for national development. The policy direction was towards an industrial take-off. There was emphasis on establishing state-owned manufacturing enterprises, mostly import-substitution industries (Garlic, 1971). The government also tried to link agriculture and industry, by ensuring that most of the industries used local raw materials. Public participation in agriculture was encouraged, and state farms, which were funded, managed and staffed as state institutions, were established (Baah, 2002; Garlic, 1971; Ray, 1986). Dr Nkrumah's government also placed emphasis on formal education as a way of training the much-needed manpower for the country's development. Educational infrastructure and facilities were provided in all the administrative regions of the country. Basic school education at the middle school level was made fee-free and compulsory (Robertson, 1984; Seidman, 1978).

Dr Nkrumah's government was overthrown by the military and police in a coup d'état towards the end of February 1966. The National Liberation Council (NLC), a military government, which took over the administration of the country, reviewed the

previous government's economic, social and development policies. Most of the projects that had been set up under the President Nkrumah's government were discontinued, and a new approach to national growth and development was adopted (Konings, 1987). Konings (1987) reported that as part of the NLC government's policies, and on the advice of the International Monetary Fund (IMF), the government sold out some of the state farms that were set up in the early and mid 1960s by Dr Nkrumah's government, to private local entrepreneurs. Others were committed into joint concerns, with state-private participation. The regime sought to drastically cut waste in the public sector organisations. A strategy that was adopted in this direction was to inject a sense of business into public ventures (Konings, 1987).

In 1969, the new civilian government under Dr Kofi Abrefa Busia took over power from the NLC. The Busia administration adopted the basic needs approach to the country's development (Aryeetey and Harrigan, 2000; Gyimah-Boadi and Jeffries, 2000). Rural and community development became the vision and focus of the country's social, economic and national development agenda. Besides this, the government encouraged small-scale business initiatives through micro funding. Local business initiatives were expected to thrive and become the main driving force of the country's economy; they were to serve as the country's engine of growth (Gyimah-Boadi and Jeffries, 2000, Killick, 1978). To liberalize the Ghanaian economy, the Busia government also found it economically prudent to dismantle import controls. Liberalisation of the economy was enthusiastically evoked. However, there was a backlash; this bold economic decision, together with a fall in the world market price for cocoa, resulted in an undesirable and unexpected major balance of payment deficit. The government, finally and inevitably, had to devalue the country's currency to cope with the harsh and troubling economic effects of its development policies (Killick (1978). The devaluation met a general urban disapproval, and it was set as one of the reasons for the take over of the country, through yet another military coup-de-tat (Gyimah-Boadi and Jeffries, 2000; Killick, 1978).

The new military regime, under General Ignatius Kutu Acheampong, re-valued the country's currency by 44%. This served the purpose of cushioning the economic pain of the people resulting from the devaluation of the currency by the previous administration. Experts believed that this crucial economic decision was targeted less at getting a logical and positive solution to the macro-economic situation, and more

out of the will to win the support and confidence of the people in the military government (Konings, 1987). The Acheampong regime introduced another dimension of tackling the country's economy. It made *self-reliance* its main economic policy (Gyimah-Boadi and Jeffries, 2000). As a sequel to this, the government embarked on an aggressive agricultural development, which was dubbed *Operation Feed Yourself* (OFY). State funding or private commercial and subsistence farming was the main feature of the regime's agricultural and economic policy. Provision of micro-credits to farmers and heavy subsidies for agricultural inputs formed the basis of the government's support for massive agricultural drive. The government's agricultural policy promoted the growing of domestic staple foods. Rice cultivation in northern Ghana was particularly strongly promoted (Gyimah-Boadi and Jeffries, 2000).

Konings (1987) argued that the economic policies of the first two post-Nkrumah regimes were what provided the basis for the NRC/SMS's success in the OFY in the early 1970s. The two regimes had reviewed the role of the state in agricultural production, and placed emphasis on private commercial agriculture. This laid the foundation for the massive capitalist rice production in northern Ghana, which achieved a marked breakthrough during the launch of the OFY by the General Acheampong's government. Konings (1987) stated that the country's Two-Year Development Plan (1968-1970) promoted large scale agricultural production in northern Ghanaian, and also "sought to glorify the dynamic entrepreneur as the engine of production and economic growth" (Konings, 1987:170). Soon the country's economy began ailing badly. There was a fall in cocoa exports; presenting shocks to the country's economy. This was followed almost immediately by a rapid and continuous fall in the value of the country's currency (Gyimah-Boadi and Jeffries, 2000).

When the country returned to civilian administration once again, the Limann government had inherited a weak economy. The new administration saw a reduction in government expenditure as a necessary step towards confronting the poor economy. It also sought to increase government revenue, as it introduced a few new taxes. The already poor living standard of Ghanaians became severe (Gyimah-Boadi and Jeffries 2000; Killick, 2000). The government was overthrown in a coup de tat in December 1981.

By 1983, Ghana's economy was almost shattered. Inappropriate macro-economic policies had inflicted tremendous damage to the country's economy. There was acute shortage of foreign exchange. Fiscal deficits were staggering. The currency was overvalued and inflation was high (Gyimah-Boadi and Jeffries, 2000; World Bank, 1994). The Provisional National Defence Council (PNDC), which had taken over power from Dr Limann's government, decided on a comprehensive economic reform (Emmanuel and Paul, 1980). With support from the International Monetary Fund (IMF), the World Bank, and other multilateral and bilateral donors, an Economic Recovery Programme was launched. A World Bank Country Report (1984) described Ghana's economy from 1970 up to the period leading to the introduction of the country's Economic Recovery Programme as follows:

"The Ghanaian economy has been steadily deteriorating throughout the past decade, but the situation has been critical. Past years have been characterised, in varying intensity, by persistent high inflation, declining production and exports, flourishing illegal activities and political instability. A gradual decline in per capita income has increased the incidence of absolute poverty and has been accompanied by a worsening of income distribution, growing unemployment and the emigration of skilled professionals" (World Bank Country Report: 1984: XV).

The report further noted that adverse internal and external factors led to a severe damage to the country's economy. This was reflected in grave economic indices such as: reducing imports; declining exports; low investments; constant and acute rise in petroleum imports; falling government revenue, escalating government deficit, and; declining real wages (World Bank Country Report, 1984).

Under the reform programme, the government increased the producer price of cocoa by 65%, doubled the price for fuel, introduced a uniform tariff on imports, introduced exchange rate reforms and controls, and initiated a system of export bonuses and import surcharges. The result was that there was a defacto devaluation of the country's currency by 800% (World Bank Report, 1984). According to Vanderpuye-Orgle (2004), the reforms brought capital inflows into the economy, and this had a positive impact on the country's resources. In general, there was a bold attempt to introduce sound, effective and prudent macro-economic management by injecting fiscal and monitoring discipline into the economy. Besides this, it was

thought that a liberalisation of the trade and payment regime would be a most prudent economic and final decision (Aryeetey and Harringan, 2000; World Bank Report, 1984).

Since the year 2000, when President John Agyekum Kufuor's New Patriotic Party (NPP), took over the administration of the country, the economy has shown positive results in terms of both macro and micro economic growth, and this has had a modest effect on the livelihood of the people (Government of Ghana, 2006). The result has been steady and appreciable annual increases in Gross Domestic Product (GDP). In 2003, the country's GDP rose by 4.5 per cent; it grew by 5.8 per cent in 2005, and was expected to record the same appreciable growth in 2006. According to the Minister of Finance and Economic Planning, the review of the country's GDP performance indicated that the government was on course to achieve the economic targets by the end of 2006 (The Budget Statement and Economic Policy, Government of Ghana, 2006). True to the Minister's words, in 2006 the GDP further grew by 5.5 per cent. Whilst GDP continues to grow annually, inflation figures have been sliding down the scale within the last five years. From a figure of 41% in March 2001, the inflation rate by the end of September 2005 was 14.9%. The country's Gross Official Reserves have grown to US 4.67 billion as at September in 2006. "This represents 3.5 months of import cover, a markedly healthier position than the less than one month's cover of year 2002" (The Budget Statement and Economic Policy, Government of Ghana, 2006:13).

2.4. Agriculture in Ghana's Economy

Agriculture is the dominant sector in the Ghanaian economy in terms of its contribution to the Gross Domestic Product (GDP), foreign exchange earnings and employment (Ghana Poverty Reduction Strategy (GPRS), 2003; MoFA, 1998; Nyanteng and Seini, 2000). According to Nyanteng and Seini (2000) while the sector's contribution to GDP averaged about 55% in the first half of the 1980s, it progressively declined to 41% in 1995. This means that the sector witnessed a 14% decline within a period of about 10 years (Nyanteng and Seini, 2000). The decline appears to have been stabilised by the beginning of the year 2000. Data from the Ministry of Agriculture indicate that in 1999, the agricultural sector contributed 40.5% of GDP and accounted for 38.6% of the country's foreign exchange earnings (MoFA,

2004). In the year 2005, agriculture accounted for 50% of the Consumer Price Index (The Budget Statement, Government of Ghana, 2006:13).

Appulah (2003) observed that even though more than 60% of the country's economically active population are involved in agriculture, the country is still faced with perennial food insecurity. The agricultural sector is made up of crop cultivation, fisheries, forestry and livestock farming. Most of the farmers in Ghana are small scale food and cash crop farmers (Al-Hassan, 2007). Cocoa is the single most important export crop of the country. Until the last three decades, the country was the world's leading producer of cocoa (Nyanteng and Seini, 2000). Food crops that are grown for local consumption and for export to neighbouring countries include yams, maize, millet, cowpea and rice, and these are cultivated mostly in northern Ghana (Obeng, et al, 1990). The country is an important exporter of timber, both round logs and processed wood products.

Most farmers in Ghana are small scale rural farmers, with small holdings. Al-Hassan (2007) stated that 90% of the total food output in Ghana is produced by smallholder farming, where farm holdings are between two (2) hectares and five (5) hectares. Smallholder farming is therefore a significant feature in national agricultural production and food security. The common agricultural practises in Ghana are the use of bush fallowing and crop rotation systems (Al-Hassan, 2007; MoFA, 2002). These systems contribute significantly to the restoration of soil fertility. However in areas where there is scramble for land due to popular pressure, the soils are becoming poor in terms of fertility as result of continuous tilling each year. Mixed cropping and mixed farming are also important features of agriculture in Ghana. Land preparation is done through the use of tractors and other heavy machinery, mostly by the large scale commercial farmers; and through the use of animal traction and the rudimentary hoe and cutlass method, mostly by the small scale rural farmer (MoFA, 1998).

Rainfall is the main determinant of the type of crop cultivated in various parts of the country. The moist area of the country supports the cultivation of mostly tree crops and starchy staples, whilst the drier areas, mostly northern Ghana, support the cultivation of cereals, root crops, legumes, cotton and tobacco (MoFA, 1998). Irrigation dams for all-year farming are few and dispersed. An overwhelming majority of the farmers in Ghana have no access to irrigation facilities. They rely purely on rain-fed agriculture (MoFA, 1998).

As part of the interventions under the Economic Recovery Programme (ERP), which was launched in 1983 to arrest the decline of the economy, a Medium Term Agricultural Development Programme (MTADP) was initiated in 1997 to strengthen the capacity of the public sector agencies in the provision of agricultural services (MoFA, 1998). The overall performance of the agricultural sector improved and contributed significantly to the total GDP. The sector was, however, still expected to grow. A new strategic framework to re-direct the socio-economic development of the country was designed and elaborated in a national policy document, Ghana Vision 2020 (Government of Ghana, 2005). The expectation of the government under this new economic vision and direction is that, Ghana will be transformed into a middle-income country by the year 2020. It is expected that agriculture will grow at a rate of 6% within the period (Government of Ghana, 2005).

Given its contribution to GDP and the high prevalence of poverty among farmers, especially small scale rural farmers, much is expected from the agricultural sector in the fight against poverty. Information on how agriculture can reduce poverty is necessary to guide the policy choices (Al-Hassan, 2007). Poverty reduction in Ghana is limited by lack of growth in agriculture and agro-processing. This indicates the link between agricultural growth and poverty reduction (Government of Ghana, 2006).

The agro-processing industry is underdeveloped. Much of the food produced is purchased in the raw form. Like farming, food processing is done on small scale, using traditional technology. Marketing infrastructure is also undeveloped, post-harvest losses are estimated at about 30%, and are higher for highly perishable items such as fruits and vegetables. All these add up to affect agricultural production and farm incomes for rural farmers (Al-Hassan, 2003).

Rural people, who form the bulk of the country's farmers, require relevant knowledge and skills to increase production. Increased access to extension services and agricultural technology has been identified as one of the country's strategies for agricultural growth (MoFA, 1998; The Budget Statement, Government of Ghana, 2006). Changes therefore need to be made to the extension services delivery to enable extension provide more effective and sustainable services to the agricultural industry to help in achieving appreciable levels of agricultural production (MoFA, 1998), and to raise the income levels and quality of life of rural farm families.

However, the almost chronic shortage of extension staff, which is reflected in the high extension-farmer ratio, does not give hope that extension services can adequately provide knowledge and skills to the farmers. The current call is that MoFA should consider a more intense use of rural radio for interactions with rural farmers. Broadcasting, especially public service local radio, can promote effective communication with the people (Ansah, 1994; Karikari, 1994).

2.5. History of the Mass Media in Ghana

The first mass media channel to be established in Ghana was a national newspaper. Known as the *Gold Coast Gazette*, the newspaper was established in 1832 by the crown governor of the Gold Coast, Sir Charles MacCarthy (Jones-Quartey, 1974, 1975; Mytton, 1983). Far earlier than this time, a newspaper had been set up in Liberia. It was called the *Liberia Herald*, and its publication started in 1826 (Boikaii III, 1985).

The *Gold Coast Gazette* was aimed at giving information about the country and events outside the country for the benefit of colonial rulers and the few local elite at that time (Ansah, 1991). This first experience in mass media production was followed by the establishment, in 1857, of the *Accra Herald*, which was the first indigenous press in the country. The *Gold Coast Times* was next to be set up, and that was in 1874. The establishment of the *Accra Herald* set forth the beginning of nationalist agitation for self-government (Mytton, 1983).

In the first half of the twentieth century, the *Gold Coast Express*, which was the first daily newspaper, was established, and in 1921, *The Gold Coast Leader* emerged on the newsstand (Jones-Quartey, 1974; 1975). In the same year, the *Gold Coast Pioneer* was established by the British Colonial Government. It was thought to be a rival newspaper set up by the colonial government to counter the nationalist and revolutionary approaches that were used by the indigenous newspapers (Jones-Quartey, 1974).

Establishing newspapers by the country's local entrepreneurs became intense by the first half of the nineteenth century. According to Ansah (1991), few decades before independence, there was a rush by local elite, most of who were in the forefront of the struggle for independence, to establish private newspapers. Mytton (1983) and Sobowale (1985) reported similar observations. Mytton (1983) stated that the

rapid increase in the number of newspapers in the Gold Coast was a reflection of the growing nationalism and nationalist activities in pre-colonial African states.

Sobowale (1985) observed that, in Nigeria, pre-independence newspapers were either owned by political parties, or vividly identified with political parties. According to Ansah (1991), by the middle of the nineteenth century, the emerging leaders of Africa, notably Dr Kwame Nkrumah of the Gold Coast, Nnamdi Azikiwe of Nigeria, Jomo Kenyatta of Kenya, Julius Nyerere of Tanzania and Leopold Sengor of Senegal had either set up their own newspapers or played the role of editors to newspapers that were set up in their respective countries. Two nationalist leaders, Nnamdi Azikiwe of Nigeria and Wallace Johnson of Sierra Leone, established the *African Morning Post* in Ghana. The two left for their respective countries only after they were convicted for sedition (Jones-Quartey, 1974).

The West African Times, founded by Dr. J. B. Danquah, *The Evening News*, founded by Dr Kwame Nkrumah in 1948, and *The Ashanti Pioneer*, were used by the founders to fight against colonial rule. The *Accra Evening News* particularly played an important role in Ghana's independence struggle in the late 1940s and early 1950s. The newspaper was used as a propaganda tool for mobilising mass demonstrations, political protests and economic boycotts against the colonial government (Ansah, 1991).

Broadcasting started in Ghana in 1935, about the same time that radio broadcasting started in most other West Africa Countries (GBC, 1995; Head, 1974). Kenya was the first territory in sub-Saharan Africa to operate a regular broadcasting service (Roberts, 1974), and Sierra Leone first had the experience in 1934, a year earlier than Ghana, through a re-diffusion system (Head, 1974). Ghana's first radio station was set up by Governor Sir Arnold Hudson, then the Governor of Gold Coast (now Ghana) (Ansah, 1985; GBC, 1995; Ghartey-Tagoe, 1994). A British Engineer, F.A.W. Byron installed the first equipment in Accra for commissioning and Sir Arnold Hodson made the first broadcast to audience with 300 receivers (Ghartey-Tagoe, 1994). The new broadcasting station was code-named radio "ZOY". Broadcasting was first in English and four Ghanaian languages namely, Twi, Ga, Ewe and later Hausa. When Ghana attained Independence, two more Ghanaian languages – Dabgani and Nzema – were added (Ghartey-Tagoe, 1994; Kugblenu, 1974; Head and Kugblenu, 1978). The radio was used by the colonial government to explain policies and programmes to the

people, to provide news on events outside the country to the people of Ghana and to provide entertainment to the people (Ansah, 1985; Ghartey-Tagoe, 1994). The state-owned GBC Radio remained the only radio station until the country gained independence. Even after independence, the Ghana Broadcasting Corporation remained a state monopoly (Ansah, 1985; Ghartey-Tagoe, 1994).

Television was introduced in Ghana in 1965, three decades after radio was established in Ghana. Ghana television, since its inception, has been run together with public service radio under the Ghana Broadcasting Corporation (Ansah, 1985; Ghartey-Tagoe, 1994; Kugblenu, 1974). Kugblenu (1974) reported that Television started with the intention of dedicating itself to education, information and nation building. Kugblenu (1974), citing the Ghana Information Service (1964:76), stated that the then President, Dr Kwame Nkrumah, at the inauguration of Television declared that “Ghana’s television will not cater for cheap entertainment nor commercialism; its paramount objective will be education in the purest sense” (Kugblenu, 1994:90). In line with this official declaration and directive, therefore, television was used mainly to spread messages and information about government policies and programmes, and to interpret them to the people. It was clear that there was no tolerance for opposition and dissenting views (Ansah, 1991, 1994).

Only two years after Dr Nkrumah’s government was overthrown, Ghana Television (GTV) went commercial. For nearly three decades, GTV enjoyed state monopoly. The liberalisation of the airwaves in 1996 brought GTV’s monopoly in Ghana to an end. Five other television stations, all private enterprises, are fully operating now in the country, giving GTV a strong competition in relation, mostly, to advertising revenue and for audience viewing (Kafewo, 2007).

For the print media, even though a few newspapers existed, there was no press freedom under almost all the military regimes (Ansah, 1991; Boafo, 1985). The country’s 1992 Constitution supports the promotion of local culture as well as affirmative action for the empowerment of the disadvantaged majority of the people (Karikari, 1994).

The promulgation of the 1992 Constitution, and the restoration of constitutional rule in 1992, opened the doors for liberalisation of the media in Ghana. Concomitant to this was the intense agitations for pluralism in radio broadcasting (Karikari, 1994). However, at that time, there was already intense involvement of the private sector in

print media operation. Indeed, there were more private newspapers than state-owned ones, but broadcasting remained a state monopoly. Finally the government localised the state-owned GBC, allowing for the establishment of local radio stations in all the country's ten administrative regions (Bonnah Koomson, 1994; Karikari, 1994). In August 2001 the criminal libel law was repealed, and this gave absolute freedom to the media in Ghana.

This also resulted in providing more access to poor rural farmers to information from radio. The establishment of local radio stations in all regions of the country and the gradual increase in numbers of community radio stations is making radio even more important as a tool for rural and community development.

2.6. Radio Broadcasting in Ghana

Radio and television have a strategic place in modern state entities as effective media of mass communication and mass education for social awareness and cultural enlightenment (Ansah, 1994). They also contribute to imparting scientific and technological innovations (Karikari, 1993). Radio's growth and popularity therefore has not gone unnoticed. According to Mawlana (1987), since its inception, radio broadcasting has demonstrated a rapid expansion as part of the flow of information.

The indispensable role of radio dawned on African countries and their colonial masters decades before the agitation for political independence (Mytton, 1983; Ansah, 1994). Therefore, in almost all countries in sub-Saharan Africa, the introduction of radio broadcasting started almost at the same time (Head, 1983). In Ansah's (1994) view, the radio was established in Ghana to bring to an end the barriers of isolation and ignorance, and to promote progress through communication. It was also to enable the people of the Gold Coast to improve on their very rich culture and traditions, especially their cultural music. Later the radio in Ghana, then Gold Coast, became the medium to give war news during the Second World War (Ansah, 1994).

Between 1946 and 1953, GBC was administered by the public relations department of the colonial government (Ansah, 1985). In 1953, upon the recommendations of a commission set up by the colonial government, the station was renamed Gold Coast Broadcasting System (GCBS). On attainment of independence in 1957, the name was changed to Ghana Broadcasting Corporation (GBC). In 1968, GBC received its instrument of corporation (Obeng-Quaidoo, 1985). During the first few decades of its

establishment, GBC's radio broadcasts were thought to be more suited for urban listeners than for the rural folks. There were suggestions and agitations that programmes for the rural folks be given some boost. Agricultural programmes, particularly, were considered very important if the newly independent Ghana was to emerge as an economic force (Ansah, 1985).

During the colonial period, one of the functions radio was expected to play was to promote nation building and national integration. Ansah (1994) cited Cantril and Allport to support this view:

"When millions or more people hear the same subject matter, the same arguments and appeals, the same music and humour; when their attention is held in the same way and at the same time to the same stimuli, it is psychologically inevitable that they acquire some degree of common interests, common tastes, and common attitudes. In short, it seems to be the nature of radio to encourage people to think and feel alike" (Ansah, 1994:15).

Ansah (1994) observed that though nationalists who were agitating for Ghana's independence were critical of the strict control of the radio station by the colonial government, the country's rulers, after Ghana gained independence, did not behave differently. They had a tighter control over the radio than the colonial masters did. The new rulers often stated that national integration and national development should be considered paramount.

In 1959, the Minister of Information, as quoted by Ansah (1994), on the occasion of the commissioning of new equipment for GBC, declared as follows:

"The radio is a great unifying agency in our country. Through it, people all over Ghana can appreciate that we are the entire same nation with the same ideas and aspirations. Ghana is a unity and in this small country there is no room for regional and tribal groups, each emphasising their own difference from the rest of the country, at the expense of national unity" (Ansah, 1994:25).

Ansah (1994) noted that the view of the Ghana government in relation to the role of radio as a national asset to be used by government for national development and integration was not different from the view of almost all the leaders of newly-

independent African countries in the 1950s and 1960s. He cited a statement made by a Tanzanian Minister who, in 1961, spoke on the integrative role of radio for his country:

"A broadcasting system is a very powerful instrument and it can be a very dangerous instrument if those who are responsible for running it happen to hold different views from those of the Government, and great harm can be done to this country by giving emphasis to the wrong things which need special attention. It is my view ... that to avoid this powerful instrument being used by people who may not have the interest of this country at heart, this instrument should be taken over by the Ministry of Information Services and run as one of the government departments" (Ansah, 1994:25)

In Ghana, decentralisation of radio broadcasting in the early periods of the country's political independence was not an appealing idea to the government. Yet, the need to get all people, especially the rural folks, informed on government policies and on their rights and responsibilities as citizens was compelling (Ansah, 1994; Bonnah Koomson, 1994). Meeting the needs of a country with diverse cultures certainly presents a difficult task for broadcasters working under a centralised system. Recognising this difficulty, Bonnah-Koomson (1994) observed that the promotion of small audience broadcasting system offers the solution to radio broadcasting in a polylingual country like Ghana.

The government's position, however, appeared to be that, as a nation, which had gained independence five years earlier, and was trying to transform the society, broadcasting should play the important role of fostering a sense of national identity, by making people aware of national goals and progress (Ansah, 1994). The position of government therefore was not to decentralise radio, but to make GBC start rural broadcasts in its programmes. This eventually led to the setting up of the Rural Broadcast Division of the GBC in 1962 (Ansah, 1994; Abbey-Mensah, 2001).

2.7. The Development of Local Radio

Before the Rural Broadcasting Unit was set up in 1962, GBC had started rural broadcasts that were targeted at the farmers and rural folks in the country. Ansah,

(1985) and Ansu-Kyeremeh (1992) reported that within a decade of broadcasting in Ghana, GBC allotted air time for rural educational and development broadcasts. According to Ansu-Kyeremeh (1992), development broadcasting had been part of GBC's programming since the establishment of radio broadcasting in the country in 1935, the depth of air time and the regularity of the programmes were however less felt. Abbey-Mensah (2007) shared similar information. He stated that before the Rural Broadcasting Unit was established under the GBC, broadcasts to rural farmers were done through GBC's national networks. Several attempts at rural broadcasting were made through the broadcast of agricultural programmes in the 1950s. Abbey-Mensah (2001) cited the *Cocoa Family*, a weekly broadcast on agriculture, particularly on cocoa, which was a regular feature on the national network, and another in 1957, which was broadcast in English, as examples of the attempt by GBC at rural broadcasting in the early decades after it was established. The latter programme (the one that was broadcast in English), however, did not benefit the poor illiterate farmers who could neither speak nor understand English (Abbey Mensah, 2001). From the day that the Rural Broadcast Unit was set up, broadcasts to the rural people took on a new character (Ghartey-Tagoe, 1994). Programmes designed to educate, inform and entertain the rural people were produced in the Ghanaian languages, making them more popular among the rural populations (Abbey-Mensah, 2001).

To give rural educational broadcasts a new focus, media and communication scholars started advocating for the localisation of radio (Ansah, 1985, 1989, 1993). After nearly two decades of this agitation, the establishment of regional public service radio stations started (Bonnah Koomson, 1994). The first of this attempt was the establishment of the Upper Regional Agriculture Radio (URA Radio). URA Radio was mandated to disseminate agricultural and rural development messages to the farmers within the Upper Region Agricultural Development Programme (URADEP) project area, which covered the then Upper Region of Ghana (now Upper East and Upper West regions). After the end of the project, the radio station came under the full sponsorship of the GBC. Its mandate was then extended to include rural and community development messages. Agricultural broadcasts, however, continued to take the bulk of the air time (Bonnah-Koomson, 1994).

The other two early attempts to set up local and community radio stations were the conversion of re-diffusion boxes at Apam and Swedru, in the Central Region of

Ghana, into low power FM community stations. The Swedru Project was supported by the School of Communication Studies of the University of Ghana under the School's *Wonsuom Communication Project*, and funded by UNESCO (Bonnah Koomson, 1994; Obeng-Quaidoo, 1988). It was a pilot project that used the community radio station as a source of interaction with the local communities, within the Swedru District, on development issues, mainly on agriculture (Obeng-Quaidoo, 1988).

The Apam project involved the use of the community radio station for broadcast of non-formal education programmes and adult literacy. It was funded by the Non-formal Education Division of the Ghana Education Service. The Swedru and Apam projects, after the pilot phase, were handed over to the local District Assemblies (District Councils) (Bonnah Koomson, 1994). URA Radio, however, was taken over fully by the Ghana Broadcasting Corporation, and made the first regional local/rural radio station in Ghana (Bonnah Koomson, 1994).

The re-introduction of party politics and democracy brought in its trail a new environment of political and media pluralism. The calls for restructuring the roles and status of GBC heightened (Bonnah-Koomson, 1994). Ansah (1994) noted that the time was rife for decentralisation of radio broadcasting, localising the national radio station (GBC), and encouraging private ownership, management and operation of radio. Centralisation of radio, he argued, was no longer helpful to both the state and the people. National integration, community development and national development would be served better by radio pluralism, which serve as a useful platform for cross-fertilisation of ideas, meeting the information needs of local communities and ensuring a promotion of the indigenous languages and cultures of the people (Ansah, 1994).

Chapman et al. (2003) shared a similar view with Ansah (1994). According to Chapman and his colleagues, the development of decentralised and pluralistic media is in line with the World Bank's policies aimed at reducing state monopoly over information and communication and encouraging private and community participation in media information delivery. Radio, they observed, has been a valuable part of the democratisation in many countries (Chapman et al., 2003). Similarly, Karikari (1994) argued that centralisation of radio has had the undesirable effect of limited access by linguistic, cultural and religious minorities in Ghana. He advocated for nothing short of a complete decentralisation of radio because "if even a certain amount of

decentralisation was conceded, it will bring about only a limited amount of pluralism, because ultimate control will still be vested in the state” (Karikari, 1994:8). Karikari observed that the benefit of radio pluralism, which includes localising radio for national development, is so great and necessary that it must not be left untapped. Pluralism will encourage free expression, heighten public debate on important national issues and policies, and in general, promote exchange of ideas among the people. He noted that “the vision is that improvements in economic and cultural conditions would be served better by the mass media freed from monopoly by the state” (Karikari, 1994: 6).

Chapman et al. (2003) advised that the process of attaining the ideal of radio pluralism never comes easily. In relation to the Ghanaian situation, indeed, decentralising radio broadcasting and liberalising the air waves for private participation was not easily acceded to by the government. However, so intense was the agitation for media pluralism, especially localising and decentralising broadcasting, that, finally the government had to initiate some reforms. This opened up the media landscape (Kafewo, 2008).

Citing a report from the GBC (1995), Heath (2007) reported that in 1995, the then Minister for Information, Mr Kofi Totobi Quakyi, in a message to the GBC, wrote: “It is time to redefine the objectives of public service broadcasting in Ghana and to facilitate GBC’s strategic plans for the next decade” (Heath, 2007: 95). The Minister added that the government had promised to provide funding for the GBC to enable it share development messages equitably and to provide wider access throughout the country (Heath, 2007).

Further, the Minister entreated the GBC to strive to forge a more participatory relationship with the people; a move which, it is expected, would serve the public by expressing their political and cultural diversity, while at the same time, pursuing the national development agenda (Heath, 2007). This opened the gate for the establishment of local radio stations in all the regional capitals of the country (Bonnah-Koomson, 1994). Finally the number of public service local radio stations rose to ten; one for each administrative region.

Agricultural programmes take the greatest proportion of the air time of most of the local radio stations, especially those located in administrative regions where more than

half of the economically active adult population rely on agriculture as a main source of food and income.

2.8. Conclusion

Few years after gaining independence, Ghana's economy plunged into a downward trend; reaching an all-time dismal performance in the late 1970s. Starting from the early 1980's and running throughout the 1980s' and the early parts of 1990s, pragmatic and bold economic policies, under the country's economic recovery programme (ERP), stemmed the tide of economic decline (Gyimah-Boadi and Jeffries, 2000). Evidence of economic growth became vivid after the intervention of the IMF. Since then, the economy has continued to record appreciable annual growth levels, ranging between 4% and 5.8% (Government of Ghana, 2006).

Agriculture plays a significant role in the country's economy, being the highest contributor to the country's GDP. In the past decades, it consistently contributed at least 40%, annually, to the country's GDP; reaching 50% or higher, in certain years. The agricultural sector is also the highest employer in the country's economy (Government of Ghana, 2005). A decline in agricultural production results in food insecurity, reduction in raw materials for agro-processing industries, and a general detrimental effect on the country's economy (Government of Ghana, 2005). The agricultural sector is expected to record significantly higher growth levels to assist in the country's efforts to attain the status of a middle income country by the year 2010.

The country's media, especially radio broadcasting, has been one of state monopoly, and was largely controlled until the country returned to civilian rule in 1992 (Karikari, 1994). There was sustained demand by intellectuals and media advocates for media pluralism. It can be argued that the return to civilian administration in 1992 and the guarantee of freedom of speech, including freedom of the mass media, were the factors that served as catalysts for the sustained demand for the liberalisation of the airwaves and localisation of public service broadcasting in Ghana (Karikari, 1994).

Consequently, the government initiated the processes of setting up public service local radio stations in the regions, alongside the liberalisation of the air waves for commercial broadcasting. The move also encouraged the setting up of community radio stations, most of which are a product of collaboration between the local

communities and non-governmental organisations (Bonnah-Koomson, 1994; Karikari, 1994).

Local radio stations, by their physical locations in the regions, their acute understanding of the community perspectives, and their clear knowledge of local resources, traditional issues and priorities of the people, can facilitate greater sharing of ideas on agricultural with farmers (Chapman, et al., 2003).

In the next chapter, theories relevant to the thesis – cognitive response and diffusion of innovations - are discussed.

CHAPTER THREE

THEORIES RELEVANT TO THE STUDY

3.1. Introduction

This chapter discusses two theories, which offer the basis for the main thrust of the study. The study focuses primarily on the effectiveness of radio news in the context of agricultural news broadcast. The theoretical background of the study involves an examination of memory and comprehension of broadcast news. In this sense, it is worthwhile to present a discussion of the cognitive response theory as a basis of understanding the psychological issues that relate to information processing. In addition to the cognitive response theory, the chapter discusses the diffusion of innovations theory, which provides the basis for understanding the flow to, and adoption of, agricultural news by rural farmers in a developing country such as Ghana.

3.2. The Cognitive Response Theory

The dominant contemporary views of memory and studies in the area are derived largely from the cognitive information processing models. The information processing approach holds a strong view that human beings are very much processors of information (Gunter, 1987). According to Gunter (1987: 55), “cognitive information-processing models could provide a useful theoretical basis for research into retention and comprehension of broadcast news”. Bohner (2001) and Petty and Priester (1994) gave similar explanations about the role of the cognitive response theory in information processing and attitude change.

The cognitive response theory seeks to explain the relationship between message learning and persuasion. It provides explanations also to the cognitive processes that are responsible for information uptake. This approach explains that the extent of yielding to persuasive messages or information by the receiver has a marked relationship to the cognitive responses to the message (Petty and Priester, 1994). According to Bohner (2002), the approach offers a useful theoretical basis for understanding that attitude change is influenced by the cognitive responses that are provided by individuals when they are exposed to communication.

Information processing in the cognitive response model is explained as processes or sub-processes that are brought into play when people act on information (Kellermann, 1985; Lang, 2000). The model outlines three sub-processes of information processing: *encoding*, *storage* and *retrieval* (Gunter, 1987; Kellermann, 1985; Lang (2000). Waugh and Norman (1965), as cited in Gunter (1987), distinguished two separate stores that they called primary memory (PM) and secondary memory (SM). Stimuli items first enter the PM before they strive to be maintained through rehearsal. If they are not rehearsed, they are soon forgotten. If an item remains in the PM, it may eventually enter the more permanent SM. In the SM, items are retained in memory, irrespective of whether the person rehearses them or not. The SM is known to have more storage capacity than the PM (Gunter, 1987).

Other researchers and social psychologists have identified the processes involved in message learning, storage and retrieval of information as the interplay of the working of the short term memory (STM), long term memory (LTM) and working memory (WM) (Eysenck, 1993; Eysenck and Keane, 1990). In the STM, information from a persons' experience or from the environment is first interpreted and stored. However, because the STM has a limited capacity, the information is often forgotten within half a minute, unless it is acted upon almost immediately (Kellermann, 1985). The WM, like the STM has a limited capacity. In the WM, information from the STM and LTM are often combined (Gunter, 1987). The final memory store is the long-term memory (LTM), which is assumed to have a limitless capacity. In the LTM, information is represented in a meaningful manner. The LTM then keeps this information until the time comes when the information is to be retrieved. Information, in most cases, is lost in the LTM when there has been interference from other new information from the environment which is held in the STM (Eysenck, 1993; Eysenck and Keane, 1990; Gunter, 1987).

3.2.1. Memory Processes

The LTM is described as a permanent storage house for knowledge. However, it has been noted also that it does not mean that the information stored in it is always available. Essentially all information in a person's mind is controlled by the retrieval processes (Lang, 200; Eysenck and Keane, 1990). In relation to mass communication, especially radio broadcasting, audience or viewers may listen, understand and store

information or messages, but it does not automatically mean they will recall vividly all that they have heard accurately. Sometimes, even just a few hours or days after the broadcasts, audience are unable to recall the information that they had listened to (Gunter, 1987; Lang, 2000).

The processes that influence memory recall in cognitive information are discussed in the sections that follow.

3.2.1.1. Encoding

Encoding involves getting the message or communication from a source into a recipient's brain (Gunter, 1987; Lang, 2000). This involves the entering of information into the memory. Lang (2000) explained that if a person is exposed to a message, the message enters into the persons' sensory stores, and this the beginning of the process of encoding and storing the information (Gunter, 1987).

A number of factors that are involved in encoding information into the memory have been identified by cognitive researchers (Crack and Lockhart, 1972; Gunter, 1987; Kellermann, 1982). The activities involved in the encoding process include "transforming a visual form into a verbal label or concept, selecting only a portion of the incoming information for storage, or elaborating it by processing it in the context of knowledge that is already held in memory" (Gunter, 1987:61). One of the factors that affect encoding is *arousal*; and arousal enhances *attention* (Kellermann, 1985). This attention could either be a product of the external stimuli working on sensory organs or as a direct consequence of a person's goals. It has been found that, most often, knowledge that is stored gives signals or inputs into the sensory register, and this can cause arousal (Kellermann, 1985).

Brewer and Crano (1994) describe our attention capacity as one that is limited. To them therefore, people will tune in only to certain aspects of incoming information and ignore the rest. It is only those aspects of information that we attend to that are encoded.

Gunter's (1987) view is that the level of physiological arousal at the time of an event has some direct influence on the level of recall of a message. The effect and level of arousal has been found to depend on the nature and level of complexity of the conscious processing of the message that is required. Gunter noted that researchers have found that how relatively simple or complex information is, and the period that

the learning situation is happening are useful indicators of the level and effect of arousal, and by extension, of subsequent learning. Messages that arouse listeners' attention are very much likely to help in learning and memory recall (Gunter, 1987).

When information enters a person's brain, any aspect of it that is not selected for processing is written off by new information (Gunter, 1987). This initial step in the encoding process determines which aspects of information will get into mental representation. This is in turn, influenced by *automatic* and *controlled* selection processes (Lang, 2000, Lang Dhillon and Dong, 1995; Lang, et al, 2004). *Controlled selection processes*, in the case of television viewing, are the viewers' goals, and *automatic selection processes* are considered unconscious in their nature. Graham (1997) and Ohman (1997) as cited by Lang (2000), distinguished between two major types of stimulus that activate the selection processes: (i) information that has relationship with a person's goals; and, (ii) information that presents a change of an event or an occurrence. The controlled or conscious selection process reflects the goals of the viewer or audience, while the automatic or unconscious selection process is influenced by the level of relevance of the information to the message recipient (Lang, 2000).

Gunter (1987) pointed out that people are selective when encoding information. *Selective attention*, according to Broadbent (1958), blots out some messages while allowing others to receive the listener's attention (Gunter, 1987).

According to Lang (2000), encoded messages may not be an exact product of the original; it may contain only a small fraction of the total information from the original message (Lang, 2000). After messages are encoded into the short term memory, the next thing that is most likely to happen is that they will be transferred into some longer term store (Lang, 1989).

3.2.1.2. Storage

This is the next process in cognitive response theory. During the encoding process, a mental representation of the message that has been heard or learnt, is placed in an activated memory. Newly encoded message or information is activated by associations with the other information that is active in the short term memory (Bohner, 2002). As a person thinks about the message, the likely outcome is that more and more associations between the new information and the old information are

formed. The more a person links a new bit of information into this associative memory network, the more likely that the information will be better stored (Bohner, 2002). This process of linking newly encoded information or memories is called *storage*. The more associations are formed between the new and the old information, the more completely the new information is stored. When any piece of information is poorly stored, the likely reason is that enough associations and links do not exist (Bohner, 2002).

Craik and Lockhart (1972) distinguished between short terms store (STS) and long term store (LTS). They noted that STS has a limited capacity, but LTS has no known limit. Messages in the STS can be completely forgotten within about 30 seconds. In the LTS, however, information or messages can be forgotten, but this will occur very slowly, thus may take a long time. The information may not also be forgotten at all. In their view, in unaided recall of messages, generally the last few items that the receiver is exposed to, are normally retrieved from the STS, where as the earlier items that were heard or learnt, are retrieved from the LTS (Craik and Lockhart, 1972).

In relation to memory recall and comprehension of broadcast news, therefore, it will be expected that information that is stored in the LTS will be remembered long after the uptake of that information, whereas information stored in the STS will be forgotten soon, if not retrieved in less than a minute.

Storage of information in memory has also been explained in terms of the relationship between episodic and semantic memory (Eysenck, 1990: Eysenck and Keane, 1993: Lang, 2000). According to Lang (1989, 1990), episodic memory is memory that is suited to, or used for the day-to-day activities of life, and semantic memory relates more to the store of general knowledge of the world. Lang (2000) indicated that in order for a person to gain information, the person must process it and store it episodically. Lang (1989) drew a relationship between episodic memory and semantic memory, as he argued that any information that gets into the semantic memory must first be part of the episodic memory. In his view, “when we learn something, initially, it is remembered as what we did today – only later is it stored as simply a fact that we know” (Lang, 1989: 443). Therefore for a person to make incoming information a part of his general knowledge and store it in semantic memory, several conditions must exist. These include the relevance of the

information, the ease of understanding the message, and the amount of effort the receiver voluntarily invests into the creation of the episodic memory (Lang, 1989).

Drawing from the arguments presented above, it is expected that, in relation to broadcast news on local radio, the relevance of a news item or message, the effectiveness of the programming variable used in the dissemination of the broadcast, and the motivation of the listener, can add up to influence the amount of that message that will be stored in memory.

3.2.1.3. Retrieval

The information encoded does not receive equal amounts of processing during the storage process. Some portions of the message will be better stored while others may not (Gunter, 1987). The stored messages wait for reactivation (Lang, 2000).

Retrieval therefore involves the process of scanning through the associative networks in our minds with the purpose of getting specific information. This specific information is then placed into a working memory (Eysenck, 1990; Eysenck and Keane, 1999; Lang, 2000).

The retrieval of information from memory is not only related to an outcome associated with learning the content of a message, but also retrieval can occur simultaneously with message reception (Eysenck and Keane, 1993; Lang, 2000). Listeners and learners will search their memories and retrieve relevant previously stored knowledge from long-term memory as they receive similar messages. This helps in the understanding and storage of the information (Eysenck and Keane, 1993; Lang, 2000).

Lang (2000) gave an elaboration to this process. He stated, for example, that a message about an election will elicit a concurrent reaction in the form of retrieval of what the person already knows about the elections. This is the principle of *priming* (Hogg and Vaughan, 2002; Hwang et al., 2006).

Attention to a message has been found to influence encoding and recall of the message. Information that primes with the previous knowledge we already hold are very likely to arouse our attention (Sabonmatsu and Fazio, 1991)

3.2.2. Summary

Inferring from the above discussion, memory is a composite of the outcome of encoding, storage and recall. Even though the cognitive response theory draws its strength from mostly television experiments, its basic tenets have a relationship with memory recall also from radio broadcasts. How much of a radio message a listener can recall will depend upon the amount of the message the listener is able to encode, store and retrieve. A significant factor in this case will have to do with how much resources the message recipient has, or is willing, to allocate for the message (Brewer and Crano, 1994; Kellermann, 1985).

The relevance of cognitive response to radio broadcasting is particularly drawn from Lang's (2000) view that the selection process of information is guided and regulated by two types of stimuli: (i) information that is relevant to the goals and needs of the individual and (ii) information that represents the change or an unexpected occurrence in the environment.

Besides these, the ease of understanding of a message, the temporary order, and the efforts the message recipient is willing to allocate to the message are all factors that will determine the amount of message stored in memory (Lang, 1989). The amount of information that is retrieved will depend on the amount of searching that is done in the associative networks to get it into working memory (Hogg and Vaughan, 2002; Sabonmatsu and Fazio, 1991).

It is expected that relevance of a message to the needs of a listener, as well as the general knowledge the receiver already has, the suitability of the broadcast or programming format, and the individual's level of effort to learn from the broadcast news, will all add up to determine the level of learning from broadcast news.

3.3 The Diffusion Theory

As part of this study, the general information seeking behaviour of rural farmers, their sources of agricultural information, their self-reported adoption levels of agricultural technology, their attitudes towards agricultural broadcast sources and their perceptions of the credibility of agricultural messages are investigated. The relevance of the diffusion model to this study stems from the theory's general applicability to

information dissemination of agricultural innovations, especially among rural farmers. The model therefore has relevance to this study.

Diffusion research relates to the study of the processes in a system of how innovations – ideas, information practices, knowledge and objects – become known and spread throughout the social system (Severin and Tankard Jnr., 1992). According to Severin and Tankard Jnr. (1992), the diffusion model is a logical addition to the two-step-flow model. They noted that while the two-step hypothesis “is mainly concerned with how an individual receives information and passes it along to others, the diffusion process concentrates on the final stage of the adoption or rejection of an innovation” (Severin and Tankard Jnr., 1992: 198).

The diffusion theory has suggested that there is a two-step communication process. In this process, facilitators, communication sources and change deliver messages that are often designed and packaged outside the villages to the villagers. The change agents and facilitators involve opinion leaders and decision makers in the villages in their communication delivery efforts. The diffusion theory is definite that there is an adoption pattern of any new idea or innovation introduced into a community (Rogers, 1962, 1983; Rogers and Shoemaker (1971).

The product of the adoption process in the diffusion research is the *S-shaped* curve (Roger, 1969, 1983; Severin and Tankard Jnr., 1992). This still has contemporary importance, as it has been found that most innovations continue to have an *S-shaped* rate of adoption (Rogers, 1995). The adoption rate of innovations always has a slow start. Gradually as the *early adopters* start to influence the rate, there occurs a fairly rapid rise. At a point, this rapid rise will start to slacken again. This gives the curve an *S-shape* (Rogers, 1969).

One of the most well-known and most cited studies in diffusion research has been the one conducted in 1943 among farmers in Iowa by Ryan and Gross (Severin and Tankard Jnr., 1992; Rogers, 1969; 1983). In the study, an innovation that was released to Iowa farmers in 1928 resulted in noticeable agricultural innovations for over 20 years. The result was a revolution in farm productivity among the farmers, and within the period of the innovation. The Ryan and Gross study was highly useful and influential in the formation of the diffusion paradigm. Besides this, the study applied the four main elements of diffusion; (1) an innovation is (2) communicated

through certain channels (3) over time and (4) among members of a social system (Severin and Tankard Jnr, 1992).

The diffusion theory identified five adopter categories as follows: (1) innovators – persons who are eager to try new ideas, and have more cosmopolite relationship than their peers; (2) early adopters – people who are respectable in their communities, are usually opinion leaders within the social system; (3) early majority – people who are open and interact frequently with their peers but do not necessarily hold leadership positions; (4) late majority – people who demonstrate scepticism, and will usually adopt an innovation either due to economic necessity or network pressure; and, (5) laggards – persons who are characteristically traditional, are not cosmopolite, and have a high tendency to rely mostly on the past as their point of reference (Melkote, 1991; Rogers, 1983). These categories follow a standard distribution curve. The curve demonstrates that, very little innovators adopt the innovation in the beginning (2.5%), early adopters (13.5%), the early majority (34%), the late majority (34%) and finally, the laggards (16%) (Rogers, 1962).

According to Rogers (1962), there is a great difference among the adopter groups in terms of their media behaviour, personal characteristics and position in the social structure. The early adopters are those who were young, rated higher on social status, possessed superior mental abilities and demonstrate a high financial status. The early adopters also rely more on impersonal and cosmopolite information sources and a greater number of other sources of information (Rogers, 1962).

Diffusion research proposed five stages in the adoption process of the individual decision maker and information or knowledge seeker (Rogers, 1969). The five stages were awareness, interest, evaluation, trial and adoption. The level and ease of acceptance of an innovation in a social system, Rogers (1983) argued, depends largely on the characteristics of the innovation itself.

Five attributes that affect the rate of adoption of an innovation are: (i) the relative advantage or degree to which an innovation was considered more advantageous and more useful than the ideas it superseded; (ii) compatibility, or the degree to which an innovation was directly consistent with the values and experiences of the intended beneficiary or receiver; (iii) complexity, or the degree to which an innovation was relatively difficult or relatively easier to understand and to apply; (iv) divisibility, or the degree to which an innovation could be tried by the beneficiary on a limited and

gradual basis; and, (v) communicability, or the degree to which the results of the innovation could be spread to others in the social system who might need the information or idea (Rogers, 1962).

The diffusion theory predicts that the mass media as well as interpersonal contacts provide information, and influence opinion and judgment (Rogers, 1983). This is facilitated by the existence and operation of networks. The nature of networks and the roles opinion leaders play in them determine the likelihood that the innovation will be adopted (Severin and Tankard Jnr., 1992).

Opinion leaders, according to Severin and Tankard, Jnr. (1992), are similar in many respects to their followers, and they are often not very far ahead of their group members in terms of interest in an idea or innovation. However, these opinion leaders exert influence on audience behaviour using their personal contact (Severin and Tankard Jnr., 1992).

Apart from opinion leaders, there are additional intermediaries in an innovation diffusion process called *change agents* and *gatekeepers* (Rogers, 1983; Severin and Tankard Jnr., 1992). A change agent, according to Severin and Tankard Jnr. (1992: 200) is “a professional person who attempts to influence adoption decisions in a direction that he or she feels desirable”. Change agents often have higher education and social status than the persons they are trying to influence to adopt innovation. This makes them heterophilous to their clients.

The use of opinion leaders by change agents overcomes the barrier of *heterophily* and creates a *homophilous* relationship between them and the peasants they try to influence. Rogers (1962) indicated that in diffusion of innovations, communication is more effective when a higher degree of *homophily* is present. Agunga (1990) shared a similar view. He observed that in a communication process, when a *homophily* relationship happens to exist between the message provider and the message receiver, this enhances the effectiveness of message delivery (Agunga, 1990).

Rogers indicated that another concept that is important for effective message and technology transfer in the diffusion of innovations is *empathy*. To him, “communication is less effective when a low degree of homophily is present, unless the source has a high degree of *empathy* with the receiver” (Rogers, 1969:182). Rogers (1969) advised that to ensure that the principle of *empathy* is not missed in the communication process with peasants, the selection of a change agent should come

from the farm background. *Empathy* with the people is most effectively gained by change agents if they are feedback-minded and receiver-oriented. He cautioned that being too *empathic* could be dysfunctional. It could lead to a situation where the change agent no longer sees the reason to change. This is because he may perceive his programmes more in the position of the people he is expected to help attain change (Rogers, 1969).

Rogers (1969) further noted that an appropriate level of change agents' empathy with their clients will partly depend on the clients' level of empathy with the change agent. Gans (1962), as cited by Rogers (1969), found that most of the social workers in a Boston slum had a relatively low degree of empathy with their clients, whereas the slum residents were able to take the role of the change agents with greater ease. This led to a situation where the clients had a certain degree of advantage in their relations with the social worker. The social worker, however, was disadvantaged for having a deficient empathy with the clients.

It is expected that two-way reciprocal empathy enhances communication between change agents and their agricultural clientele.

In a communication situation, one of the variables that the communicator has control over is the source. The expectation is that, having the right source can increase the effectiveness of a message (Severin and Tankard Jnr., 1992). The right source is the source that is rated as credible. Schramm and Roberts identified *source credibility* as one of several factors that influences message acceptance. They stated that: "the potential to accept a message depends upon message factors such as how the message is organised, the source to which is attributed, its clarity, the nature of its appeal, etc" (Schramm and Roberts, 1964:391).

Credibility, according to Rogers (1969), could be measured through indices such as level of knowledge or technical competence of the source of the messages. In Curran and Seaton's (1991) view, the willingness of the public to believe what it is told is related to the public's level of trust in the source. Higher credibility can lead to greater contact by the clients and higher contact with an extension agent who is found to be credible will lead to even higher credibility (Rogers, 1969).

In relation to radio broadcasting, it is expected that the level of perceived credibility of the radio station and its programme producers, the level of contact the

farmers have with the radio staff, and the relevance of the radio messages, could all influence the level of perceived credibility of the radio station by its audience.

The diffusion theory has been criticised for being characterised by the general tenets of the modernization theory (Rogers, 1983). Such characterisation included a basic assumption that rural education and rural development could only be facilitated in non-industrialised societies through the application of Western media systems; and modernisation was a necessary basis for development (Lerner, 1958, 1971). The modernisation and diffusion models both prescribe a one-way communication pattern. In this pattern of communication, the message recipients do not actively take part in the design of the message. They also do not determine the message content (Lerner, 1958; Rogers, 1969).

Communication strategies for development encourage message sharing between the development communicator and the beneficiaries of development messages (Bamberger, 1991; Chambers, 1994; Jacobson, 1994; Klandermans, 1984). Therefore, recent approaches in the communication of agriculture and rural development messages with the rural folks and peasants in developing countries have shifted from the one-way approach. The approach is now participatory and dialogical (Agunga, 1990; Childers, 1990; Eisendstadt, 1980; Servaes, 1989).

In rural radio broadcasting, for example, participatory message sharing and programme production are becoming increasingly important as ways of communicating agricultural messages with the farmers (Chapman et al., 2003)

In spite of the limitations of the diffusion theory for contemporary communication and development approaches, the theory still presents valid and strong features in its concepts of *source credibility*, *empathy* and *homophily* (Rogers, 1969). Rural listeners' attitudes towards radio messages, and even towards the radio station, are expected to be related to the perceived view of the credibility of the source of communication. Perhaps, the cultural sensitivity of rural audiences in Africa makes the concepts of *empathy* and *homophily* still relevant in development communications with the rural people. Rogers' (1969) view of the importance of opinion leaders in the spread of innovations is still valid in a continent where opinion leadership is still strongly linked to level of influence, which in turn is related to level of education, wealth and media exposure.

3.3.1. Summary

A major assertion in diffusion theory is that there is a relationship between the early adopters of development messages and high socio-economic status, age, and opinion leadership (Rogers, 1962; 1969; 1971). Media behaviour, position in the social structure and personal characteristics have great value in distinguishing the early adopters from the late adopters and *laggers*. Perceived credibility by message recipients of the source of the message, and the perceived relevance of the message disseminated by the source to the receiver have been identified also by Rogers (1971) as factors that influence message reception and adoption.

In relation to my study, socio-economic and demographic characteristics such as age, income, education, gender, together with attitudes and perceptions of the rural farmers towards radio and the radio broadcasts/programmes, were investigated, using the survey data. The diffusion theory therefore provided a basis for analysing and presenting the findings of the data gathered through the survey research.

3.4. Conclusion

This chapter discussed two theories – the cognitive response theory and the diffusion of innovations theory -- as a basis of establishing a theoretical framework of the study.

The treatment of the cognitive response theory revealed that message relevance, effect of programming formats (variables), and the individual's level of already stored knowledge and effort to learn from the broadcast news, will all add up to determine the level of recall and comprehension of broadcast news. Research questions that logically flow from the discussion are: What programming variables influence message comprehension and unaided recall? Which audience factors influence recall and comprehension of broadcast news?

The discussion on the diffusion theory suggested that perceived credibility by message recipients of the source of the message, and the perceived relevance of the messages-disseminated are factors that influence message reception and adoption. In relation to this study, it is expected that psychological factors such as farmers' attitudes towards local radio, and their perceptions of the credibility of radio messages, will have an influence on radio listenership, and application of the radio messages. It appears appropriate therefore to put forth this research question: What

influence or effects do psychological factors such as attitudes and source credibility have on level of radio listenership?

In the next chapter, a review of literature on memory recall and comprehension of broadcast news is offered. Also the chapter presents a review of studies on the use of radio for agricultural extension among rural farmers in Asia and Africa. The discussions in the chapter underpinned the conceptual framework of the study.

CHAPTER FOUR

REVIEW OF LITERATURE OF RELATED STUDIES

4.1. Introduction

The previous chapter offered a discussion of two theories – the cognitive response theory and the diffusion theory. An attempt was made to draw on their relevance to the current study, with the view to carving out the conceptual framework of this study. The present chapter sets out the empirical background for this study. The study's focus is on the information effectiveness of radio broadcasts, particularly in the context of agricultural news production. As a result, a series of controlled experiments are conducted with the view to ascertaining the effectiveness of production variables. The importance of audience factors on memory recall and comprehension are also investigated as part of the study. It was therefore found relevant to examine earlier works on memory and comprehension for broadcast news, with the view to identifying the key production and audience factors that have been found to influence information uptake by broadcast audiences. In addition to this, the chapter presents also a discussion of the current approaches to the transmission of agricultural messages through local and community radio to peasant farmers. Finally, the chapter offers a discussion of the factors that influence listenership to local radio and adoption of the radio messages.

4.2. Review of Literature on Comprehension and Recall of Broadcast News

Available literature on research findings on memory recall suggests that learning from broadcast news is generally low among audiences. Studies on memory recall and comprehension of broadcast news supports the view that audiences generally seem to recall relatively little of what they see, hear and read from mass media sources (Bernard and Coldevin, 1985; Berry, 1999; DeFleur and Cronin, 1991; Gunter, 1987; Gunter, Clifford and Berry, 1980). There seems, however, to be different levels and degrees of loss of information from the three main media sources – print, television and radio. The relative effectiveness of these three media types have been investigated and reported copiously by media and communication researchers (Anderson and Burns, 1991; Gunter, Furnharm and Gietson, 1980; Wick, 1992). Even though the evidence has not been completely conclusive, the literature seems to support the view

that print media is generally more superior in terms of levels of recall and comprehension (DeFleur and Cronin, 1991; Walma van der Molen and Klijn, 2004). The broadcast media has generally been found to be less effective than the print media as sources of information and teaching (Browne, 1978; Gunter, 1987; Gunter and Furnham, 1986; Gunter, Furnham and Gietson, 1984; Stauffer, Frost and Rybolt, 1981; Wilson, 1974) even though some studies have rejected that view (Katz, Adoni and Parness, 1977).

After a study with 418 participants on “The effects of Medium on Loss of Information”, Wilson (1974) found that overall all the three media types – print, radio and television –were poor sources of learning. However, he reported that there were differences in the level of knowledge loss from the three media sources. The mean loss of information for all the samples in the study was highest among those who received the information from radio. He reported a 92% loss of information from radio, 79.12% loss from television and 72.83% loss from newspapers.

Other researchers reported findings that supported the view that the print is superior to broadcast media as a source of learning. Walma, Molen and Klijn (2004) noted that the print is more effective than broadcast media in memory recall and comprehension. Similar views on the relatively less effectiveness of broadcast news as compared to print news has been reported by researchers who conducted comparison experiments between television news stories and print media. Findings reported by Gunter (1987), Stauffer, Frost and Rybolt (1981) are clear that the print media performs better than the electronic media as sources of retention of information and comprehension of news. However, findings reported by Katz, Adoni, and Parness (1977) and DeFleur (1991) have rejected the view that print media is superior to broadcast media in learning situations.

Researchers have assigned reasons for the relative superiority of print media over broadcast media in news recall and comprehension. Perloff, Wartella, and Becker (1982) noted that people tend to devote more attention to stories in newspapers, and indeed re-read the important stories and aspects in the newspaper. With television, people typically watch whilst simultaneously performing other activities (Woodall, Davis and Sahin, 1983). Broadcast news gives on-the-spot messages, as opposed to the availability of the print media for re-reading (Gunter, 1987). Also the reader of a newspaper has the choice of determining the pace of reading, an advantage that

television viewers and radio listeners do not have (Berry, 1999). For the listeners and viewers of broadcast news, information must be processed as soon as it is presented (Gunter, Furnham and Gietson, 1984).

This section of my thesis is devoted to a discussion of findings reported on recall and comprehension of broadcast news.

Whilst there is copious research on recall and comprehension of broadcast news from the developed world, there is almost lack of literature from the developing world, particularly in Africa. The work by Stauffer, Frost and Rybolt (1980) in Kenya stands conspicuous among the bulk of research on broadcast news, as it represents, to date, the only comprehensive and well-known study on broadcast news recall and comprehension in Africa. The bulk of literature reviewed in this section of my study therefore is drawn largely from studies conducted in Europe and North America.

Findings of broadcast news recall and comprehension suggests that much of what we learn is often forgotten (Gunter, 1987; Gunter, Furham and Gietson, 1984; Wilson, 1974). In a study conducted in America by Neuman (1976), respondents were able to recall (unaided) only an average of 1.2 stories of a network newscast, and as much as half of the respondents could not recall even a single story. DeFleur and Cronin (1991) cited a study conducted in Finland by Nordenstreng (1970) on television viewers which revealed that 48% of viewers could not remember anything from the news telecast for that evening (DeFleur and Cronin, 1991). Stauffer, Frost and Rybolt (1980, 1983) reported findings that suggested that recall of broadcast news is generally low among all categories of listeners, even though they found evidence that recall was lower among the less educated. In a study to test the abilities of literates and illiterates to learn from a television news programme, Stauffer, Frost and Rybolt (1978) found that the literate group could recall more than half (six or more items) of the 12 stories contained in the broadcast and only 4.7 (39%) mean recall score was recorded for the illiterate group.

Varied explanations and variables have been presented as the sources and causes of poor recall of broadcast news, and the generally low effectiveness of radio and television as sources of learning. According to Burkum (1997), these explanations include a broad range of factors such as faulty learning measures to news story content, production variables and environmental influences and effects. In addition to these variables, Gunter (1987) identified audience characteristics as responsible for

the different levels of knowledge gain, recall and comprehension from broadcast news. These factors are discussed in the next section.

4.2.1. Factors Influencing Recall and Comprehension of Broadcast News

4.2.1.1. Age, Education and Gender

Much has been reported on the influence of education on the amount of learning from broadcast news (Gunter, 1987; Stauffer, Frost and Rybolt, 1978, 1980); but not much investigation has been done on the influence of age and gender on recall, comprehension and learning from broadcast news. While the literature is more conclusive in some cases, in others it is less so. According to Gunter (1987), there are indications that changes do occur with age in relation to cognitive information processes, even though the literature is not very consistent on this. Cognitive psychologists have reported that certain mental capacities and processes, for example, memory functioning, may deteriorate significantly among older people. This may present difficulties, especially with the processing of new information which contain different and unfamiliar topics and which are rapidly presented (Gunter, 1987). Craik and Simon (1980), as cited by Gunter (1980), observed that *the processing deficit hypothesis*, suggests that as people grow older the cognitive resources for effective processing of information diminishes.

According to Gunter (1987), learning that calls for more effort occurs less efficiently among older people than younger ones. Gunter (1987) cited literature to support the view that the older people perform less with message encoding, message retrieval and message storage. Citing Canestrari (1968) and Arenberg (1965), Gunter noted that, in learning lists of words, increasing the time for which the words are presented helps the older people's memory more than it does of the memory of the younger ones. Even though the evidence for age-related storage and forgetting differences remain unclear, there has been observed and reported findings of the younger people been superior to the elderly when spontaneous recall is tested and when cues are given to aid memory (Gunter, 1987). Results of research experiments suggest that age has an influence on message recall and comprehension. Burkum (1997), after a study on the effects of redundant actualities on recall of broadcast news, found that age and gender accounted for some of the variance in recall of news

story information; indeed he reported that the combined amount of variance accounted for by age and gender was about half of that accounted for by distraction and about the same for that accounted for by redundancy. Stauffer, Frost and Rybolt (1983), after a study on 597 adult respondents ranging from age 18 to 87, found that age had an influence on recall of broadcast news. There was appreciably huge difference in recall scores between those who are below the age of 60 and those above, with those below recording an average of 46% in recall scores and those above 60 recording 25%.

The influence of gender over recall of broadcast news is less clear and inconclusive, largely because not much empirical studies have been reported. However, Gunter (1987) observed that patterns of media use, interest in the news and utility of information demonstrate vivid variations between the sexes. According to Gunter, psychological evidence seem to suggest to some extent that there are differences associated with age and sex in cognitive information processing abilities relating to message acquisition and retention. Burkum (1997) in his study on the *Effects of Redundant Actualities on Recall of Radio News* reported that gender was among the variables that accounted for variance in recall of news information. Perhaps more studies testing the level of influence of gender and age on recall and comprehension of broadcast news will be useful in making it clear and definitive whether these two important demographic variables have any relationship with learning from broadcast media.

Studies conducted in different parts of the world seem to support the view that education has an influence on learning from broadcast news. Stauffer, Frost and Rybolt's (1980) study in Kenya found education to be the only audience variable that showed a significant correlation with both unaided recall scores and the test scores of the 13-item news broadcast. While the college students in the sample scored a mean recall of six items (46%) out of the 13-item news broadcast, the illiterate group scored an average of 2.9 items (22%). Also the scores for the comprehension tests followed a similar pattern. College students scored an average of 42%, while illiterate members in the sample recorded a mean score of 23%. Stauffer, Frost and Rybolt (1980) concluded after that study that noted that the educational process that enhances the development of reading and writing skills also enhances the ability to decode oral information.

In an earlier study in the United States with 128 participants, made up of 61 college students and 61 adult non-readers who were students in the Philadelphia Adult Basic Education Academy in Philadelphia and the Adult Basic Learning Centres in Worcester and Brockton in Massachusetts, Stauffer, Frost and Rybolt (1978) found significant correlation between education and news recall and comprehension. After an experiment that involved the use of a 12-item television newscast, the researchers found that the college students scored an average of 60.8%, while the learners in the adult basic education programme scored an average of 38.2%. They concluded that despite the observations of compensatory common sense developed by functional illiterates in our society, this characteristic may not extend to an ability to recall and use information from television news with the same efficiency as literates (Stauffer, Frost and Rybolt, 1978).

In another study among 597 respondents conducted on phone by Stauffer, Frost and Rybolt (1983), education was found to have a positive influence on recall. The recall levels were different among the various educational categories to which respondents fell. Respondents who had attended graduate school and those who had some college education recorded higher recall scores – 25% and 24% respectively – than those with low level of education – 13% for high school graduates and 8% for less than high school graduates.

Neumann (1976) conducted a study on 200 residents of San Francisco on an evening's news telecast. He interviewed members of the sample unexpectedly by phone soon after the broadcast, requesting the participants to indicate the news they had just viewed. Using the unaided questioning techniques, Neuman found that respondents with college education overall recorded higher scores than those without college education, even though the difference in scores was almost negligible; a 5% difference. A study in Israel by Katz, Adoni and Parness (1977) comparing levels of recall from radio news and television newscast, revealed that apart from being generally superior in recall of the broadcast message, the most educated group also demonstrated that they were also those who showed the most improvement in recall scores among those who saw the pictures on the screen.

4.2.1.2. Recaps and Repetition

Most studies conducted on the effects of additional verbal information and pictures have reported that recall of television and radio broadcasts are enhanced by additional verbal information in the form of repetition and recaps, and additional illustrations (Bernard and Coldevin, 1985; Findahl and Hoijer, 1975; Perloff, Wartella and Becker, 1982; Reese, 1984; Son, Reese and Davie, 1987). A few of studies however found such recaps counter productive or less effective in enhancing recall and understanding of broadcast news (Wulfemeyer and McFadden, 1985).

Perhaps it might be necessary to first distinguish the various types of recaps used in broadcast news. Repetition of information in the mass media, especially radio and television, is often categorised either as *massed* or *distributed*. Distributed repetition is often interspersed within the body of a broadcast, and massed recaps or summary material is often presented either at the end or at the beginning of a broadcast (Gunter, 1987). Repetition or recaps, whether of the distributed practice or of the massed format, have been found to enhance memory recall and comprehension of broadcast news (Bernard and Coldevin, 1985; Findahl and Hoijer, 1975). In their study, Findahl and Hoijer (1975) set out with the proposition that giving additional background to a story, and expanding a story through recaps or repetition would enhance recall and comprehension. They found that the repetition in the form of additional verbal information that stressed the areas that were difficult to understand in a broadcast enhanced the listeners' cognitive organisation of the story content. Stauffer, Frost and Rybolt (1980) reported after their study in Kenya that those stories that were repeated in the broadcast that was used for the study were recalled more by the participants than those that were not repeated. Bernard and Coldevin (1985) investigated the effect of short headline type recaps on recall of items in a broadcast, and found that the recaps were useful in enhancing only the gist of the stories, but not necessarily the comprehension of the messages.

Using a three-and-half minute, five-story radio newscast, Wulfemeyer and McFadden (1985) assigned 282 students to two groups –143 for the control group and 139 for the experimental group. The study reported that, the college students who listened to the three-and-half minute simulated radio newscast that had no actualities scored significantly higher on a multiple test for recall. The same group also rated newscast more interesting than did the group that listened to a newscast that had

actualities. Wulfemeyer and McFadden (1985) observed that their findings contradicted the results of other works on the effects of recaps, repetition and actualities in broadcast. “The brevity of the newscast in this study, the placement of the actualities within the newscast, the difficulty of the actuality based questions and the homogeneity of the sample could explain the contradictory finding” (Wulfemeyer and McFadden, 1985:192)

Son, Reese and Davie’s (1987) study on *The Effects of Visual-Verbal Redundancy and Recaps of Television News Learning*, found that redundancy in words and pictures significantly improved recall of television news, but did not have a significant effect on story learning. The redundant visuals that were employed throughout on the individual stories resulted in a correspondingly general increase in recall of the news items. Perloff, Wartella and Becker (1982) reported similar findings when they conducted their study in Ohio, United States, using 55 students. The students were broken into five groups and assigned different treatments as follows: recap-longer pause between stories; recap-ordinary pause; no recap-longer pause between stories; no recap-ordinary pause between stories; and, control group, which did not view the newscast. The researchers reported that while the recap produced a significant main effect, the pause manipulation was less successful.

4.2.1.3. Message Relevance, Interest and Motivation

It is expected that in a radio programme, farmers’ attention will be tuned more to the messages they can immediately use. They are therefore likely to store this information better than those that they do not consider to be immediately relevant to them. The effect of attention on news recall and information uptake has been investigated by researchers (Stauffer, Rybolt and Frost, 1983). Chaffee and Schleuder (1986) are of the view that attention, or increased mental focus, is an important variable in the processing of mass media messages. Kellermann (1985) observed that many factors affect encoding of a message, and two of these have implications for recall and comprehension of broadcast news: attention to the news, and parsing. Attention, according to Kellermann, is a state of focused consciousness which is a product of either external stimuli working on the sensory organs or internal goals or knowledge of the individual that directs input to the sensory register (Kellermann, 1985). From the perspective of the external stimuli, attention is determined by novel

or salient events, issues or objects. The importance of a message to a recipient will determine the level of interest in the message, and this in turn spells its relevance (Kellermann, 1985). Messages that are considered relevant to the immediate needs of a farmer, therefore, are expected to be recalled and understood better than those that are less relevant. Attentional focus generated by a person's internal need therefore results in the activation of information in the long term memory (LTM) and its placement in the working memory (WM). The information could be retrieved from these memories when required. Kellermann (1985) and Brewer and Crano (1994) noted the strength of motivation in cognitive processing of messages.

Zillmann and Bryant (1994) argue that when people witness, read or hear of an event via the mass media, ideas having a similar meaning are activated in them for a short time afterwards, and that these thoughts in turn can activate other semantically related ideas and actions. This is what Bryant and Zillmann referred to as *priming effect*. The theory maintains that presentation of a certain stimulus that has a particular meaning, primes other semantically related concepts, and this heightens the likelihood that thoughts with much the same meaning as the presentation stimulus will come to mind. Most of the research on priming effects that were cited by Bryant and Zillmann (1994) were done with television. However, the writers stated that although they could not be certain of any investigations of the possible consequences of radio-reported violence, it should be expected that it is possible for the radio to be able to activate associated thoughts and actions.

Interest in a news broadcast can be aroused by method of presentation, and this level of interest however may not necessarily bring about enhanced levels of recall and comprehension. Significantly, the person needs to have knowledge in the issues contained in the news (Berry, 1999). Perhaps, Berry (1999), by this claim, is re-emphasising what other researchers (Tichenor, Donohue, and Olien, 1970) have reported on the potency of already stored knowledge through education in influencing amount of recall of broadcast news, and generally the amount of learning an individual will attain from broadcast news.

If interest and motivation have a relationship with the level of relevance audience ascribe to a news broadcast, or even to an individual item in the broadcast, then perhaps it is reasonable to assume that, in relation to this thesis research, messages

that are relevant to farmers' needs will promote interest in listening and learning from these messages.

Gunter's (1987) view is that the evidence of positive mediating effects of interest or motivational levels on information uptake from television news is not conclusive (Gunter, 1987). However, Genova and Greenberg (1979) as cited by Gunter (1987) in a study, traced the diffusion of two news events over a ten day period, after which they found that respondents who showed interest in a news story knew more about the item than those who showed less interest.

4.2.1.4. *Distraction and Delayed Recall*

Researchers have found that most people are engaged in one or more other activities when they listen to radio or are viewing television. Attention to the news is affected by such other activities that audience are engaged in as they view or listen to broadcast news (Burkum, 1997). Divided attention, according to Burkum (1997), restricts the ability to absorb and remember information.

Anderson (2002) explained the effect of distraction in terms of the divided auditory effect it offers in a listening situation. He noted that the effect of distraction could be better appreciated if this is investigated using the *dichotic listening task* approach. Anderson (2002) reported a dialectic listening experiment in which participants were made to wear a set of earphones that sent two messages at the same time, each entering from one ear phone. The participants were asked to shadow one of the two messages; which meant that they were to report back the message from only one of the earphones. Most of the participants were unable to combine the two messages, so in the end, they put off one ear phone (Anderson, 2002).

Anderson's (2002) conclusion is that very little of a message is understood and recalled in a situation of verbal distraction. Anderson also found strong effect of parallelism on message recall and comprehension. While most of us perform separate acts at the same time when those acts involve different motor systems such as walking and chewing gum, there is difficulty of getting one motor system to do two things at the same time. The import of Anderson's (2002) research is that, distraction may cause some negative effect on radio listening, and hence recall and comprehension, if it involves the presence of other verbal noise; but will have very little or no effect if it involves other forms of distraction, other than verbal.

In relation to delayed recall, Kellermann (1985) reported that time-delay can affect amount of message contents that a person can recall. Our memory of news and events can change as a result of the effect of other information that is supplied after the event. In Kellermann's (1985) view, this is because, accessing a schema during the retrieval stage is a product of a reconstruction of events, and this process could be affected by errors. Thus, events that occurred and are stored in memory after the to-be-recalled items could pose a threat, by way of interference, with recall of the event (Kellermann, 1985). Gunter (1987) reported that even information that has been learnt and stored in the long term memory (LTM) of a person can be lost as a result of interference from other new information held in short term memory (STM). This means that time-delay in recall can affect the amount of the contents of broadcast news that is recalled.

4.2.1.5. Item Position and item Duration

There are copious findings on the relationship between memory of a news item and the position of the item on a broadcast (Berry, 1999; Stauffer, Frost and Rybolt, 1980). In general, item order has been found to have little effect on recall, but the items in *favourable positions* such as the first, second and last, have been found in most studies to attract higher recall by audience (Berry, 1999). In studies on recall and comprehension of broadcast news, the first, second and last positions are considered "*favourable positions*". Booth (1970) argued that the reason news items in the *favourable positions* – the first and last positions – are recalled most is explained in terms of the learning theory, which holds that the material presented first or last is learned more because there are fewer competing items that could interfere with learning. Booth (1970) concluded that based on the learning theory, it is reasonable to predict that recall will be higher for items in the first and last positions than for those in the middle of a news bulletin in the media.

Based on this assumption, most researchers who sought to test the effect of serial position on message recall and comprehension have investigated the performance of participants in relation to their recall scores for the items in the *favourable positions*. Results reported by Stauffer, Frost and Rybolt (1980) in their Kenya study suggests mixed findings on the effect of item order (item position), item duration and relevance of message. The most frequently recalled story among the 13-

item broadcast news that they used for their experiment was the first storey. This finding could however not provide conclusive evidence of the significance of item position in message recall because the item was also the longest in the broadcast, lasting one minute and forty-five seconds.

The effect of item order on recall was made even less clear when Stauffer and his colleagues found that an item that was broadcast seventh in the news and lasted for only 40 seconds, was recalled by a relatively high figure of 38% of the total sample. The three researchers pointed to the local importance or proximity of the item as the reason for the relatively high level of recall it received, in spite of its unfavourable position and its relatively short duration in the broadcast. In his study on *“Comprehension and recall of Internet news: a quantitative study of web page design”* Berry, (1999), measured the effect of item order by asking each participant to indicate the stories read first and last on the web page. Similar to the findings made by Stauffer, and his colleagues in their Kenyan experiment, Berry (1999) found that apart from the importance of position, proximity or relative importance of a news item to the audience does affect its recall. He reported that the national news story in the item was the first story read by majority of the participants for both those who read the plain web site and those who read the web site with multi media, even though it was not the first item on the web page.

Item duration has been investigated as a variable that has a possible influence on recall and comprehension of media messages. Booth (1970) argued that the amount of time that people devote to a news item should have an influence on the level of recall of that news news. When greater time is devoted to a news item, Booth (1970) argued, there is more opportunity for additional details and also for information that will give further information to that which will serve to reinforce the initial cues in the information. This helps to both explain the item better and to put the explanation in perspective.

In relation to broadcasts to rural farmers, it is expected that the items with longer duration will be better remembered than those with shorter duration

4.3. Review of Literature on Radio in Agricultural Communication

4.3.1. Use of Radio for Agricultural Communication

Rural radio in many developing countries is an important tool for use in many aspects of development, including promoting the process of participatory democracy and rural and community development (Chapman et al., 2003; Menon, 1986). Agricultural communication and extension, however, take more air time of these rural radio stations. This is understandable and acceptable because radio stations in rural areas in Africa have a predominantly agricultural clientele, and the radio stations are always aware that information on agriculture is most needed by the rural populations where the local radio stations operate (Chapman et al., 2003).

Communication and development experts believe that radio is the most appropriate medium for rural poverty reduction and rural emancipation programmes (Okwu, Kaku and Aba, 2007). Research findings on the use of radio in agricultural communication in developing countries are widespread (Monu, 1983; Partel and Ekpere, 1978). Most of these reports suggest varying degrees of knowledge gain and behaviour change among peasant farmers when they are exposed to agricultural extension messages. In these research findings, the basic tenets of the diffusion theory are evoked, even though most of these studies did not claim to be testing the diffusion theory.

The strength of rural radio as an extension tool lies in its relative advantage of being able to reach illiterate rural farmers in even the remotest areas. It also provides them with information on all aspects of agriculture in the languages they understand (Chapman, et al., 2003). Rural and community radio are effective in blending the people's cultures and traditional communication channels with development messages (Panford et al, 2001; Ansu-Kyeremeh, 1992, 1997). One of the early approaches to the use of rural radio for agricultural extension in Ghana was the experiment of the *Wonsuom* Rural Communication Project at Swedru in the Central Region (Boafo, 1984; Bonnah-Koomson, 1994). Boafo (1984) reported that the *Wonsuom* Rural Communication Project was important not only for the valuable development messages it provided, but also it offered the people a platform for the exchange of ideas. The project combined the use of radio and a community newspaper to promote a two-way communication with the people of the Swedru District of the Central Region. Most people in the district live in rural communities. The capital town of the

Region. Most people in the district live in rural communities. The capital town of the district, which is Swedru, is the only urban settlement in the district. More than half of the rural adult population in the district are farmers.

The project's clientele were therefore largely farmers. Programmes for radio broadcasts were guided by the needs of the farmers. Regular follow-up visits of the programme staff to the communities for programme production, and regular follow-ups to the communities after the programmes, enabled a continuous and fruitful dialogue with the farmers (Bonnah-Koomson, 1994).

After a collaborative research project between six African countries and the Overseas Development Institute (ODI), UK, which was funded by the Department for International Development (DFID), a wrap-up workshop on soil and water conservation (SWC) techniques was organised by the University for Development Studies (UDS), Tamale, one of the partner institutions. The need to disseminate the research results arose (Chapman et al, 2003). In response to this, Chapman et al (2003) carried out a study on the use of radio for vernacular programmes on soil and water conservation in northern Ghana.

The study used a radio programme, written in English and translated into six local languages. The programme was designed to combine music and drama with information from the presenter on soil and water conservation topics discussed by a panel. Farmers' levels of knowledge were measured before and after the radio broadcasts. The general finding of the study was that an understanding of the soil and water conservation practices seemed to have improved after farmers listened to the messages (Chapman et al., 2003).

Another example of the use of radio for agricultural and rural extension was reported by Myers (1998). He conducted a study in Mali on a radio campaign on forestation. Mali is faced with the problems of deforestation and desertification. The country is located in a semi-arid region. Because of high illiteracy levels, the country relies very much on radio to reach out to the rural communities (Myers, 1998). Myers reported that in October 1994, a radio programme on national regeneration of trees and vegetation was designed by the collective efforts of radio programme producers, the forestry and extension agents and Near East Foundation (NEF), an NGO.

Participatory workshops were organised for all the actors in the project, and the rapid rural appraisal (RRP) technique was used to gather data on the information

needs of farmers, and to draw up the project evaluation strategies and methodology. Fourteen radio programmes were produced in total. The programmes were broadcast and repeated over a period, amounting to 20 hours of airtime in total (Myers, 1998). The campaign was tied to coincide with the farming season, which is the time naturally occurring trees must be protected. Myers (1998) reported that at the end of the project, the major findings were that, there was not only a gain in knowledge, but also there was a reasonable impact by way of the adoption of the messages. This translated into physical terms. The people were planting trees and protecting those that grew naturally. The success of the project in terms of the adoption rates of the messages could be due to the strategy of repeat broadcasts (Myers, 1998). Social psychologists suggest that repetition as a communication strategy enhances understanding and memory recall. Simple repetition of a statement makes it appear truer. This enhances its adoption and recall (Hogg and Vaughan, 2005).

In Ghana, Radio Savannah Tamale is located within the region that has the greatest land space in the country - Northern Region. It is also the region that produces the bulk of the country's cereal requirements. Agricultural programmes are therefore next to non-formal adult literacy programmes in terms of allocation of air-time. The radio station's agricultural programmes are broadcast in English, Gonja and Dagbani. The two local languages are understood and spoken by an overwhelming majority of the people (Chapman, et al., 2003).

During the crop planting season, most of Radio Savannah's programme messages are on control of weeds, application of fertilizers and compost manure, and harvesting and post-harvest handling and management (Chapman et al., 2003). Radio Savannah collaborates with extension agents and the large number of NGOs in the area to produce radio agricultural programmes. The extension agents serve mostly as resource persons, and the NGOs buy airtime to carry out radio campaigns, mostly but not limited to agricultural issues. Some of the staff of the NGOs serves as resource persons for the radio station's agricultural programmes.

Also in the Northern Region, Simli Radio, a community radio project funded and run by the Ghana Danish Community Programme broadcasts a wide range of programmes with emphasis on agriculture and rural development (Chapman, et al., 2003; Kafewo, 2007; Zakariah, 2004). The radio station's range covers 60 kilometres, and its broadcasts cover three districts in Northern Ghana – Savelugu-Nanton, Tolon-

Kumbungu and Tamale Municipal (Chapman, et al., 2003). Simli's radio programme production uses the *narrowcasting* strategy of rural broadcasting. The listening communities are concentrated within a limited geographical area (Zakariah, 2004). The audience are homogenous or near homogenous in terms of characteristics such as language, culture, occupation, literacy rates and other socio-economic variables. The messages are on agriculture and adult literacy (Chapman et al., 2003). Simli Radio adopts a participatory approach to its programme production. The radio programme producers visit the rural people in their communities, where they record discussion messages through discussions with the people and interviews with the local populations. The recorded messages form part of the programmes that the radio station broadcasts to its target communities (Kafewo, 2007). Thus the farmers hear their own voices or the voices of their neighbours or community members on phone. They also listen to the broadcast of the problems, concerns, and development needs as presented to the radio station by them. This makes the radio station very popular with the target rural communities. Audience participation in radio enhances the adoption of the radio messages and also makes the radio station popular. As noted by Kafewo (2007), Simli Radio "demonstrates how community radio deconstructs one's conception of radio – from the station's philosophy through to its studio environment and its specialist cast of people who run the equipment and do the programming" (Kafewo, 2007: 63).

4.3.2. Factors Relating to Radio Listenership and Application of Radio Messages

4.3.2.1. Radio Ownership and Listenership

Radio is the most important mass communication medium in Africa. As a result of this, there is high radio ownership and listenership among even illiterate rural populations. Two studies in Nigeria by Okwu, Kuku, and Aba (2007) and Breiger (1990) revealed a high radio listenership and radio ownership. Okwu, Kuku and Aba, (2007), after a study on the diffusion of innovations from a local radio station, Radio Benue, reported that 69% of the farmers owned radio sets. They found also that 66% of the farmers listened to the radio agricultural broadcasts from Radio Benue. In a study on mass media and health communication in rural Nigeria, Brieger (1990) found that radio ownership was high among the two communities he used for the study.

Three-quarters (75%) of the sample of his study listened to radio at least once in a week. Radio ownership has been found to be equally high in Ghana. Chapman et al. (2003) reported that 59% of the farmers in northern Ghana who were selected for a study on the use of vernacular radio for information delivery on soil and water conservation, owned radio sets. Chapman et al. (2003) also found that radio listenership was very high. Perhaps this was because even the farmers who reported that they did not possess radio sets indicated that they had access to radio sets.

4.3.2.2. Attitudes and Perceptions of Source Credibility

Psychological processes and capacities influence our ability to function as members of a society, as they determine our ability to interpret, understand, and make judgements (Fraser and Burchell, 2001). Attitudes and perceptions have been studied copiously in relation to message learning and adoption. The importance of farmers' attitudes in message understanding and technology adoption among peasants and rural farmers in many parts of the world has been reported. Communication is a voluntary activity, and the propensity to get engaged in it will depend to a large extent on the perceived benefits to be derived from it. According to Bohner (2001), our attitudes provide a guide to our behaviour, and as such people's attitudes influence their perceptions and thinking. Our attitudes therefore are expressed by evaluating a particular entity; the product of this evaluation is a degree of favour or disfavour (Eysenck, 2004). A positive belief about an object therefore has a high likelihood of leading to a positive feeling or disposition towards the object (Bohner, 2001). Positive attitudes towards radio therefore are expected to evoke high listenership to, and high participation in, the radio station's programmes.

Perceptions, like attitudes, have influence on audience members' level of acceptance of the selection of the source of communication and recall of the messages from a communication source (Meflert, et al., 2006). Credibility, which is the degree of perceived trustworthiness and competence that audiences ascribe to a communication source, is an important element in the spread of innovations. Credibility could be measured through indices such as level of knowledge or technical competence of the source of the messages (Rogers, 1969; 1976). Based on the literature on the influence of psychological factors on message uptake, therefore, it

seems logical to suggest that perceptions of credibility of radio would have a positive relationship with farmers' level of listenership to agricultural broadcasts.

4.3.2.3. Media Exposure and Socio-economic and Demographic Characteristics

In general it is expected that people with high levels of education are expected to learn more from mass media than those with low levels of education (Tichenor, Donohue and Olien, 1970). This means they will be exposed to the mass media and learn news at a faster rate than the less educated (Price and Zaller, 1993). In relation to local radio, it is expected that farmers in local communities who rate high on education will listen to radio and learn more from the radio news than those who rate low on education.

A person's media exposure is measured by his level of reliance on mass media for information. People who rate high on media exposure often depend upon multiple sources of media for information. They seek information aggressively, and are also able to learn from the media than those who rate low on media exposure. People who rate high on media exposure tend to be the early adopters of information in a social system (Lerner, 1958), and are normally the early adopters of innovations (Rogers, 1969; 1983). Tichenor, Donohue and Olien (1970) have argued that people who rate high on media exposure also tend to learn more from the media. The proposition of the knowledge gap hypothesis is that the rich in knowledge benefits from a greater growth in knowledge than the less knowledgeable. Those who have knowledge tend to rely more on the mass media for even more knowledge than those who rate low in education and knowledge (Tichenor, Donohue and Olien, 1970).

It is expected that in rural communities in Ghana, the young and educated village folks who listen to radio, read newspapers and watch television, and are in the habit of travelling outside their immediate environment, will rate high on radio listenership, and also on application of agricultural messages from radio.

4.4. Conclusion

This chapter offered a review of literature on memory recall and comprehension of broadcast news and the use of local radio for agricultural broadcasts. While the literature on memory recall and comprehension of broadcasts news drew largely on

literature from the developed world, the discussion on the use of local radio for agricultural communication drew largely on the literature from the developing world, particularly in Asia and Africa. Literature on memory recall of broadcast news in Africa is very scanty. The work of Stauffer, Rybolt and Frosts (1980) in Kenya, remains the most comprehensive study on recall and comprehension of broadcast news in Africa.

The main issues that emerged from the above discussions are that: programming and audience variables do exert some influence on the amount of learning from broadcast news: and recaps of main messages in a broadcast, and repeat broadcasts of radio programmes do have positive effects on memory recall and comprehension of broadcast news. Equally important is the attention factor. Attention to the news is a product of the level of motivation a person has for listening to a broadcast. The relevance of a message can also determine the level of motivation.

Age, education, and media exposure were found to be some of the audience factors that influence recall and comprehension of broadcast news.

These findings suggest the need for this study to investigate the effect of programming variables and audience factors on unaided recall and comprehension of broadcast news. The research questions that this study will seek answers to, therefore, are as follows:

- What are the levels of farmers' unaided recall and comprehension of broadcast news?
- Which audience factors influence unaided recall and message comprehension?
- How is unaided recall related to message comprehension?
- Which programming variables enhance farmers' unaided recall and comprehension?

The literature reviewed on the use of radio for agricultural broadcast news revealed that radio is an important source of message delivery to farmers in Africa. There is high radio ownership, and radio listenership among rural people. Also it was found that attitudes and perceptions of source credibility, and socio-economic and demographic factors do have an influence on farmer's listenership to radio. This study will seek answers to the following research questions:

- What are the socio-economic and demographic characteristics of the farmers?
- What is the radio listening behaviour of the rural farmers in terms of:
 - i. Level of radio listenership?
 - ii. Radio listening periods?
 - iii. Radio programme format preferences?
 - iv. Reasons for listening to radio?
- How effective is local radio in agricultural communication in terms of farmers' level of listenership to the agricultural broadcasts?
- Which are the main sources of agricultural messages to the farmers?
- What is the relationship between attitudes and perceptions of source credibility and farmers levels of radio listenership?

Answers to these questions will be provided in chapters six, seven, eight and nine of this study. In the next chapter, a discussion of the methodology of the study is presented.

CHAPTER FIVE

RESEARCH METHODOLOGY

5.1. Introduction

The last two chapters presented discussions on the theoretical basis of the study. In chapter three, the cognitive response theory was treated as a basis for providing the theoretical setting of the study, which is primarily focused on the information effectiveness of radio broadcasts in the context of agricultural news production. Also, a discussion of the diffusion theory provided a basis for understanding the message adoption processes and behaviour of rural broadcast audiences. In chapter four, a presentation of the empirical studies on memory recall and comprehension of broadcast news, and the use of rural radio for agricultural communication, was done.

This chapter presents the methodology of the study. It starts by stating and discussing the hypotheses of the study. The chapter outlines the research design. The methods of data collection are presented, together with a justification of using the methods for this study. The data gathering process is discussed, and the problems encountered during the field studies are explained. Finally, the chapter discusses the approaches to the analyses of the data

5.2. Research Hypotheses

Ten research hypotheses were formulated and tested. The hypotheses were drawn logically from the discussions that were contained in chapters three and four of this study. Five hypotheses each were formulated for the survey research and the field experiments. The ten hypotheses are discussed as follows:

5.2.1. Survey Data

For the survey data, five hypotheses that were tested are as follows:

H1. Better educated farmers will demonstrate higher levels of media exposure than less educated farmers.

H2. Better educated farmers will report higher rates of adoption/application of radio agricultural messages to their farms than less educated farmers.

H3: Farmers who rate high on media exposure are more likely to apply the messages from the radio messages to their farms than those who rate low on media exposure.

The literature on message adoption is decisive that there is a relationship between level of education, media exposure and adoption of innovations within a social system (Rogers, 1969) and level of adoption of modern ideas (Lerner, 1958). Research has shown that better educated farmers are better able to deal with information, have greater access to external information sources than less educated farmers. Hence better educated farmers are the early adopters of innovations (Rogers, 1969). Price and Zaller (1993) argued that education is an important influence in the acquisition of further information and learning. The expectation therefore is that those with large storage of information learn even more. Citing Markus and Levy (1985), Price and Zaller (1993) attributed this to the suggestion by the psychological theory, which explains that, people who possess large stores of information also tend to need well-developed schemata so as to be able to effectively process messages. These schemata are useful in learning new knowledge. Also, people who have high levels of education rate high on information seeking, and are more cosmopolite (Lerner, 1958; Rogers, 1969). They are active information seekers, and they rely on a variety of mass media and interpersonal sources for their information needs.

H4: Better educated farmers are more likely to report higher comprehension of local radio agricultural messages than those with lower levels of education.

According to Gunter (1987), it has been widely argued that the best educated members of the society keep most informed about contemporary news issues and gain most from the exposure to the news media. It has been further found that it is the exposure to the print media rather than the electronic media – radio and television – that is mostly associated with being highly knowledgeable about world affairs. Robinson (1972), as cited by Gunter (1987) stated that research in the early 1970s have revealed that information has become so common in every part of the world that even the less educated people are becoming relatively well-informed. Thus, socio-economic and educational differences alone no longer seem sufficient to predict information gain from the mass media.

However, Price and Zaller (1993) argued that there is an influence of education on knowledge acquisition from the mass media. According to them, that better-educated people are more likely to learn from the news than the less educated.

H5. Perceived source credibility of the radio messages would be positively related to farmers' level of radio listenership.

Message understanding, information acquisition and technology adoption among peasants and rural farmers in many parts of the world have been found to be influenced by their attitudes towards their sources of communication (Rogers, 1969, 1976). Attitudes guide behaviour modification and behaviour change, and as such people's attitudes do have marked influence on their perceptions and thinking. Eventually, this is demonstrated in their degree of favour or disfavour for an object, an event, or a message (Bohner, 2001). A positive belief about an object therefore will lead to a positive feeling or positive disposition towards the object (Bohner, 2001). Positive attitudes towards radio therefore are expected to evoke high listenership to, and high participation in, the radio station's programmes. Perceptions, like attitudes, do exert influence on audience members' level of participation in communication and message adoption. People's attitudes towards an object determine how they will think about the object, and indeed how they will see it (Bohner, 2001). Credibility, which is the degree to which message receivers evaluate the trustworthiness and competence of a communication source, is an important element in the spread of innovations (Rogers, 1969).

People are more receptive to the messages of communication sources that they perceive as most credible. Where credibility assigned to a source is high, this can result to more contact by the clients and, more or regular contact with an extension agent, who is found to be credible, will lead to even higher credibility (Rogers, 1969).

Drawing from Roger's (1969), view, therefore, and in relation to my study, it is expected that perceptions of credibility of local radio and its programmes will have an influence on level of radio listenership. It is further expected that the attitudes of the farmers towards the local radio station, and the relevance of the radio messages, could also influence the level of perceived credibility of the radio station by the farmers.

5.2.2. Experiments

For the data from the experiments, the following hypotheses were formulated and tested:

H6: Farmers are more likely to recall messages that are repeated than those that are broadcast only once.

H7: Farmers are more likely to understand messages that are repeated than those that are broadcast only once

One of the strategies adopted by Myers (1998) in a radio campaign aimed at discouraging deforestation and encouraging afforestation in Mali was to have repeat broadcasts of the radio programmes. In the end, Myers reported that there was not only a gain in knowledge, but also there was a reasonable impact by way of the adoption of the messages. This translated positively into physical action and activity; the people were planting trees and protecting those that grew naturally. The success of the project in terms of the adoption rates of the messages could be due to the strategy of repeat broadcasts. Hogg and Vaughan (2005) suggest that repetition as a communication strategy enhances understanding and memory recall. Simple repetition of a statement makes it appear more truthful, and this makes its recall, comprehension and adoption very likely (Hogg and Vaughan, 2005)

H8: Farmers who listen to a radio broadcast with recaps at the end will record higher recall scores than those who listen to the same broadcast without recaps.

Recaps have been found to enhance recall and comprehension of broadcast news (Bernard and Coldevin, 1985; Findahl and Hoijer, 1975). In a study on recap strategies on television news recall, Bernard and Coldevin (1985) reported that recaps of the headlines of a news bulletin increased recall of the gist of the stories, but was less successful in increasing recall of the details of the stories. Findahl and Hoijer (1975) varied a number of additional verbal information in the form of recaps to a radio programme and found that the additional information made it easier for participants to recall the contents of the news stories. Son, Reese and Davie (1987), after a study on effects of visual verbal redundancy and recaps on television news found that recap of stories enhanced an understanding of the newscast. They concluded that recapping is an effective technique for increasing viewers' understanding of television news, but not necessarily general recall. They noted that even though their finding was contrary

to the findings made by Perloff et al. (1982), it confirmed the results reported by Bernard and Coldevin (1985), which indicated that recaps were effective in enhancing general knowledge of gist of a story and not comprehension or detailed knowledge of the item (Son, Reese and Davie, 1987).

H9: Messages that are of immediate relevance to farmers will be better recalled than those that do not have immediate relevance to farmers' information need.

H10: Broadcast messages would be better understood by farmers who have immediate use of the messages than those who do not have immediate use of them.

It is expected that in a radio programme, farmers' attention will be tuned more to the messages they can immediately use. They are therefore likely to store and understand the information better than those that they do not consider to be immediately relevant to them. Following from this argument, it can be said that farmers pay attention to a radio broadcast whose messages they like; it means they are motivated to listen to the messages. Studies on motivational differences in relation to message recall have produced varying results (Gunter, 1987). In relation to television viewing, Neuman (1976) found substantial difference in mean recall from television bulletins by motivational level than by educational level among respondents interviewed by telephone shortly after the evening's newscast.

In Neuman's study, individuals who admitted that they watched the news primarily for relaxation had significantly lower rates of recall than those who claimed they wanted to keep informed. These two groups of respondents – those who said they watched for entertainments and those who said they watched for information – constituted only a third of the sample. Another study by Gantz (1979) on motivational factors and recall was cited by Gunter (1987). In the study, Gantz took a sample of 500 respondents and interviewed them about their reasons for watching television and on their memory for the content of a major newscast. Gantz divided the sample into four types of news viewers on the basis of their expressed attitudes towards the news as follows: information seekers; recreation-diversion seekers; information and recreation seekers, and; casual viewers. The study found that recall of news items from the test bulletins correlated significantly with both information-seeking and

recreation-diversion-seeking motives, however, the information seekers tended to remember slightly more news items than recreation-diversion seekers. It was further found that individuals who viewed television news for information and entertainment rated lowest on recall among the four groups of respondents. According to Gunter (1987), overall, though, the evidence for positive mediating effects of interest or motivational levels on informational uptake from television news is not conclusive.

In relation to radio, and in relation to this thesis research, it is expected that there will be a priming effect between the messages that the farmers listen to, and the messages that they immediately require for their farming activities. The farmers, it is expected, will draw cognitive relationships between the messages they listen to on the radio and those that they immediately and practically need to apply to their farms. This priming effect of the messages will stimulate retention and promote better recall of the messages. In relation to hypothesis six (H6), therefore, it is expected that messages that are broadcast at the time the farmers need them most, are those that will remain most in the memory of the farmers, if even this will be for the period between the time they were broadcast and the time they were utilised or applied in practical terms, on their farms.

One of the factors that determine whether the central or peripheral route is taken in message processing is *motivation* (Brewer and Crano, 1994). If a person is motivated to think highly of a message, possibly as a result of the relevance of the message to that person, there is a much greater chance of message elaboration than if the motivation to listen to the message is low or does not exist at all. A message with high personal relevance or a message that is ego-involving is likely to be recalled and understood better than a message that has little or no personal relevance (Brewer and Crano, 1994).

5.3. Study Design

The research aims to glean insights into the current radio listening habits of rural audiences, preferred radio message contents, preferred radio programme formats, and the effects of psychological factors on perceived message comprehension and recall. The actual levels of farmers' recall and comprehension of agricultural broadcasts, the audience factors that influence the level of recall and comprehension of radio broadcasts and the effect of radio programming variables and formats were

investigated and ascertained. To be able to meet the study's aims and objectives, test the research hypotheses and to adequately and accurately answer the research questions of the study, two methods were used to gather and analyse the data - survey questionnaires and field experiments.

5.3.1. Survey Research

Survey is an empirical study that employs the use of questionnaires or interviews to investigate and describe an occurrence, an issue or a phenomenon (Burns, 2000; Reinard, 1994) or to both describe and explain situations and phenomenon (Gunter, 2000; Wimmer and Dominic, 2006; Singletary Jnr., Bruce and Straight, 1999). According to Shoemaker and Mccombs (1991:154), in survey research, "the information collected – the data - is generally numerical and suitable for statistical analysis".

Gunter distinguished between the descriptive and analytical functions of survey research. Descriptive surveys, Gunter indicated, "are useful for documenting a particular state of affairs regarding public opinion or behaviour or population characteristics at one point in time" (Gunter, 2000: 24). The descriptive aspect of research, Burns (2000) noted, allows large quantities of data to be summarised. This is useful in making the data easy to understand and interpret. Analytical surveys, on the other hand, help in explaining variables, and drawing possible relationships between them (Burns, 2000).

This thesis research employed the techniques and methods of both the analytical and descriptive techniques of survey research.

Survey research, Singletary (1994) stated, has been found to be easy to employ, and it rates high on reliability. Survey research has stoutly remained a useful methodological tool for researchers and scholars in audience research and in studies relating to diffusion of innovations among farmers (Emenyeonu, 1987) and technology transfer to farmers in developing countries (Chizari, Karbasioun, and Lindner, 1998).

Singletary Jnr., Bruce and Straights (1999) described the typical features of survey research as follows:

1. *"A large number of respondents are chosen through probability sampling procedures to represent the position of interest.*
2. *Systematic questionnaires or interview procedures are used to ask prescribed questions of respondents and to record their answers.*
3. *Answers are numerically coded and analysed with the aid of statistical software"* (Singletary Jnr., Bruce and Straights, 1999:239)

Similarly, Gunter (2000) noted the importance of sampling procedure and questionnaire design in survey research. He observed that the growth of survey research has contributed to the development in methodological practice. Some of the major developments in this regard relates principally to techniques of sampling and design of questionnaires (Gunter, 2002).

5.3.1.1. Advantages of Survey Research

The popularity of survey research in media effect studies is possibly explained by the relative advantages of this methodological approach. The advantages of the survey method have been forcefully presented by researchers and experts (Berger, 2002; Priest, 1996). Survey has been effective for social description, and they provide detailed information. Survey also provides accurate and reliable data. Also, it is very useful, convenient and suitable for collecting large amounts of data (Singletary Jnr., Bruce and Straights, 1999).

Other researchers have emphasised the flexibility of the survey method as one of its important merits. The flexibility of the survey research, it is argued, provides easy use (Singletary Jnr., Bruce and Straights, 1999). Their flexibility also makes them very appropriate for use in collecting large amounts of data from large sample sizes. This, therefore, makes them cost-effective (Berger, 2002; Schroder et al., 2003).

Survey research is also rated very highly on reliability. Also it is acclaimed for easy applicability to many research situations. These two merits make survey research contribute significantly to the scientific and cross-cultural studies (Schroder et al., 2003). The popularity of survey method has been put forth by some experts as one of its merits. Most people, everywhere, are familiar with answering survey questions, and this makes its use easy and straightforward (Priest, 1996).

5.3.1.2. Limitations of Survey Research

In spite of its advantages and strengths as a methodological tool, survey research has been criticised by some writers, who cited a variety of its shortcomings. According to Schroder et al. (2003), one of the weaknesses of the survey research is that it is incapable of determining cause-effect relationships. A major disadvantage in survey research relates to its use in explanatory research. Grabe and Westley (2003) expressed a similar view. They argued that survey research does not go beyond establishing relationship between variables. They are not very suited to determining cause-effect relationships. Experiments can offer directionality through the manipulation of the independent variable. However, in survey research this is done only through an interpretation of the relationships or associations between the variables (Grabe and Westley, 2003). Surveys are less strong in eliminating possible influences on the dependent variable by other extraneous factors. However, experimental methodologies are able to effectively deal with this situation by employing controls that will ensure that extraneous variables are not allowed to influence the direction of the dependent variable (Schroder et al., 2003).

Another weakness of survey data is that respondents can sometimes be less honest in their responses; they can give responses that they consider acceptable to the interviewer or researcher. This flaw in survey research is even more likely to happen when the issues being investigated are considered sensitive by the respondent (Berger, 1998). Surveys rely solely on report on behaviour of a person or respondent, and not the necessarily on the researcher's own observation of that behaviour. Any act of providing untrue answers, half-truths and inaccurate responses can result in the collection of wrong or poor data. Also, inability to recall past events by respondents, and the misunderstanding of questions by the respondents, especially in self-administered questionnaires, can lead to the collection of inaccurate data (Berger, 2003). These weaknesses in survey research are tackled by experiments (Grabe and Westley, 2003).

5.3.1.3. Rationale for Using Survey for the Study

This thesis research used the survey research because of its strengths and suitability for the study. As noted by Reinhard (1994), survey offers the researcher the opportunity to have a broader outlook of an issue or phenomenon, while employing

the scientific means. Jensen (2002) noted that survey is very useful in diffusion studies. He stated that:

“the most common approach to diffusion studies has been survey methodologies which make it possible to measure credibility or accessibility of either media or information in different social groups and contexts” (Jensen, 2002:141)

In this thesis research, the data collected on farmers, using the survey design, enabled the researcher to describe the characteristics of the farmers, their radio listening habits, media exposure, attitudes and perceptions, as well as establishing relationships between farmer characteristics and communication behaviour. The survey was useful also in analysing the relationships between the main variables of the study, and thereby providing explanations. An aspect of this study draws heavily on the methodologies of diffusion research, therefore making the survey methodology very appropriate. Schroder et al. (2003) noted that the use of survey research in audience survey can offer data that is useful for description and analyses of variables.

There are copious studies in Africa (Emenyeonu, 1987; Osuntogun, Deyama and Anyawu, 1986), which employed the use of the survey method to conduct investigations that were either wholly or partially drawn on the diffusion of innovations model.

5.3.2. Field Experiments

In this study, field experiments were used to collect and analyse data on farmers' recall and comprehension of broadcast news. Experiments have been used in media research for more than half a century (Gunter, 2000) for media research; the effects of television, radio and print media (Gunter, 1987). In the last few decades, there has been copious research conducted using the experimental methodology (Katz, Adoni and Parness, 1977; Son, Reese and Davie, 1987; Gunter, Clifford, and Berry, 1983; Booth, 2001) to draw and analyse the relationship between recall and comprehension of broadcast news on one hand, and audience factors and programming variables on the other. This study has been influenced, theoretically and methodological by such studies.

Experiments involve modifying something in a particular way (Reinhard, 1994). The idea is to compare outcomes in situations, both with or without the modifications (Gunter, 1987). Experiments are designed mainly to establish cause-and-effect

relationships (Christensen, 1996; Coolican, 2004; Gunter, 2000). The controlled experiment, when carried out with care, is the most potent way of answering research questions on cause-effect (Grabe and Westley, 2003). According to Gunter, controlled experiments can be used to measure the specific effects of manipulable variables on dependent variables under investigation (Gunter, 2000). Coolican's (2004) view of the potency of experiments to prove cause-effect is similar to those expressed by Gunter (2000) and Grabe and Westley (2003). He asserted that very often an experiment can determine the direction of cause where an observation in the field has been incapable of offering clear direction of the cause (Coolican, 2004).

5.3.2.1. Advantages of Field Experiments

According to Grabe and Westley (2003), an experiment is the most potent research method for seeking answers to research questions. They added that "the controlled method is our best – and very nearly only – way of investigating causal processes" (Grabe and Westley, 2003:267). Arguing the case for field experiments in media studies, Wimmer and Dominick (2006) noted that one major merit of the use of experimentation in media is that it scores high on validity. Field experiments are normally conducted in study situations which have close resemblance to the natural settings and this helps in collecting accurate data on the behaviours of the people being studied (Wimmer and Dominick, 2006).

Another strength of the field experiment is that the researcher can, at any time, change the manipulable variables even on the field, or at least modify them, once he finds this prudent, situationally relevant and useful to the objectives of the research (Wimmer and Dominic, 2006).

5.3.2.2. Limitations of Field Experiments

In spite of their strengths as a technique for determining cause and effect relationship, experiments do have their limitations. One of the areas where the weaknesses of experiments are seen is where they fail to completely ensure bias-free selection of participants (Singleton, Bruce and Straits, 1999).

Another limitation of the experimental design is that in most experiments, the experimental conditions do not often represent natural conditions (Singleton, Bruce and Straits, 1999).

Also, handling experiments in the hands of an inexperienced researcher could become a research nightmare; the consequence could be a failure. Controlling experiments to ensure its internal and external validity is a huge problem, which even most experienced researchers, could face (Singleton, Bruce and Straits, 1999).

5.3.2.3. *Rationale for using Field Experiments for the Study*

The strength of the experimental design to prove cause–effect and its willingness to lend itself to manipulation and control (Christensen, 1996; Schroder et al., 2003) makes it an appropriate research technique for this thesis research. According to Gunter (2000), self-reported media data cannot be relied on to prove cause-effect relationship. It is experimental methodologies that can be relied upon to prove the cause-effect relationship (Gunter, 2000).

In this thesis research, therefore, the experiments conducted provided a more accurate assessment of farmers' levels of message comprehension and recall of agricultural broadcasts, than the self-reported responses gathered from the farmers through the survey data.

Besides ascertaining accurately the recall and comprehension levels, the experiments proved very useful in determining the relative potency of audience characteristics and programme variables that influence recall and comprehension of agricultural news. Survey research is incapable of providing such information. The results of the field experiments, hopefully, constituted insightful scientific data which drew conclusive evidence of the levels and factors influencing recall and comprehension of radio agricultural news by poor peasant farmers in Ghana.

5.4. Study Location and Target Group

The study area comprised three administrative regions – Northern, Upper East and Upper West Regions. These three administrative regions were purposively selected for the study. The reasons for selecting these regions for the study are as follows: (1) First, the major activity in the three regions is agriculture, in which more than 70% of the economically active adult population are engaged, compared to the national average of 56% (Al-Hassan, 2007); (2) Secondly, the three regions are the poorest in the country (Ghana Statistical Service, 1995, 2000; IMF, 2005), and the most deprived in terms of transport infrastructure; this has a detrimental effect on

extension service delivery to the farmers by frontline extension officers; (3) Finally the three public service local radio stations in the three regions have a predominantly illiterate and rural clientele; about 75% of the total population of the northern region, for example, live in rural communities (MoFA, 1997). Local radio therefore is the major source of news to the majority of the people in the area.

The participants of the study were adults between the ages of 21 and 70 years. The reason for using this age group of adults for the study was that they are the economically active people in the rural communities. In relation to agriculture, they are those who are actively engaged in crop and animal farming. Farmers who were over 70 years were not picked for the study because this category of farmers is often no longer engaged in active farming. At that age, most of them bequeath their farmlands to their male children and male grand children.

Small-scale rural farmers were the target group. This category of farmers has farm holdings of less than 10 acres (2.5 hectares). They rely on public service extension officers, local radio and interpersonal communication channels for messages on agriculture and rural development. Also, it is mostly the small scale farmers who rely most on radio for information and knowledge on agriculture, health, politics, rural and community development. Radio means a lot to them, and they rely more on radio than any other form of mass media for information.

5.5. Sampling and Sample Size

5.5.1. Survey

In this study, a multi-stage stratified sampling technique was used to gather the data for the survey. A combination of purposive and random sampling methods was employed. To arrive at the sample, three out of the ten administrative regions in Ghana were purposively selected, as already mentioned in the above sub-heading (5.4). Next, seven administrative districts were randomly selected from among the districts where there is clear and uninterrupted radio reception. From each of the seven districts, two communities were selected. Thus a total of 14 rural communities (Table 5.1) were selected for the study. In each of the 14 communities, 15 percent of the households were sampled. A total of 365 households were therefore sampled for the survey research. In each of the households the first adult who happened to be the

first the interviewers met, was interviewed, provided the person's age was above 20 years, and also provided the person owned a farm.

Table 5.1: Distribution of Respondents by Location: Survey Research

Region	District	Community	Households	Sample
Upper East	Bongo	Anafobisi	126	19
		Kuyellingo	108	16
	Kasena-Nankana	Wury	194	29
		Gia	243	36
Upper West	Wa East	Bulenga	288	43
		Mengwe	129	19
Northern	Tamale-Peri Urban	Datoyilli	294	44
		Fooshegu	121	18
	Savelugu-Nanton	Ziong	170	25
		Tarkpa	154	23
	Tolon-Kumbungu	Bognayili	135	20
		Nwogu	62	9
	Central Gonja	Sankpagla	195	29
		Fufulso	235	35
Total			2455	365

5.5.2. Experiments

For the experiments, a total of 252 farmers from eight rural communities were used as participants. The eight communities were picked from four administrative districts in northern Ghana – Tamale Peri-urban, Tolon-Kumbungu, Central Gonja and Savelugu-Nanton (see Table 5.2). The reasons for selecting the four districts for the study are as follows:

(i). First, geographically, all communities in those districts are within the coverage area of Radio Savannah Tamale, a public service local radio station; and Simli Radio, a community radio station. Farmers in these four districts therefore receive broadcast news from these two local/rural radio stations. There are several districts in the selected districts where some portions do not receive the signals of Radio Savannah Tamale, and Radio Simli, even though they receive the signals from the national networks – Radio One and Radio Two

(ii). Second, the inhabitants of the four districts speak Gonja and Dagbani – two of the main languages spoken in Ghana. The two languages are also the only local languages that are used for agricultural broadcasts by Radio Savannah, Tamale (RST), which is the local radio station with the largest coverage area in terms of both the land mass and the population its programmes serve.

(iii). Third, the researcher speaks the two languages (Gonja and Dagbani) with proficiency; therefore he was able to play a part in the design of the broadcasts that were used for the experiments, and also conducted the face-to face interviews with the farmers after they had listened to the broadcasts.

(iv). Finally, the researcher understands the socio-cultural settings of the four districts. Gaining access to the communities in the four districts did not pose any problems. Being familiar with the cultural setting, the researcher was able to employ the appropriate community entry techniques to conduct the field work and to gather the data. The people's cultural sensibilities were not offended, and the traditional protocols of the area were followed.

The eight communities were selected purposively because of: (1) their ease of access by road transport, (2) their character as agricultural communities, especially in terms of maize production, and (4) their population; all the villages were rural communities since each of them had a population of less than 5,000.

Table 5.2: Distribution of Participants by Location: Field Experiments

District	Community	Participants	Experiment
Savelugu-Nanton	Moglaa	32	Recaps at the beginning of a broadcasts
Tolon-Kumbungu	Mbanayili	32	Effect of delayed recall
	Lumo	36	Message relevance
Tamale-Peri-Urban	Sugashei	32	Effect of repeat broadcast (once)
	Dungu	30	Recaps at the end of the broadcast
Central Gonja	Kpatinyan	30	Straight talk as repeat broadcast
	Yipala	30	Effect of repeat broadcast (twice)
	Ntereso	30	Effect of distributed recaps
Total	8 communities	252	8 experiments

5.6. Data Gathering

5.6.1. Survey Research

5.6.1.1. Structure of the Survey Instrument

The survey instrument contained both close-ended and open-ended questions. The survey instrument was developed based on the objectives of the study, and the literature review. Essentially, the survey instrument was divided into six sections as follows:

Section 1: Farmers' socio-economic and demographic characteristics

Under this section, seven questions were used to measure the farmers' personal characteristics. The variables that were investigated were: age, income, education, sex, marital status, family size, income from agriculture, other sources of income, and income from the other economic activities. These variables provided useful information on the respondents, and a correlation between these variables and other independent variables were investigated as part of the study.

Section 2: Farmers' Communication Behaviour

In this section the relative importance of radio, television and newspapers as sources of information to the farmers was investigated. The questions contained in this section sought to investigate whether farmers listened to radio, watched television or read newspapers, and the number of days they relied on these sources of news within a week. The information gathered under this section helped in measuring farmers' sources of news, their radio ownership, access to radio and radio listening periods within a day.

Section 3: Radio Agricultural Programmes

Data gathered from this section was useful in measuring the farmers' level of reliance on radio for agricultural news. In particular, the farmers' frequency of listening to radio agricultural broadcasts, their radio programme format preferences, and their level of comprehension of the radio messages were investigated. Also the

questions in this section sought to investigate which farmers have been involved in radio agricultural production, and their level of involvement.

Section 4: Message Relevancy, Message Comprehension, Message Recall, and Broadcast Timing

The questions in this section sought to investigate the perceived levels of farmers' comprehension and recall of the broadcast news on agriculture. The section also sought to investigate farmers' level of adoption of the radio messages on their farms. The views of respondents on the relevance of the messages to their agricultural information needs were measured, and their views on the duration of the radio messages and suitability of the broadcast periods were investigated.

Section 5: Attitudes and Perceptions

Attitudes and perceptions of the credibility of radio were measured by using a five-item five-point Likert scale for each of them. The questions contained negative and positive statements. Crespo (2001) observed that attitudes surveys have been used for several decades in measuring such things as public moods and beliefs concerning a wide range of areas including political events and public information campaigns. In Kellermann's (1995) view, attitudes are assessed by means of questionnaires. The use of indirect questions and interrelated questions in a questionnaire is one effective way of measuring attitudes. Priest (1996) noted the importance of Likert scales in media research, and stated that though they often measure attitudes, they are useful also for measuring variables such as credibility, believability, preferences, needs and satisfaction. The items in the Likert scales that were used for this study were adopted from studies by Salleh (1989), El-gindi (1986), as cited by Salleh (1989), Salleh and Zakariah (1993); and Zakariah (1993), and modified to suit the scope and objectives of this study.

Section Six: How Local Radio Can Be Made More Beneficial to Farmers

This section contained one question – an open-ended question that sought to elicit farmers' views on how local radio can be made more beneficial to them. Multiple responses to this question were permitted.

5.6.1.2.. Administering the Survey Instrument

Training Research Assistants and Interviewers

The survey research instrument was administered through face-to-face interviews with the help of six trained interviewers and three research assistants. The interviewers and research assistants all had reasonably high levels of education: each of them held a Higher National Diploma Certificate, a Bachelors certificate, or a Masters Degree. They were also provided with the requisite training on how to administer the questionnaires. This was useful in minimising errors that could affect the quality of the data from the survey research (Singletary, 1994). The researcher personally trained the interviewers and provided supervision during the interviews. The training was done at three locations; in Tamale, at Bolgatanga, and at Wa. These are the capital towns of the administrative regions that constituted the study area. Each of the training sessions took two days. The first day of the training involved: explaining the purpose of the research to the interviewers; going through the questionnaires with them to ensure they understood the questions; and teaching them basic techniques of face-to-face interviews. The second day normally involved a practical administration of the questionnaires by the interviewers to a few farmers (two or three farmers) outside the selected communities for the study. The problems encountered and the lessons learnt by the enumerators and research assistants were then discussed.

Pre-testing the Survey Instrument

The survey instrument was pre-tested in May 2006, using 30 farmers outside the communities that were sampled for the study. In survey research it is always desirable to conduct a pre-test of the research instrument (Bryman, 2003). Pre-testing of an interview schedule is important to ascertain whether the questions are well framed and understandable to the respondents (Babbie, 1995; Bryman, 2003). Apart from reaping these two advantages of pre-testing, the average time that was needed to complete an interview using the survey instrument was known. Some corrections were made to the questionnaires after the pre-testing to enhance comprehension. The corrections had to do with the wording of a few of the questions. It was also noticed that a few questions were redundant, and these were dropped.

Data Gathering Period

Data for the survey was collected in the months of late May, June, July, and December, 2006. The period from late August, September, October and November 2006, were used for the field experiments. The farmers were interviewed individually at convenient places in their homes.

Method of Data Collection: Face to-face Interviews

The direct interview method was used, and this ensured that the respondents were persuaded to answer all the questions (Babbie, 1986), and it also provided a 100 per cent response rate (Gunter, 2000). Non-response, which can seriously undermine the representativeness or value of a research sample (Deacon, et al, 1999), was therefore avoided. Face-to-face interviews were used because of their inherent merits. Babbie (1995) stated that the interview method provides a guard against questions that will be confusing to the respondents. The interviewer can note the respondents' reactions to the questions; and through the interview method respondents are persuaded to answer all questions, and to do so as accurately as possible (Babbie, 1995; David and Sutton, 2004).

Singleton Jnr. and Straits (1999) also observed that because of the high response rate when using the face-face interviews, less bias is introduced into the data as a result of manipulation of sampled persons. Face-to-face interviewing additionally permits important and relevant observations that may be of interest to the researcher to be noticed and recorded (Singleton Jnr. and Straits, 1999).

Singletary (1994) stated that the face-to-face interview enables the interviewer to watch the respondent in such a way that it will assist him gauge comprehension, follow-up where it is necessary and beneficial to do so. He added that, besides these, the face-to-face method is useful in helping the interviewer to get the needed explanations through further probing.

The face-to-face interview is most beneficial when the research question is of the technical type. More time is needed to explain the questions and to probe, and this makes the face-to-face interviews more effective than other methods of gathering survey data (Singletary, 1994). Also the face-to-face interview is appropriate when the research topic is sensitive – one that is of highly personal nature or likely to evoke avoidance. For instance questions on personal intimacies may be avoided by

interviewees when the interview is done on telephone, but when conducted using the face-to-face interviews, the interviewee might more readily provide personal information to the interviewer (Singleton Jnr. and Straits, 1994).

This thesis research used the face-to-face interviews to administer the questionnaires largely because the respondents were predominantly illiterate. Even for those who could read and write, their literacy skills were less than adequate to enable them have a thorough understanding of the questions and to accurately express their responses in writing. It was therefore safer, useful and necessary to administer the instrument through the face-to face interviews. It allowed for a more accurate data to be gathered.

Another reason for using the face-to-face interviews to gather the data was that certain questions were probed further to elicit the accurate responses. The training given to the enumerators was useful in getting the farmers to respond to all the questions in as accurate and candid manner as possible.

Venue for Data Gathering

In each of the sampled households, the first adult the interviewers met was invited to respond to the interviews, provided he/she owned a farm, and was between the ages of 21 and 70 years. The interviews were conducted mostly in the homes. However, there were some instances where some of the respondents insisted that the interviews with them be conducted outside their compounds, mostly under shady trees. At the time the data collection started through the use of the survey instrument– May 2006 – temperatures were quite high in the study area. The shade under big trees in the compounds provided some comfort against the heat.

Time of the Day for Data Gathering

In conducting research, timing is important (Blackie, 2000). The researcher was mindful of the need to time the data gathering days and times to suit the farmers. The data gathering was done mostly in the morning (between 6 am and 10 am) and late afternoon periods (between 3 pm and 5 pm). These are normally the periods that most farmers in the study area could be met at their homes during the crop farming season. Between the late mornings and afternoons (10 am to 3 pm) most farmers in Ghana are

on their fields. The researcher, his research assistants and enumerators were conscious of these times when appointment with the farmers for the interviews were being made

Checking the Completed Questionnaires

Each day the researcher and the research assistant were on the field together with the interviewers to ensure that the right methods and procedures were being used to gather the data. Also, at the end of each day, the research assistants checked the completed questionnaires to ensure that all the questions were and portions of the questionnaire were completed. The main goal was to identify any slippages and to remedy them immediately. At home, the researcher himself further went through the completed questionnaires to check for questions that were left unanswered, and for any inaccuracies and discrepancies in the responses.

5.6.2. The Field Experiments

5.6.2.1. Designing the Radio Broadcasts

The field experiments conducted in the study involved the use of recorded radio agricultural broadcasts on three main aspects of agriculture: crop farming, livestock farming and control of crop pests. A total of eight radio agricultural programmes were designed for the study. Before the experiments were conducted, three pilot studies were done, using the recorded broadcasts and the instrument that contained the questions on the three aspects of agriculture, as mentioned above. The main reasons for conducting the pilot studies were to determine whether the questions were clear in meaning, and the information provided in the broadcasts were adequate to answer the questions on comprehension.

The radio broadcasts were designed with the help of three experienced radio staff of Radio Savannah Tamale, and five agricultural extension staff of the Ministry of Agriculture, in the Northern Region. Each of the experiments was conducted either in Gonja or in Dagbani. These two are the local languages that are used for radio broadcasts by Radio Savannah Tamale. The questions for measuring the unaided recall and comprehension of the broadcasts were also validated by a panel of four – two senior radio programme producers and two senior agricultural officers. The reason for the validation was to enhance the internal validity of the experiments. A

few suggestions were given by the panel. Through the validation it was found that the questions were too many. As a result, a few questions were dropped from each of the instruments used for the experiments.

The radio broadcasts were produced in the studio of Radio Savannah Tamale, and recorded onto audio cassettes. The recorded cassettes were carried along to the field and played to the farmers. To make the radio programmes look very much the same as the agricultural broadcasts that the farmers normally listened to live on air on Radio Savannah Tamale, two radio agricultural programme presenters were used as hosts in the broadcasts. The voices of these two staff were very familiar to rural farmers who were regular listeners to radio agricultural broadcasts. Also the agricultural extension officers who presented the messages in the recorded audio cassettes had a wealth of experience in handling radio agricultural discussion programmes on Radio Savannah Tamale, and the rural folks knew the names and voices of the agricultural experts. This, it was expected, also added credibility to the broadcasts. Familiarity between the source and the receiver of a message creates a homophilous relationship (Rogers, 1978). This promotes the credibility of the source and its message.

5.6.2.2. Structure of Research Instrument for Experiments

The research instrument for the field experiments was structured into four sections as follows:

Section 1: Demographic and Socio-economic Characteristics

This section measured the demographic and socio-economic characteristics of the participants. The variables measured in this section were the same as those investigated in the first section of the survey research.

Section 2: Media Exposure

This section contained two questions, and these sought to measure participants' media exposure.

Section 3: Attitudes and Perceptions of Source Credibility

The third section investigated the participants' attitudes and perceptions of source credibility, using the two five-item five-point Likert scales that were used also for the survey component of this study.

Section 4: Unaided Recall and Message Comprehension

The fourth section measured unaided recall and comprehension of the broadcasts that the farmers listened to as part of the experiments. Unaided recall was measured using only one question; the question requested the farmers to mention the main themes or items contained in the broadcast. For comprehension, a series of questions were asked. The number of questions that were used to measure comprehension varied according to the volume of messages contained in each broadcast. This was because the eight broadcasts used for the experiments were on three different aspects of agriculture: maize cultivation; control of the larger grain borer; and small ruminant production. Five of the experiments contained messages on maize production; two were on small ruminant production; and one was on the control of the larger grain borer.

5.6.2.3. Conducting the Experiments

The field experiments were conducted from August to November, 2006. In each of the eight communities, one experiment was conducted. To conduct an experiment, the researcher first had to visit the village to meet with the chief and opinion leaders. The first contact was normally the Assembly member or unit committee member. The purpose of the researcher's visit was explained to the Assembly member who, in turn, introduced the researcher to the village chief (or village elder, in the case of a village which had no chief). The purpose of the researcher's visit was then explained also to the village chief and his consent and approval was sought to enable the researcher conduct the experiments. As observed by Aryeetey (1998), in Ghana, getting the consent and approval from a chief or traditional ruler before any project is undertaken in rural communities assures the researcher the cooperation of the respondents. Similarly, Konings (1987) observed that the village chief in Ghana wields enormous respect and authority. He stated that "no peasant may approach the state apparatus without the chief's consent or even his presence" (Konings, 1987: 319). Any project

to be carried out in a rural community in Ghana without the knowledge and consent of the chief or village elder may not receive the required cooperation from the rural folks.

In each village, once I got the consent or approval of the chief or village elder, I worked with the Assembly member or unit committee member. In certain villages, the Assembly member or unit committee member in charge of the village resided in another village, but had jurisdiction over the village where the experiment was conducted. In such situations, the chairman of the town development committee or the village health volunteer became my immediate contact person.

On the agreed date and time, the researcher with the help of his three research assistants and the village contact person would organise the farmers for the experiments. In each village and for each experiment, the farmers were put into a control group and an experimental group through the principle of *randomization*. Their demographic and socio-economic characteristics were taken after they had been put into the two groups. Through the data that was collected on the respondents demographic characteristics, the researcher ensured that there was *matching* to ensure that the certain characteristics such as education, gender and income were equally reflected in the two groups.

After the farmers' demographic characteristics were taken they were then given a briefing on the exercise. They were informed that they would listen to a radio broadcast after which they would be required to have interviews with the researcher. The participants' demographic characteristics and their attitudes and perceptions towards radio were recorded first before the experiments were conducted the next day. The interviews meant to test unaided recall and comprehension were conducted soon after the farmers listened to the broadcasts.

The experiments with the two groups – the control group and the treatment group – were conducted at different times and at different locations, but within the same day and in the same community. Normally as one group listened to the broadcast on audio cassette, the other group was being organised and made to stay in a different location.

The face-to-face interviews were used to measure and record participants' unaided recall and comprehension scores. This was done with the aid of a structured questionnaire. The researcher and one of the field assistants conducted the interviews.

The farmers' responses were recorded verbatim, and where there were no responses, the spaces in the questionnaire were left blank.

The experiments were conducted in the Town Council Hall, the chief's court yard, the assembly member's house or in a classroom in the community's primary or junior secondary school.

5.6.2.4. The Eight Experiments Conducted

The eight experiments that were conducted are as follows:

1. Repeat Broadcast (Repeating a broadcast once)

This experiment sought to measure the effect of repeating a broadcast on farmers' unaided recall and comprehension of broadcast news. The experimental group listened to a broadcast twice, while the control group listened to the same broadcast only once.

2. Repeat Broadcast (Repeating a broadcast twice)

This experiment was conducted also to investigate the effect of repeating a broadcast. However, the broadcast was repeated twice; it was broadcast three times to the experimental group, and once to the control group. The purpose was to assess the effect that a broadcast that is repeated several times will have on memory recall and comprehension,

3. Effect of Straight Talk

This experiment investigated the *effect of straight talk* as summary material on farmers' comprehension and recall of agricultural broadcast news. Two broadcasts were used for this experiment; one which was a discussion of 15 minutes' duration, and which included an additional five minutes of straight talk, (delivered in the form of a direct talk by the programme host), and the other which contained only the 15 minutes' discussion.

4. Effect of Recaps at the End of a Broadcast

This experiment was conducted using two different broadcasts. One of the broadcasts contained messages broadcast within 30 minutes, and the other contained the same 30-minutes' broadcast, but with an additional three minutes of recaps of the main items contained in the broadcast.

5. Effect of Recaps (Preview) at the beginning of a Broadcast

This experiment measured the effect of placing summary material as preview (recaps) at the beginning of a broadcast. The participants in the experimental group listened to a 30-minute radio programme which was preceded by a three-minute summary of the main issues that are contained in the main broadcast, while the control group listened to only the 30 minutes broadcast without a preceding summary material.

6. Distributed Recaps

This experiment investigated the effects of distributed recaps. Two radio broadcasts were designed for this experiment; one contained recaps at the end of each item, while the other contained no such summary (recap) material. The broadcast with the distributed recaps had an additional three minutes, which contained the recaps.

7. Delayed Recall

This experiment investigated the effect of time-delay on memory recall and understanding of broadcast news. One radio programme was used for this experiment. The experimental group were tested for unaided recall and comprehension after a week, whilst the control group was made to respond to the test soon after listening to the broadcast.

8. Message Relevance

This experiment had no treatment group and control group. There were, however, two groups –Group A and Group B. Farmers in Group A had cultivated maize for the crop season, while those in Group B had not cultivated maize. The two groups of farmers were tested for recall and comprehension. The purpose of the experiment was to determine whether the farmers who had cultivated maize will score significantly higher unaided recall and comprehension than those who had not cultivated maize, since the messages contained in broadcast were on maize production.

5.6.2.4. The Dependent Variables for the Field Experiments

The dependent variables for the experiments were unaided recall and comprehension. Using unaided recall to measure how information is coded, stored and

retrieved has been criticised by researchers (Berry, 1983; Findhal and Hoijer, 1985; Woodall, Davis and Sahin, 1983), most of them pointing out that the use of unaided recall does not provide television viewers and radio audiences the necessary prompts to access information that may be stored in memory (Berry, 1999).

The use of telephone to measure recall of television news broadcast, for example, has been criticised on the grounds that there is often no guarantee that the participants in such experiments really listened to the broadcast (DeFleur, et al., 1992; Saljo and Cedersund, 1988), as cited by Berry (1999). In spite of the criticism of the use of free recall (unaided recall) for experiments in broadcast news, the researcher found it necessary to use unaided recall and message comprehension as the dependent variables for the study.

In this thesis research, while the unaided recall scores provided an indication of the general level of the items that were stored in memory, the comprehension tests measured the amount of knowledge and understanding gained from the broadcasts. Recall and comprehension as the dependent variables for this study provided a complete picture to the level of learning and benefits that farmers derive from radio broadcasts of agricultural news. It enabled also the relationship between memory recall and comprehension of broadcast news to be further investigated. Most studies on cognitive response to broadcast news have combined the use of unaided recall of the broadcast items and comprehension of the broadcast messages (Stauffer, Frost and Rybolt, 1980, 1983).

The unaided recall technique has been used by researchers in recall studies within the past three decades or more (Gunter, Clifford and Berry, 1999; Katz, Adoni and Parness, 1978; Stauffer, Frost and Rybolt, 1978 and 1980). Unaided recall in this study involved allowing participants, without giving them any cues, to mention the items that were discussed in the broadcasts. This required that the participants provided short but accurate statements of the main items that constituted each broadcast (Stauffer, Frost and Rybolt, 1980; Katz, Adoni and Parness, 1977, 1978, 1980).

In this study each correct item recalled unaided attracted one point. A response was adjudged to be correct if it was considered an accurately paraphrased statement of the main item or an exact re-statement of the item as mentioned or introduced by the programme host. No point was given when (1) a participant failed to provide any

response; (2) when a participant mentioned an item that was not discussed in the programme; and, (3) when a participant mentioned an issue that bore no resemblance, in terms of meaning, to any of the items discussed in the broadcast.

Questions that sought to measure comprehension covered a wide range of areas including: giving explanations as to how certain agricultural techniques work; explaining why some agricultural practices must be carried out at particular times; describing processes such as application of agro-chemicals like fertilizers and other farm inputs; identifying which agencies give support to farmers, and what kind of support they give; and providing accurate names of agricultural inputs. In general the comprehension tests components of the experiments sought to make farmers provide answers to “how?”, “where?”, “which?” and “what?” questions.

The actual score allocated to each response depended very much on the accuracy and completeness of the response (Gunter, Berry and Clifford, 1981). An accurate response attracted two points; a partially correct response attracted one point; and a wrong response or no response attracted no point.

5.6.2.5. Ensuring Internal Validity of the Experiments

True experiments aim at attaining internal validity. Singleton Jr., Bruce and Straits, (1999) observed that an experiment has internal validity when references can be made about its cause and effect, and suggesting with confidence that the independent variable, and not any extraneous factors or variables was what provided the differences in the dependent variable. Burney and White (1996) underscored the importance of internal validity in experiments when they observed that it is the most fundamental in experimental studies. This is because it relates to the logic of the relationship between the independent and dependent variables. They stated that:

“An experiment has internal validity if there are sound reasons to Believe that a cause-effect relationship really is present between the independent and the dependent variables (Burney and White, 1996:170)

Where there are contaminations that make it difficult for an experimenter to conclude that the experimental variables are what caused the observed effect in a study then the study suffers from internal invalidity (Reinhard, 1994). Common threats to internal validity that have been classified by experimenters/researchers

include: *history*, *maturation*, *testing*, *instrumentation*, *regression*, *mortality* (Reinhard, 1994; Singleton, Jnr., Bruce and Straits, 1999) the *interaction of selection* and *maturation* (Reinhard, 1994).

In conducting the experiments, care was taken to avoid the threats to internal validity of the experiment. *History* was controlled for by using radio programmes that were designed by the researcher with the help of radio programme producers and technical experts from the Ministry of Agriculture (MoFA). The researcher avoided using an agricultural radio programme that had already been broadcast. No participant or group in the experiments had any prior information of the contents of the broadcasts. What the researcher could not control for was whether some participants in time past had information or knowledge on some of the agricultural issues that were discussed in the broadcasts.

Maturation was controlled for by avoiding delays in recording participants' responses (Reinhard, 1994). Participants were made to respond to the questions that sought to measure their recall and comprehension soon after each broadcast. Participants in each group were all interviewed within an hour after listening to the broadcasts. Long waiting periods due to long delays in conducting interviews in experimental situations are a major source of the problem of *maturation*. There were no cases of participants opting out of the experiments, once they had listened to the radio broadcasts, so *mortality* did not pose any threat. Before an experiment was conducted, the demographic and socio-economic characteristics of the farmers were taken earlier. On the day of the experiment if any farmer opted out, that farmer's place was filled by a volunteer whose socio-economic and demographic characteristics were taken before the entire group listened to the broadcasts.

Instrumentation and *selection* were controlled for by using the same set of questionnaires, and also the same set of unaided recall and test instruments for all participants. The threat to internal validity by *statistical regression* was controlled for by ensuring that after participants were randomly assigned to groups, further steps were taken to ensure that there was *matching*. The data on the farmers' demographic and socio-economic characteristics were useful in ensuring that in each experiment, the participants in the control group and experimental group had almost an equal number of persons on some variables on which they share equal levels (Reinhard, 1994). According to Reinhard (1994), people in an experiment can be matched

because they share the same characteristics such age, sex, job classification and intelligence. For my study, efforts were made to have the participants in the control and experimental groups equal in terms of age, sex and educational levels. Job classification was not important to the study because the main occupation of all the farmers was agriculture. No one group was made to have more participants that were likely to be more knowledgeable or have any form of advantage in terms of recall and comprehension of news than the other.

5.7. Problems Encountered in the Field

Problems Relating to the Experiments

It took an average of ten days to conduct a single experiment. In a few cases, where the researcher and his field assistants were lucky to have the cooperation and full commitment of the village contact person, it took about a week to conduct an experiment. Conducting one experiment required a minimum of three visits to a village. In some cases, up to four or five visits were made to a community before the community members were organised for the experiments. This was a product of village bureaucracy; a combined effect of traditional protocol and quasi-official bureaucratic bottlenecks. The chief wields traditional power and no “outsider” can work in his community without his consent and authorisation (Konings, 1987; Aryeetey, 1998).

The assembly member wields pseudo-political power and carries a democratic mandate in the community; no public or private “intruder” can carry out any development, political, or social activity, and even an academic study, in his community without his blessing and support. Meeting the assembly member without getting the nod from the chief meant that there was no traditional entry to the community, and getting the chief’s clearance to work in the community without getting the support of the assembly person meant that the researcher was going to face problems of getting the support and cooperation of the community members, especially the youth. To get a community completely organised for a study required painstaking commitment, which was reflected in the several visits and meetings the researcher had with the village authorities and community members. The result was

that so much time was consumed before one experiment was conducted. In financial terms, so much money was spent on transport.

Another problem the researcher faced was that he worked with people who had neither been participants in an experiment, nor involved in conducting an experiment. It took a lot of time and effort to get the community members organised for the experiments. In some cases the number of community members who volunteered to take part in the experiments was more than the actual number the researcher needed for the research. Dropping some of the volunteers created some dissatisfaction, especially from the assembly member. There were also instances, albeit few, where some community members wanted to belong to the same group (either the control group or the experimental group) as their neighbours and friends. For example, there was a case of two friends with the same level of education who wanted to belong to one group. The researcher insisted that there was the need to assign them to different groups to ensure that *matching* was done. One of them did not appear happy. He was replaced by another volunteer with a similar level of education, but it took some delay.

Problems Relating to the Survey

Even though the questionnaires for both the survey and experiments were pre-tested, and some modifications made to them to ensure clarity and ease of understanding, there were few cases where some respondents (who were interviewed using the survey questionnaires) complained that the interviews took a very long time. The field assistants had to persuade those few respondents to answer all the questions.

Another problem that the researcher faced with the survey research was that in some of the communities, there were either no up-to-date statistics on the number of household or the available figures were inaccurate. As noted by Twumasi (2001), poor numbering of houses and the difficulty of defining a household or a house in a typical Ghanaian village poses a problem to survey researchers. To resolve this problem, in communities where there were inaccurate numbering of houses the researcher and his field assistants were assisted by the assembly members, unit committee members, and village volunteers to physically count the number of houses.

Conducting the experiments was very demanding, both in terms of money and time. The data gathering was done in phases in each of the three regions. The researcher was personally in each of the regions when the data were gathered. He

offered close supervision in the field. Transportation was therefore a major cost throughout the duration of the data gathering. The research assistants and interviewers were paid for the job done. That was another major cost item during the data gathering.

5.8. Analyses of Data

The data were analysed by computer using the Statistical Package for Social Sciences (SPSS), Version 14 sub-programme. The data analyses involved the following:

Survey Data

1. Measures of central tendency – frequency distribution, mean, and standard deviation were used to present data in tabular form.
2. The Pearson product-moment correlation was used to determine the direction and strength of relationship between the dependent and independent variables of the survey data. This statistical technique is suited for continuous variables (Pallant, 2005). The relationship between radio listenership and independent variables such as attitudes towards radio, perceptions of the credibility of radio, income of respondents was measured using the Pearson product moment correlation. Also the relationship between education and media exposure; message adoption and respondents attitudes towards radio; and also, between adoption of radio messages and perceptions of credibility of radio were all investigated using the Pearson product moment correlation.
3. Spearman rank correlation was also used to measure the relationship between variables which were in the form of rank data. This technique is suited for data that are in ordinal measures (Black, 1999).
4. Chi-square was run to test for differences between nominal data and some variables of the study. Specifically, the difference between male and female respondents on scores on media exposure, radio ownership, reported levels of

message comprehension and recall, and message relevance were investigated using the chi-square.

Experiments

1. In the experiments, as was the case with the survey data, frequency distribution tables were used to present the data. Specifically, participant's unaided recall and comprehension test scores were presented in tabular form, using mean and standard deviation.

2. T-test was used to determine the significant difference in scores between the control groups and experimental groups in relation to the dependent variables of the field experiments – unaided recall and message comprehension of agricultural broadcast news. Essentially the t-test was used to test the hypotheses of the study. The t-test is a popular method for comparing group mean scores (Wimmer and Dominick, 2000).

3. Pearson-product moment correlation statistical technique was useful for my study as it helped in determining the relationship between the independent and dependent variables (Singletary (2002). Specifically, it was useful in determining and establishing the strength and direction of relationship between audience factors and levels of unaided recall and comprehension. It was used also in establishing the relationship between broadcast duration of the news items and participants' unaided recall and comprehension of the broadcasts.

4. Chi-square was run to determine the relationship between gender and message comprehension, and between gender and unaided recall. This technique is useful for measuring variations in a cross tabulation (Singletary, 2002).

5. Stepwise multiple regression analysis was ran to determine the predictive capacity of the independent variables of the study to the dependent variable. Specifically, the effects of age, gender, income, education, media exposure, attitudes towards radio, and perceptions of the credibility of radio programmes were assessed in

relation to their predictive capacity of the dependent variables of the experiments – unaided recall and message comprehension.

6. ANOVA was used to investigate the influence of item position on unaided recall and comprehension of the broadcasts. According to Wimmer and Dominick (2000), ANOVA's main merit is its usefulness in simultaneously investigating several independent variables or factors (Miller and Brewer, 2003). ANOVA is the most suitable tool when an experiment involves several comparisons (Singletary, 2002).

Significance Level

For all the analyses conducted in the study, the significance level was pegged at the 0.05 level. This is because this level is neither too conservative nor too risky. As noted by Singletary (2002: 198), "it is a general standard by which most researchers subscribe."

5.9. Conclusion

This chapter provided a description of the research design. It started with a discussion of the hypotheses of the study. Theoretical discussions of the survey method and the experimental methodology were provided, and an explanation of how the two methods were used on the field was done.

As a tool to glean insights into media reception and media habits, the survey has been a useful methodology. The experimental methodology provided accurate measures of unaided recall and comprehension of broadcast news. The two methods therefore offered useful complementary data.

A major problem faced in the field was the many and tedious journeys that were made to the rural communities by car and on motorbikes. The roads to most of the communities were poor and this made some of the trips tedious. Sometimes the researcher and his field assistants had to use motorbikes to wage through the roads or paths, to get to the communities.

On a number of occasions, the researcher and his research assistants and field staff had to face disappointments as the contact persons failed to organise the villagers for the survey interviews or the experiments.

In the end, though, relevant data was gathered, and the whole data gathering experience was a useful and priceless one.

The next chapter offers a discussion and analyses of the survey data that were gathered through face-to-face interviews with 365 farmers.

CHAPTER SIX

FINDINGS AND DISCUSSION OF SURVEY DATA

6.1. Introduction

This chapter presents the findings of the survey conducted on 365 farmers within the study area. The chapter offers discussions of farmers' demographic and socio-economic characteristics, farmers' sources of information and media exposure, radio listening behaviours, and listenership to radio agricultural programmes. Farmers' self-reported levels of message adoption, message comprehension and unaided recall are discussed. The chapter presents a discussion on the respondents' attitudes and perceptions of the credibility of local radio and its messages. In addition, the chapter discusses the findings in relation to the following hypotheses:

H1. Better educated farmers will demonstrate higher levels of media exposure than less educated farmers.

H2. Better educated farmers will report higher rates of adoption/application of radio agricultural messages to their farms than less educated farmers.

H3: Farmers who rate high on media exposure are more likely to apply the messages from the radio messages to their farms than those who rate low on media exposure.

H4: Better educated farmers are more likely to report higher comprehension of local radio agricultural messages than those with lower levels of education.

H5. Perceived source credibility of the radio messages would be positively related to farmers' level of radio listenership.

6.2. Respondents' Demographic and Socio-economic Characteristics

6.2.1. Age and gender

An overwhelming majority of the respondents (86.6%) were males, and the rest (13.4%) were females (Table 6.1). The explanation for this highly skewed sample in favour of males is that it was adults whose main occupation was farming, and who took their own decisions in relation to farmland utilisation and crop cultivation, that constituted the participants of the study. In the area where this study was conducted, more males than females have access to land. The society is male-dominated in terms

of traditional allocation of resources, and this has a direct reflection on ownership and use of cultivable lands. According to Robertson (1984), women make immense contribution to food production in Ghana. In spite of this contribution, however, women's development and the prospects of improving their standards of living are low as a result of gender inequalities (Awumbillah, 2006). In the Upper East Region of Ghana, men exercise an important degree of control over resources (Yazdani, 2000).

In general, women have less access to land in Ghana and in most parts of Africa. Adeyokunnu (1984) reported that in Nigeria women in the rural communities where farming is a predominant activity performs almost all the farming operations themselves, including even the tedious and energy-sapping farm work such as land preparation and weeding. Yet, in general, however, women's social and economic status is lower than that of men.

The mean age of the respondents was 39.9 years and standard deviation was 11.5; the youngest respondent was 21 years and the oldest, 70 years. More than half of the farmers (58.6%) were 40 years old or below, and only 3% were more than 60 years old. The age group of 31 to 40 years constituted 31.2% of the sample. The relatively small number of the elderly people (60 to 70 years) in the sample (3%) is a reflection of the proportion of the elderly persons (7.9%) in the country's 2000 population census (Ghana Statistical Service, 2002). Most of the farmers (82.7%) fell within the ages of 21 and 50, which is the economically active group.

The huge numbers of young farmers in my sample could be attributed to the rapid rise in the country's population, and possibly the lack of any large manufacturing industries and economic ventures in the northern part of the country where the sample was drawn.¹

The result has implication for agricultural development in Ghana. According to Okwu, Kuku and Aba (2007), age factor is significant in agricultural information accessibility and utilization, since younger farmers are considered to be generally more responsive to new ideas and practices than older farmers. Older farmers, Okwu

¹ The area is the poorest part of the country. The dominant economic activity in the area is small scale farming, mostly food crop cultivation, and livestock farming. There is a general lack of job opportunities. The few manufacturing activities in the area are carried out mostly by small scale agro-processing industries which are sparsely dotted in that huge geographical area.

and his colleagues noted, are generally conservative and not very responsive to new ideas, agricultural innovations and practices.

Table 6.1: Age and Gender Distribution of Respondents

Age	Gender		Total
	Male	Female	
21-30	90 (24.7)	10 (2.7)	100 (27.4)
31-40	100(27.1)	14 (3.8)	114 (31.2)
41-50	73 (20.0)	15 (4.1)	88 (24.1)
51-60	43 (11.8)	8 (2.2)	51(14.0)
61-70	11 (3.0)	1 (.3)	12 (3.3)
Total	317 (86.6)	48 (13.4)	365 (100)

() Figures in brackets are percentages.

N=365

Mean age = 39.9 years

SD=11.5

6.2.2. Marital status and family size

Data in Table 6.2 shows that 90.7% of the farmers were married, 7.4% were single, and the rest were either divorced, widows or widowers (1.9%).² Family size

² In a society such as rural northern Ghana, where marriage is a kind of “initiation” into adulthood, it is not surprising that an overwhelming majority of the respondents were married. Those who are divorced often re-marry, except the very elderly. Much respect is accorded to the institution of marriage.

was measured by number of dependents per respondent. The mean family size was 7.7, which is greater than the national average of 6. The standard deviation was 4.6. Fifteen respondents (4.1%) had no dependents. The highest number of dependents per respondent was 21. About a quarter (24.2%) of the respondents had ten or less dependents. Polygamy is a common practice among the rural people in Ghana, and this is one of the factors that account for large family sizes in rural communities. According to Kaplan et al. (1971: 117), in Ghana, “in many traditional groups polygamy is a stated ideal”. They noted that even though polygamy in urban areas in Ghana was on the decline in the late 1960’s as a result of economic pressures and the dictates of modern life “efforts designed to reduce polygamy has been only marginally effective in traditional groups” (Kaplan et al., 1971: 117). In northern Ghana, where a greater majority of the people live in rural communities, polygamy is still widely practiced, and this accounts for the high household populations. Large family sizes are considered an economic advantage in rural communities where the predominant activity is subsistence farming.

Table 6 2: Distribution of Respondents by Marital Status and Family Size

Marital Status	Frequency	Percent
Single	27	7.4
Married	331	90.7
Widow/widower	5	1.4
Divorced	2	0.5
Total	365	100.0
Family Size	Frequency	Percent
0	15	4.1
1 – 4	81	22.1
5 – 8	133	36.4
9 - 12	77	21.1
13 -16	45	12.3
17 -20	12	3.3
21 -24	2	0.5
Total	365	100.0

N=365

Mean family size = 7.7

SD = 4.6

6.2.3. Education and Income

About three-quarters (77.8%) of the farmers had no formal education and they could not also avail themselves of the Ministry of Education's non-formal education project and the adult literacy programmes run by non-governmental organisations (Table 6.3). These farmers are illiterate; completely unable to read and write. Farmers who had some form of non-formal education were 7.9%, and only 14.2% of the sample had formal education at various levels from primary school to senior secondary school. Data at the national level reveal that 59.9% of the population in

rural areas are illiterate (Government of Ghana, 2005). The high illiteracy rate of 77.8% found in this study (as against the national average of 59.9% for rural areas) underscores the stark reality of the disparities in educational levels between the north and south of Ghana.

Table 6.3: Distribution of Respondents by Level of Education

Level of education	Gender		Total
	Male	Female	
No form of education	246 (67.4)	38 (10.4)	284 (77.8)
Non-formal education	24 (6.6)	5 (1.4)	29 (7.9)
Primary School	19 (5.2)	3 (0.8)	22 (6.0)
Middle School	6 (1.6)	1 (0.3)	7 (1.9)
Junior Secondary School	11 (3.0)	1 (0.3)	12 (3.3)
Technical/Vocational School	6 (1.6)	0	6 (1.6)
Senior Secondary School	5 (1.4)	0	5 (1.4)
Total	317 (86.6%)	48 (13.4%)	365(100%)

() figures in brackets are percentages

N=365

Table 6.4 shows that the mean annual income earned by respondents through agriculture - crop production and livestock rearing - was 3,277,000 Gh. Cedis (about US\$340 in 2006). The standard deviation of the income distribution was 1,842,000 Gh. Cedis (about \$193). This figure is higher than what was reported by Chapman et al. (2003). In a study conducted in northern Ghana, Chapman et al. (2003) found that the average monthly income was 160, 000 Gh. Cedis (\$23 in 2003), which is equivalent to an annual income of about \$300. There has been an attainment of relative micro-economic stability and modest growth in Ghana's economy since the launch of the country's Growth and Poverty Reduction Strategy in 2003 (Government of Ghana, 2005). This has had a positive reflection in the arrest of the free-fall in value of the Ghanaian cedi in the last three years (Budget Statement, Government of Ghana, 2006).

These factors possibly account for the increase in the mean annual income of poor rural farmers.

This study found that the lowest annual income of the farmers was 600, 000 Gh. Cedis (about \$67 in 2006). One respondent had an unusually high annual income of 18, 000,000 Gh. Cedis (about \$2,000 in 2006). This figure is therefore a marked exception of the generally low annual incomes that the farmers reported. More than half of the respondents (55%) earned annual incomes of less than 3, 000,000 Gh. Cedis (about \$330 in 2006). Only 10% earned more than 5,000, 000 Gh. Cedis per annum (about \$400 in 2006). In general, the women are poorer. A chi-square value of $\chi^2=15.238$, $df=1$, $p<.004$ suggests a significant relationship between gender and income.

This finding is consistent with results of previous studies and available data on the income levels of rural women in Africa (Kandiyoti, 1984). In Africa, average incomes of women are generally lower than those of men. For example, in Nigeria, average incomes for rural women are about a third of those of men (Kandiyoti, 1984), and in Ghana even though the women contribute more than half of the farm labour, they are poorer than the men (Awumbillah, 2006).

Adeyekunnu (1984) noted that Boserup's (1970) assertion that Africa is a region for female farming *par excellence* lends support to the importance of the involvement of the African woman in Agriculture. Rural women in southern Africa often work 16 to 18 hours a day, inside the home and outside in the agricultural fields, contributing to production (Adeyekunnu, 1984). Yet, the women remain even poorer than the men. One of the reasons that accounts for this is that the women have less access to the factors and means of production; farm lands, farm inputs, farm machinery, farm labour and micro credit (Adeyekunnu, 1984). The poverty of rural women in agriculture in northern Ghana is drawn from similar reasons. The women contribute most to the efforts at obviating food insecurity and increasing rural farm families' household budgets. Undoubtedly, addressing the issues of access to land by women, and giving them support in terms of farm inputs and credit, will have positive influence on the country's agricultural growth and development.

Table 6.4: Distribution of Respondents by Gender and Annual Income

Income (‘000 Ghana Cedi)	Gender		Total
	Male	Female	
1000 – 3000	163 (44.7)	39 (10.7)	202 (55.3)
3001 – 6000	123 (33.7)	8 (2.2)	131 (35.9)
6001 – 9000	28 (7.7)	1 (0.3)	29 (7.9)
9001 - 12000	2 (0.6)	0	2 (0.6)
Above 12,000	1 (0.3)	0	1 (0.3)
Total	317 (86.6)	48 (13.4)	365 (100)

() figures in brackets are percentages

N=365

Mean income = 3,277,000 Gh. Cedis (\$340)

SD = 1,841,000 Gh. Cedis (\$193)

**Table 6.5: Distribution of Respondents by Gender and Other Sources of Income
(Apart from agriculture)**

Other Source of Income	Gender		Total
	Male	Female	
No other Source of income	255(69.9)	7 (1.9)	262 (71.8)
Petty trading	17(4.7)	18 (4.9)	35 (9.6)
Food processing	0 (0)	24 (6.6)	24 (6.6)
Weaving	7 (1.9)	0	7 (1.9)
Wood carving	5 (1.4)	0	6 (1.4)
Block laying	8 (2.2)	0	8 (2.2)
Butcher	6 (1.6)	0	6 (1.6)
Teacher	5 (1.4)	0	5 (1.4)
Others	12 (3.8)	1 (0.3)	13(3.6)
Total	317(86. 8)	49 (13.2)	365(100)

() figures in brackets are percentages
N=365

In addition to income earned through agricultural activities, more than a quarter of the respondents (28.2%) earned income from other economic activities (Table 6.5). An important finding made by the study is that whilst an overwhelming percentage of the women (87.8%) (N=48), were engaged in other productive economic activities (apart from agriculture) to earn additional income to support the family budget, only about 20% (N=317) of the men sought additional income from other productive economic ventures.

The most common activity is petty trading, in which 9.6% of the respondents were involved, more than half of them being women. Another activity in which respondents were engaged as a way of making additional money to support household budgets was value-added agro-processing. The study found that 8% of the total sample was involved in this activity, and all of them were females.

Data from the “*Implementation of the Ghana Poverty Reduction Strategy (GPRS): Citizens’ Assessment 2005*” document seems to support this finding. According to the GPRS document, trading is next to agriculture in terms of the

number of people who are gainfully employed in Ghana. Whereas the national average of people engaged in trading is 16.5%, in the northern savannah area of the country (northern Ghana) where agriculture employs the most number of the economically active population, only 8.4% are involved in trading (Government of Ghana, 2006). The figure representing the percentage of traders in the sample (9.6%) is quite close to the figure presented by government (8.4%) as the economically active population in northern Ghana who are involved in petty trading. Also, Adeyekunnu (1984) cited a study by Adeyekunnu (1980), which reported that a survey of 600 women conducted in Nigeria in 1978-79, indicated that trading was the most important activity of the women outside the home, followed by agriculture. Yoruba women in south-western Nigeria are predominantly traders, selling mostly agro-processed items, manufactured items and local dishes to supplement household domestic budget (Adeyekunnu, 1984).

Alli (1979) stated that in Egypt, women make significant contributions to agriculture, particularly in producing poultry, keeping small ruminants and marketing a variety of agricultural commodities such as dairy products, eggs, vegetables and grains (Adeyekunnu, 1984). In Sudan, a report by ECA (1975) noted that women's role in the traditional sector is considerable, as they are involved in agriculture, handicraft, livestock production, and trade, over and above their other duties of looking after the home, cooking and taking care of the children (Adeyekunnu, 1984). Women in northern Ghana, where the sample for this study was taken, are valuable contributors to food production. They are heavily involved in petty trading, and completely dominate the rural agro-processing sector.

6.3. Sources of Information and Media Exposure

6.3.1. Radio Ownership and Listenership

This study found that radio is the most pervasive media source for farmers in the study area. An overwhelming majority of the farmers (87.4%) owned radio sets, and all the farmers in the sample (365) indicated that they listened to radio (see Table 6.6). Similar studies on rural farmers in Ghana have indicated equally high radio ownership and radio listenership (Chapman et al., 2003). Chapman et al. (2003), after a study conducted on 120 respondents, reported that 58% of the farmers owned radio sets, and

all of the farmers had access to radio sets any time they wanted to listen to news. In Ghana, portable dry cell battery-operated radio sets are carried everywhere by farmers, even to the farms, to listen to news and community and rural development broadcasts (Panford et al., 2002). In Nigeria, radio ownership is an important factor that determines the physical availability of the medium and exposure of audience to radio agricultural programmes (Okwu, Kuku, and Aba, 2007). Okwu, Kuku and Aba (2007), after a study on 100 farmers, found that 69% of the sample owned radio sets. Also, a study conducted in the Eastern Region of Nigeria by Emenyeonu (1987) revealed that 82.1% of the respondents owned radio sets.

In this study, those who did not own radio sets (12.6%) reported that they relied on the sets of their husbands, wives, friends and neighbours. More than half of those who did not own radio sets were women, and they relied mostly on their husbands' sets for news and general information.

A chi-square analysis showed a significant relationship between gender and radio ownership ($\chi^2=36.5$, $df=1$, $p<0.001$). A significantly higher number of men than women owned radio sets. This finding may be attributed to two factors. First women in northern Ghana generally have lower incomes as compared to men. Even though the women work so hard on the farms and most of them are engaged in income-generating activities to support the family, they still remain poorer than the men. To afford the cost of buying a radio set may be a financial burden, besides the additional problem of buying dry cells regularly to power the set. Presumably, therefore, the reason why women generally do not own radio sets is because of their general poverty situation as compared to men.

Table 6.6: Distribution of Respondents by Radio Ownership and Selected Demographic and Socio-economic Variables

Gender	Radio Ownership		Total
	Yes	No	
Male	290 (79.5)	27 (7.4)	317 (86.9)
Female	29 (7.9)	19 (5.2)	48 (13.1)
Total	319 (87.4)	46 (12.6)	365 (100)
Income			
Less than 3,000	164 (44.9)	38 (10.4)	202(55.3)
3001-6000	123 (33.7)	8 (2.2)	131(35.9)
6001-9000	28 (7.9)	0	29 (7.9)
9001-12000	2 (0.5)	0	2(0.2)
Above 12000	1 (0.3)	0	1(0.3)
Total	319 (87.4)	46(12.6)	365 (100)
Education			
No education	246 (67.4)	38 (10.4)	284 (77.8)
Non-formal education	24 (6.6)	5 (1.4)	29 (7.9)
Primary School	19 (5.2)	3 (0.8)	22 (6.6)
Middle School	7 (1.9)	0	7 (1.9)
Junior Secondary	12 (3.3)	0	12 (3.3)
Technical Institute	6 (1.6)	0	6 (1.6)
Senior Secondary	5 (1.4)	0	5 (1.4)
Total	319 (87.4)	46 (12.6)	365 (100)
Age			
21-30	91(24.9)	9 (2.5)	100 (27.4)
31-40	103(28.2)	11(3.0)	114 (31.2)
41-50	74(20.3)	14(3.8)	88 (24.1)
51-60	41(11.2)	10(2.7)	51 (14.0)
61-70	10 (2.7)	2 (.5)	12 (3.3)
Total	319 (86.3)	46 (13.2)	365 (100)

() figures in brackets are percentages
N=365

This study further supported this assumption in the sense that radio ownership was found also to have a relationship with farmers' income. By extension, this finding suggests that apart from women, men with lower incomes are also less likely to own radio sets than men with higher incomes. A spearman's correlation on income levels

and radio ownership found a slightly significant relationship ($\rho = .223$, $p < .002$). Two demographic variables - education and age - however, were found to have no significant relationship with radio ownership. Chi-square value for education and radio ownership was $\chi^2 = 5.071$, $df = 1$, $p < .535$, and for age and education, the value was $\chi^2 = 9.128$, $df = 1$, $p < .058$.

6.3.2. Television and Newspapers

A small number of the farmers (11%) reported that they watched television, and an even much smaller number (3%) read newspapers. The low level of newspaper readership could be attributed to the high illiteracy rate and possibly the low income levels of the farmers. With more than half of the respondents earning less than one dollar (US\$ 1) a day from agriculture, buying newspapers could be a heavy financial burden; almost a financial nightmare. The same argument could be advanced for the low level of television viewing. The farmers simply cannot afford the cost of television sets. Generally, in Ghana, television receivers are far fewer than radio sets. Abbey-Mensah (2001) reported that in Ghana there are about 219 radio receivers to a 1000 people and there are 13 television receivers to a 1000 people, and an overwhelming number of these television sets are found in the urban settlements, where most of the people can afford to buy them, and where there is electricity to power them. The problem of lack of electricity in most rural communities in northern Ghana is a disincentive to television ownership.³ In the local communities, because of the combined problem of low incomes and absence of electricity, the few wealthy rural folks who are able to buy and power their television sets do offer free access to those who do not have them.⁴ The low level of television ownership and television viewing by farmers is not limited to the rural people in Ghana. Emenyenuo (1987) reported that in Nigeria, available data shows that farmers acquire farm information from radio more than television. In his study in Eastern Nigeria, he found that while 82.1% of the farmers owned radio sets, only 29.2% owned television sets. Emenyeonu also cited Monu and Omole (1982), who found that as few as 0.8% of farmers, rely on

³ Local ingenuity is evoked by desperate rural folks as they provide power to their television sets by connecting them to car batteries; a way of circumventing the problem of lack of electricity.

⁴ Communal watching of television in the home of the chief, a sub-chief, a retired public servant who has returned to settle in his ancestral village, or a wealthy opinion leader, is a common feature in rural Ghana.

television for agricultural information. Also in Nigeria, Okigbo (1988), after an audience study, reported that among the three most important mass media – radio, television and newspapers -- television ranked lowest in terms of people's access, even though it was the most preferred by the respondents. Monu (1983), after a study on "*The Diffusion of Innovation Model in Action; the Funtua Agricultural Project*", found that radio, more than all the other media and interpersonal communication sources, topped the list of sources of farm information among farmers. These findings support the view by experts that radio, ahead of any other source of information, is the most effective and viable communication tool for rural emancipation programmes (Okwu, Kaku and Aba, 2007), including agriculture development in Africa.

6.3.3. Media Exposure

Farmers' media exposure was measured by summing up the numerical values of their responses to three questions regarding: their frequency of reading newspapers, frequency of watching television and frequency of listening to radio. As already mentioned, radio was the most popular media source among the farmers, as all the respondents mentioned they listened to radio; with 88% indicating that they listened to radio daily. However, television viewing was low. Only 11% of the farmers watch television once or more than once in a week, and a much smaller number (3%) read newspapers, with more than half of those who read the newspapers reporting that they read the newspapers only once or twice in a week. As shown in Table 6.7, the total scores of the farmers' on media exposure revealed that only (1.6%) rated the highest score of between 12 and 15, with as much as 318 (88.2%) rating the middle scores of 6 to 9. It appears logical to propose that the generally low figures on media exposure are a result of the low level of television ownership and viewing, and the very low level of newspaper readership. These two situations are, in turn, a direct backlash of the steep illiteracy rates and stark poverty of the people.

To determine the relationship between media exposure and selected socio-economic and demographic variables, the Pearson product moment correlation analyses was ran.

The results indicated as follows:

- (i) There was a slight but negative correlation between age and media exposure ($r = -.203, p < .001$)
- (ii) Income and media exposure showed a low but definite relationship ($r = .319, p < .001$).
- (iii) There was a moderate relationship between education and media exposure ($r = .464, p < .001$)

The above findings therefore supported H1 of the study which stated that: *Better educated farmers will demonstrate higher levels of media exposure than less educated farmers*. This result suggests that farmers with higher levels of education also rated higher on media exposure.

Table 6.7: Respondents' Scores on Media Exposure

Score	Frequency	Percent
1-3	2	0.6
4-5	16	4.4
6-7	308	84.4
8-9	14	3.8
10-11	19	5.2
12-15	6	1.6
Total	365	100.0

N=365

6.4. Respondents' Radio Listening Behaviours

Respondents' radio listening behaviours were measured by investigating their frequency of listening to radio, their radio listening times, their favourite radio stations, the number of radio stations they listen to, and their reasons for listening to radio.

6.4.1. Frequency of Radio Listening in a Week

The study found that all respondents listened to radio at least two days a week. An overwhelming majority of the respondents (88.5%) listened to radio daily (Table 6.8).

Table 6.8: Distribution of Respondents by Frequency of Radio Listening Per Week

Frequency of Radio Listening	Frequency	Percent
Daily	323	88.5
5 – 6 times weekly	27	7.4
3 – 4 times weekly	12	3.3
1 – 2 times weekly	3	.8
–		
Total	365	100.0

N=365

6.4.2. Radio Listening Periods

Radio listening times were put into six categories: morning (5am – 9 am), late morning (9 am – 12 pm), afternoon (12 noon to 3 pm), late afternoon (3 pm -6 pm), evening (6 pm -9 pm), and night (9 pm – 12 pm). The morning and evening periods were the most popular listening periods for the farmers. The study found that more than 80% of the farmers listened to radio in the morning, and 90% listened in the evenings. In this study, the heavy radio listenership in the morning and evening periods can be explained in terms of the fact that the respondents are farmers, and they spend most part of the day, especially the late mornings and the afternoons, working on their farms.

6.4.3. Reasons for listening to Radio

Table 6.9 contains data on farmers' reasons for listening to radio. The most popular reasons or purpose farmers cited for listening to radio included: agriculture news (94.8%), domestic news (93.7%), development issues (54%), family life education (44.4%), music (43.6%), announcements (16.2%) and sports (14.5%). Other reasons mentioned included moral and religious education, and adult literacy programmes.

Table 6.9: Distribution of Respondents by Reasons for Listening to Radio

Reason for Listening to Radio	Frequency	Percent
Agriculture	346	94.8
Domestic news	342	93.7
Development news	197	54.0
Family life education	162	44.4
Music	159	43.6
Announcements	59	16.2
Sports	53	14.5
Moral and religious education	50	14.0
Adult literacy	40	11
Foreign news	25	6
Others	12	4

Multiple responses were permitted

N=365

There are 10 local radio stations in the study area, made up of commercial (6), public service (3) and community radio (1). Respondents were asked to indicate which of the radio stations they listened to. The results indicated that most of the rural farmers listened to more than one local radio station. The radio station a farmer listened to depended much on the availability of air reception of the station and the physical closeness of the radio station to the farmer. Proximity and familiarity therefore seemed to be important elements that determined which radio station respondents listened to.

In general, however, farmers listened more to the broadcasts of the public service radio stations - Radio Savannah Tamale (RST), URA Radio, and Radio Upper West – than they did to the commercial radio stations. More than half of the respondents (63%) indicated that they listened to the programmes of RST, which is located in Tamale; the heart of the biggest region in northern Ghana. RST broadcasts in English and in two local languages – Gonja and Dagbani - to a population of nearly two million.

The number of respondents who said they listened to the radio station almost corresponded with the sample that was taken within the catchment area of the radio station. URA radio was next in terms of popularity, as about a third (29%) of the respondents listened to the radio station. URA Radio's programmes are broadcast in English and in four languages to an estimated population of one million people. Radio Upper West ranked third in terms of number of listeners (18%). It broadcasts in two local languages, in addition to English, to a population of over 500, 000 people (Government of Ghana, 2001).

The other radio stations in the study area are private commercial stations set up and managed by private businessmen, and a community radio station (Simli Radio), which is funded by the Ghana Danish Community Project (GDGP's), a non-governmental organization. These last two categories of radio stations recorded lower listenership from the audience as compared to the public service stations, even though they are very popular private commercial radio stations for the urban folks. For example, Radio Diamond and Radio Filla, two of the popular radio stations located in Tamale (the largest urban settlement in northern Ghana) were found not to be popular with the rural people. Only 9.8% and 6.2% of the farmers said they listened to Radio Diamond and Radio Filla respectively, in addition to the public service local radio stations they listened to.

The private commercial stations are profit-oriented and their programmes are more suited to the needs of the urban folks than the rural dwellers (Karikari, 1994). They devote a sizeable amount of their airtime for political debates and for foreign music. The poor rural farmers consider these two broadcasts/programmes unimportant to their immediate social and economic needs. Also, most of the radio stations have more restricted geographical coverage in terms of *reach* and *reception*, as compared to the three public service local radio stations in the study area. The public service local

radio stations have greater reach, some of them covering areas as far as 100 miles away from where they are located. Simli Radio, the only true community radio station in the northern region, is very popular within the Ghana Danish Community Project's (GDGP) target communities, but its limitation is that it has no frequency of its own. It produces its own programmes and broadcasts through Radio Savannah Tamale only an hour a day at a specific time.

The heavy reliance of the farmers on the public service radio stations could be explained in terms of the *homophily principle* in diffusion. Explaining the *homophily principle* in development, Rogers (1969) noted that the greater the similarity between a source and a receiver, the more communication is likely to have effect and produce results. Designing and tailoring their programmes to meet the needs of the rural folk, perhaps, is one major reason that accounts for the popularity of the programmes of the public service local radio stations among the rural farmers in northern Ghana.

6.5. Radio Agricultural Programmes

6.5.1. Listenership to Agricultural Programmes in a Week

Ilboudo (2002), as cited by Whaites (2005), describes radio as the "Internet of Africa". Perhaps this assertion is even more valid in the case of rural farmers in Africa, who see the radio as a true companion. According to Ilboudo (2002), farm radio has been seen as a supplement to the work of agricultural extension (Whites, 2005). Okwu, Kaku and Aba (2007) underscored the importance of radio in agricultural development. They stated the need for farmers to be informed and educated about agricultural technology to enable them increase productivity. The mass media, Okwu and his colleagues noted, can be used as information multipliers capable of overcoming the pressures of time, population, geographical constraints and shortage of trained extension personnel. In this study, radio was found to be a very popular source of agricultural information to farmers.

This study found that almost all the farmers (98.8%) listened to agricultural broadcasts, at least once a week, on public service local radio station (Table 6.10). The frequency of listening to the radio programmes within a week however varied. It was found that 73.9% listened to the radio agricultural programmes once or twice a week, and nearly one-quarter (23.5%) listened to the messages between three and four times

a week. Each of the three local radio stations in northern Ghana offer agricultural programmes/broadcasts most days in a week, but in different languages and dialects, to reach out to the many tribal and language groupings in the area.

Table 6.10: Distribution of Respondents by Frequency of Listening to Radio Agricultural Programmes on Public Service Local Radio Stations

Number of days (per week) Farmers Listen to agricultural programmes.	Frequency	Percent
5 – 6 times weekly	5	1.4
3 – 4 times weekly	90	23.5
1 – 2 times weekly	266	73.9
Seldom/never	4	1.2
Total	365	100.0

N=365

6.5.2. Direct Involvement in Radio Agricultural Programmes

The study also measured the audiences' level of participation in local radio agricultural programmes. Whilst rural farmers' listenership to local radio has been found to be high, participation by way of involvement or contribution to the discussions has been found to be very low among peasants and rural folks in most countries. Participation in the context of development communication has been defined as the provision of avenues for feedback in a situation where there are avenues for a two-way sharing of ideas (Ansah, 1991, 1994). The results of this thesis research indicated that only 12 farmers (3.3%) participated in radio agricultural programmes in the past one year. The participation was in the form of phone-ins to the radio station (seven farmers), involvement in radio interviews by radio staff as part of the radio programme production (three farmers), and direct involvement in a radio programme as a panellist (two farmers). In the twelve instances where farmers participated in the radio programmes the discussions were on crop production (two occasions), animal production (three occasions), and issues relating to avoiding environmental degradation (two farmers). Farmers in Ghana are always willing to contribute to the

radio programmes on air, but severe constraints including lack of public telephone facilities hinder their involvement in local radio.

6.5.3. Respondents' Programme Format Preferences

The three public service radio stations in the study area use four programme formats for agricultural broadcasts. They formats are: drama, discussion, magazine and straight talk. The study investigated farmers' programme format preferences, and the results (see Table 6.11) showed that nearly half of the farmers (46%) preferred the discussion format most, and about a third (32.2%) preferred the drama format. The magazine format (11.8%) and the straight talk (9.0%) were the least preferred formats. An earlier study on rural radio audiences revealed that the drama and discussion formats were the most preferred by rural audiences (Chapman et al., 2003). In a study on the use of vernacular programmes to promote soil and water conservation in northern Ghana, the researchers found that the drama component of the radio magazine programme was the most popular as "they (the farmers) seemed to have particularly enjoyed the drama" (Chapman et al., 2003: 9). Drama has been recognized as an effective tool for rural and community development. Alemna (1993) underscored the importance of drama as he observed that oral tradition is important for transmitting information in Africa. The drama format in radio broadcasting is an adaptation of the traditional folk media, which are an important component of traditional oral communication in Africa and most parts of the developing world (Ansu-Kyeremeh, 1989, 1997). The use of the drama format in innovation diffusion has the advantages of persuading the people to adopt the messages through a communication strategy that is akin to their values and expressions (Panford et al., 2001) and also stimulating them into action in relation to message adoption and behaviour change.

The farmers were requested to give reasons for their preferred programme formats. Details in table 6.12 indicate that almost all those who mentioned the discussion format as their preferred programme format indicated that the format made it easy for them to understand the agricultural messages. The drama format was rated highest by farmers in terms of its ability to sustain their attention during broadcasts; whilst the discussion format was rated highest in terms of ease of understanding radio messages.

Table 6.11: Distribution of Respondents by Radio Programme Format Preference

Programme	Frequency	Percent
Discussion	168	46.0
Drama	121	32.2
Magazine	43	11.8
Straight Talk	33	9.0
Total	365	100

N=365

Table 6.12: Distribution of Respondents by Reasons for Their Radio Programme Format Preference

Reason for radio Programme format Preference	Discussion	Drama	Magazine	Straight Talk	Total
Makes messages easy to understand	162(55.1)	65(22.1)	31(10.5)	36(12.2)	294(85.5)
Sustains my interest in the programmes	34(21.5)	90(57.0)	5(3.2)	29(18.4)	158(43.3)
Catches my attention	24(26.7)	50(55.6)	7(7.8)	9(10)	90(24.7)
Makes messages easy to remember	34(33.7)	52(51.5)	8(7.90)	7(6.90)	101(27.7)
Makes the messages appear easy to adopt	20(39.2)	20(39.2)	7(13.7)	4(7.8)	51(14.0)
Other reasons	36(50.7)	18(25.4)	7(9.9)	10(14.1)	71(19.5)

Multiple responses were permitted

() Figures in brackets are percentages

N=365

6.5.4. Broadcast Times and Broadcast Duration

Rural farmers listen to radio most in the evenings because this is the time they are at home and free. As regards the broadcast times of the agricultural programmes, results of this study indicated that 87.7% of the respondents said they were satisfied with the times that the radio agricultural programmes are broadcast (see Table 6.13).

The farmers (12.3%) who said they were not satisfied with the broadcast times were requested to suggest times that are suitable to them. Nearly half of them (20 farmers, out of 43) reported that they preferred the periods between 9pm and 10pm.

In relation to the duration of the programmes, however, 45.8% suggested that the duration was short and should be extended. About a third of the respondents (32.5%) suggested that the duration for the agricultural programmes should be 60 minutes, and 5.5% suggested that the public service radio stations should allocate 90 minutes to each agricultural broadcast (see Table 6.14).

Table 6.13: Respondents' Views on Duration and Time of Agricultural Broadcasts

Suitability of Broadcast Times	Frequency	Percent
Yes	320	87.7
No	45	12.3
Total	365	100.0

Suggestions on Broadcast Times

6 am -7am	2	0.5
7am – 8am	5	1.4
7pm -8pm	3	0.8
8pm -9pm	11	3.0
9pm-10pm	20	5.5
Others	4	1.1
Total	45	12.3

The figures in percentages are in relation to the total sample of 365
N=365

Table 6.14: Respondents' Views on Duration of Programmes

Duration is Appropriate	Frequency	Percent
Yes	198	54.2
No	167	45.8
Total	365	100.0

Suggestions on Duration of radio programmes		
—		
45 minutes	4	1.1
60 minutes	120	32.5
75 minutes	8	2.2
90 minutes	20	5.5
Others	15	4.4
Total	167	45.8

The figures in percentages are in relation to the total sample of 365

6.5.5. Adoption of Radio Agricultural Messages

In relation to application of the radio messages, data in table 6. 15 show that more than half of the farmers (58.9%) said they adopted the radio agricultural messages often. Age and income were found to have a significant relationship with reported message application. The chi-square value for age and message adoption was $\chi^2=65.850$, $df=1$, $p<.001$, and the value for income and message adoption was $\chi^2=26.069$, $df=1$, $p<.001$. The younger farmers reported that they adopted the messages more than did the older farmers. Also those with higher income reported that they adopted the messages more than those with lower incomes who reported same. Gender was however found to have no significant relationship with reported

message adoption. The chi-square value for gender and message application was $\chi^2=5.425$, $df=1$, $p<.06$

The study found also a significant positive relationship between education and reported message adoption ($\chi^2=28.609$, $df=1$, $p<.001$). Hypothesis H2 of the study, which states that: *Better educated farmers will report higher rates of adoption/application of radio agricultural messages to their farms than less educated farmers*, was therefore accepted. The study found also that respondents who rated high on education also reported higher comprehension scores than those who rated low on education.

Similarly, the study also found a significant relationship between media exposure and message adoption ($\rho=.271$, $p<.001$). This result supports hypothesis H3, which states that: *Farmers who rate high on media exposure are more likely to adopt messages from the radio than those who rate low on media exposure*. This finding is supported by literature on the adoption of innovations. According to Rogers (1969), better educated farmers are able to deal with information received from the mass media better than those with low education. Also the better educated farmers have greater access to external information sources, and they are the early adopters of innovations (Rogers, 1969).

Table 6.16 shows that the main reasons given by farmers who were not able to adopt the messages often were: Lacks of money to buy agricultural inputs and machinery (34.2%), messages are not often timely (21%), and messages are not understood (10%). Timeliness of a message therefore has an effect on its adoption rate. Rogers (1983) argues that a message that has *relative advantage* is one that likely to be adopted. A message's *relative advantage* has to do with: the degree of its economic profitability, low initial cost of effort (in applying it), savings in time and effort, decrease in discomfort, and immediacy of the rewards to be derived from adopting it (Rogers, 1983). For poor rural farmers like those in Ghana, the cost (in terms of money and inputs) of applying an innovation, seems to be the single most important factor that determines whether the innovation will be applied or not.

Table 6.15: Adoption of Radio Agricultural Messages and Selected Socio-economic and Demographic Characteristics

	Message Adoption			
	Often	Sometimes	Never	Total
<i>Age</i>				
21-30	73(20.0)	23(6.3)	4(1.1)	100(27.4)
31-40	80(21.9)	34((9.3)	0(0)	114(81.2)
41-50	48(13.2)	36(9.9)	4 (1.1)	88(24.1)
51-60	13(3.6)	29(7.9)	9 (2.3)	51(14.0)
61-70	1(0.3)	8(2.2)	3 (0.8)	12(3.3)
Total	215(58.9)	130(35.6)	20 (5.5)	365(100)
<i>Gender</i>				
Male	194 (53.2)	156 (29.0)	17(4.7)	317(86.8)
Female	21 (5.8)	24 (6.6)	3 (0.8)	48(13.2)
Total	215(58.9)	130(35.6)	20(5.5)	365 (100)
<i>Education</i>				
No form of education	149(40.8)	119(32.6)	16(4.4)	284(77.8)
Non-formal education	22(6.0)	6(1.6)	1(0.3)	29(7.9)
Primary School	18(4.9)	2(0.5)	2(0.5)	22(6.0)
Middle School	6(1.6)	0(0)	1(0.3)	7(1.9)
Junior Secondary	10(2.7)	2 (0)	0 (0)	12(2.7)
Technical/Vocational	5(1.4)	1(0.3)	0(0)	6(1.6)
Senior Secondary	5(1.4)	0 (0)	0 (0)	5(1.4)
Total	215 (58.9)	130(35.6)	20(5.5)	365(100)
<i>Income</i>				
Less than 3,000	102(27.9)	84(23.0)	16(4.4)	202(55.3)
3,000 – 6,000	83(22.7)	45 (12.3)	3(0.8)	131(35.9)
6,001 – 9,000	27(7.4)	1(0.)	1(0.3)	29(7.9)
9,000 – 12,000	2(0.5)	0(0.	0(0.0)	2(0.5)
Above 12,000	1(0.3)	0(0)	0(0)	1(0.3)
Total	215(58.9)	130(36.6)	20 (5.5)	365(100)

() Figures in brackets are percentages
N=365

Table 6.16: Respondents' Reasons for their Inability to Adopt Radio Agricultural Messages

Reason	Frequency	Percent
Lack of money	130	37.0
Messages are not timely	30	8.5
I do not understand the messages	15	4.9
Messages are not useful to me	8	5.2
Others	12	6.4

Multiple responses were permitted
N=365

6.5.6. Radio, Agricultural Extension Agents, and Interpersonal Communication: their Relative Importance and Credibility

The study sought to investigate the communication sources (mass media and interpersonal channels), in addition to radio, that the farmers rely on for agricultural information. Farmers were therefore requested to indicate all their sources of agricultural information. The study found that, radio, agricultural extension agents, and interpersonal communication channels constituted the main sources of agricultural communication. The less popular sources were television and newspapers.

This result is supported by Oladele (2006) and Monu (1982) who reported that several studies in Nigeria have identified extension agents, radio and neighbours and friends as the most important sources of agricultural information to farmers. Table 6.17 shows that almost all the farmers (98.8%) indicated they listened to radio agricultural programmes and 94.8% of the farmers got agricultural information from extension agents. This is to be expected. The public service local radio stations in Ghana were set up mainly to broadcast non-formal and development-oriented messages to the people in the various regions of the country, particularly the poor rural folks. Agriculture features prominently in the list of programmes that are considered development-oriented. Efforts aimed at reducing rural poverty in Ghana are very much linked to agricultural development. In this wise, the importance of the

mass media, particularly radio, in promoting agricultural communication and knowledge transfer to farmers has been recognized. Specific time-slots are allotted to each of the language divisions for agriculture programmes, in addition to broadcasting the programmes in English. The Extension Services Division of the Ministry of agriculture is also expected to provide free public service extension education to the country's farmers.

Neighbours ranked third in terms of the provision of agriculture messages. Seventy two farmers (19.7%) mentioned that they received agricultural information from neighbours, 16.4%, mentioned family members, 7.4% mentioned assembly and unit committee members and 3.6% mentioned traditional rulers. Considering that all these four sources are interpersonal forms of communication, it means, more than half (53.1%) of the farmers relied on interpersonal communication sources for agricultural communication, in addition to other sources. This finding suggests the importance of interpersonal communication sources in the diffusion of agricultural information in rural communities in Ghana. Assembly and unit committee members, and traditional rulers, are opinion leaders. Also, some of the family members and neighbours mentioned by the farmers as sources of information could also be influential members in the communities. The interpretation therefore is that opinion leaders and family members play significant roles in agricultural message dissemination in rural communities in Ghana.

As reported by DeFleur and Cronin (1991), interpersonal communication channels are important sources of news diffusion. News stories from the mass media travel by word of mouth as it spreads through the community. In Nigeria, Soola (1988) argued that because of their heterophilous characteristic, change agents often need the services of opinion leaders to serve as intermediaries to reach out to the rural farmer. In Ghana, some opinion leaders in the rural communities are used as "contact farmers". They are in close contact with the agricultural extension agents, and they help in spreading agricultural information to other farmers. Soola (1988) mentioned the "chief farmer" in the village, the traditional ruler (chief), village school teacher, the village priest, and other respected community members as the opinion leaders in rural communities in Nigeria. The categories of persons who constituted opinion leadership and spread information from extension agents in Nigeria are not different from those who constitute opinion leadership in Ghana. As found in this study,

traditional rulers, assembly and unit committee members, and neighbours are among the sources of agricultural information to community members in Ghana.

Even though both local radio and extension agents do not provide agricultural messages daily to the people, the messages from radio are more regular than those from the extension agents. As mentioned elsewhere in this study, 73.9% of the farmers received agricultural messages from local radio at least once a week, whereas only 4.1% of the farmers reported that they received messages from extension agents once in a week. Also, 19 farmers (4.1%) said they never received any messages from extension agents within the past one year, but only four farmers (1.2%) indicated that they seldom or never listened to agricultural messages from radio. The data indicates clearly that between radio and extension agents, radio is more regular at giving messages to the farmers.

To further determine the relative importance of radio and agricultural extension agents in agriculture message transfer to farmers, the farmers were requested to respond to two questions: (1) the source they relied on most for radio messages, and; (2) the source they considered most credible. Nearly two-thirds of the farmers (60%) said the radio was their most reliable source of agricultural information, and 29% mentioned agricultural extension agents as the most reliable source. However, information from agricultural extension agents was found to be the most credible. More than half of the farmers (53%) rated agricultural extension as the most credible as against 36.7% who stated that local radio was the most credible. Clearly the information from the extension agent is considered more credible than radio. The reasons the respondents gave for this were: (1) the extension agents provide practical demonstrations (which radio does not do, and indeed cannot do, on air); and (2) they had more face-to-face interactions with extension agents than they had with radio agricultural programme producers. For their reliance on radio, the basic reasons the respondents gave were that: the radio programmes were always on air at the scheduled dates and times; and messages from the radio are more regular than the face-to-face contact they get with extension agents.

Interpersonal communication was found to be very useful channels of agricultural communication among the farmers. About one-fifth (19.7%) of the farmers mentioned neighbours as sources of agricultural information, and 16.4% mentioned family members. Other interpersonal communication channels mentioned included assembly

member/unit committee member, traditional ruler, and development agents of non-governmental organizations.

Table 6.17: Respondents' Sources of Agricultural Information

Source	Frequency	Percent
Local radio	361	98.8
Agricultural Extension Agent	346	94.8
Neighbour	72	19.7
Family Member	60	16.4
Non-governmental Organisation	28	7.7
Assembly/Unit Committee Member	27	7.4
Television	14	3.8
Traditional Ruler	13	3.6
Newspapers	8	2.8
Others	21	5.8

Multiple responses were permitted

N=365

6.5.7. Respondents' Suggestions on How to Make the Radio Messages More Beneficial

Farmers were requested to give suggestions that will make them benefit more from the radio agricultural programmes broadcast by the local radio stations. More than fifteen suggestions were given (see Table 6.18). The most reported reasons were: radio discussion programmes on agriculture must include farmers in the discussion panels (22.4%); there should be an extension of the duration of the radio broadcasts (21.6%); the local radio stations should add more slots for agricultural broadcasts in their weekly programme schedules (11.8%); rural communities should be provided with public service paid phones to enable them phone-in to contribute to radio programmes (11.2); the programmes should be broadcasts at the time of the day when all farmers are at home and free to listen (10.4%), and; local radio stations should assist farmers to access credit by including in their broadcasts, information on where and how to get micro-credit (9.9%).

In this study, the call made by the farmers that they should be involved in the radio discussion programmes, and that they should be assisted and encouraged also to phone-in during programmes, is a response to the changing media equation in relation to radio broadcasting for development. Berringham (1979) observed that there is enough experience in the field of community participation that amply supports the view that rural communities are capable of making a firm and positive contribution to the pattern and pace of development. The practice of giving access to audiences and promoting their participation asks broadcaster to put aside some of the traditional notions of the professionalism they have imbibed and to open a new range of influences from the people they serve (Berringham, 1979; Nair and White, 1987).

Table 6.18: Respondents' Suggestions on How to Make the Radio Programmes More Beneficial

Suggestions	Frequency	Percent
Farmers should be involved in the radio discussion programmes	82	22.4
The duration of the programmes should be increased	79	21.6
The number of agricultural broadcasts per week should be increased	43	11.8
Farmers should be assisted and encouraged to phone-in duration radio programmes to contribute / seek clarification	42	11.2
Broadcasts time of the radio programmes should be fixed at the times/periods that all farmers are at home and are free to listen	38	10.4
As part of the radio messages, farmers should be given information on where and how to access credit to be able to buy agro-inputs and machinery	36	9.9
The radio programmes should be recorded in the rural communities with the farmers	33	9.0
Radio stations should seek farmer's views on the relevance of the radio messages/ and the performance of the radio presenters	28	7.1
All programmes should include short drama	16	4.2
There should be special programmes for women's problems and needs in relation to agriculture	16	4.4
All programmes should include a few minutes of traditional music	15	4.5
Radio staff should use familiar terms and names to explain technical issues	11	2.9
Names should be found in the local languages for agro-inputs and crop varieties	7	1.9
Those who handle the radio agricultural programmes should be trained so that the messages can be more comprehensible	7	1.9

Farmers were permitted to give multiple reasons
Some farmers did not have any suggestions
N=365

6.6. Reported Message Comprehension and Message Recall

6.6.1. Reported Message Comprehension

Respondents were requested to indicate whether they understood the agricultural messages *often*, *sometimes* or *never*, when the programmes are delivered. The study showed that 84.4% reported that they understood the messages often, 12.6% indicated they understood the messages sometimes, and only 3.0% said they do not understand the messages (see Table 6.19.) The study found that more of the younger farmers said they understood the radio messages than did the older farmers. Out of the total of 100 farmers within the 21 to 30 year group, 93 of them (93%) said they understood the messages often, six said they understood the messages sometimes, and only one farmer said he never understood the messages at all.

Similarly about 90% of the 171 farmers within the 31 to 40 year group said they understood the messages often. Farmers within the 61 to 70 year group scored lowest in terms of the responses on their level of understanding of the radio messages. Clearly the data revealed that the younger the respondent, the higher his or her reported level of comprehension. In other words, comprehension of the radio messages declined as age increased. A chi-square analysis indicated a significant relationship between age and reported message comprehension, $\chi^2=43.175$, $df=8$, $p<0.001$. This result is consistent with findings made by researchers on the influence of age on message comprehension. In relation to gender, it was found that the proportion of males who said they understood the messages often was higher than females who indicated that they understood the messages often. This result was however not statistically significant. A chi-square analysis indicated a value of $\chi^2=4.155$, $df=2$, $p<.125$. Gunter (1987) reported that news awareness varies with age and sex. He stated that even though not much research has been done to examine the difference in age and sex in relation to news awareness and knowledge of public affairs, there is evidence to show that the ability to understand and retain news has a relationship with age and sex.

The result of this study indicates that education and income were found not to have any significant relationship with farmers' level of comprehension of radio agricultural news. A chi-square analysis indicated a value of $\chi^2=8.999$ $df=8$, $p<.703$ for education and reported message understanding. By this result, hypothesis H4

(Farmers with better education are more likely to report higher comprehension of local radio agricultural messages than those with lower levels of education) was rejected. Even though the comparison of results of a survey with results of an experiment may not seem scientifically appropriate, nevertheless the results of the survey could be a useful basis for a fair assessment of what results may be obtained in an experiment within the same area. This result is inconsistent with findings of most research on recall and comprehension of broadcast news. After a study conducted using college students, out of school adults, 10th grade students, and illiterate adults in Kenya by Stauffer, Frost and Rybolt (1983), it was found that recall of broadcast news was significantly related to education. The college students performed better than all the other three category of respondents in a multiple choice test that was designed to test comprehension of all the 392 people in the sample.

Farmers who said they understood the messages only sometimes, and those who said they do not understand the messages, gave the following reasons: the programme duration is very short (14.8%); language is very technical (13.7%); there is no interaction with farmers during the broadcasts (11.%); and, lack of practical demonstrations of the messages on radio programmes (9%).

Table 6.19: Comprehension and Selected Socio-economic and Demographic Characteristics

	Level of Message Comprehension			Total
	Often	Sometimes	Never	
<i>Age</i>				
21 – 30	93 (25.8)	6 (1.6)	1 (0.3)	100(27.4)
31 – 40	105 (28.8)	7 (1.7)	2 (0.5)	114 (31.2)
41 – 50	71(19.5)	15 (4.1)	2 (0.2)	88(24.1)
51 – 61	34 (9.3)	13 (3.6)	4 (1.1)	51(14.0)
61 – 70	5 (1.1)	5 (1.1)	2 (0.5)	12(3.3)
Total	308 (84.4)	46(12.6)	11 (3.0)	365 (100)
<i>Gender</i>				
Male	272(88.3)	37(10.1)	8(2.2)	317(86.8)
Female	36(11.7)	9 (2.5)	3(0.8)	48(13.2)
Total	308(84.4)	46 (12.4)	11 (3.0)	365 (100)
<i>Education</i>				
No education	232(63.6)	42(11.)	10 (2.7)	284(77.8)
Non-formal	27 (7.4)	1(0.3)	1 (0.3)	29(7.9)
Primary	21 (5.8)	1(0.3)	0	22(6.0)
Middle School	6 (1.6)	1(0.3)	0	7(1.7)
Junior Secondary	11 (3.0)	1(0.3)	0	12(3.3)
Technical Certificate	6 (1.6)	0	0	6(1.6)
Senior Secondary	5 (1.4)	0	0	5(1.4)
Total	308 (84.4)	46(12.6)	11(3.0)	365(100)
<i>Income</i>				
Less than 3,000	161(44.1)	33(9.9)	8(2.2)	202(53.3)
3,000 – 6,000	117 (32.1)	11(3.0)	3 (0.8)	131 (35.9)
6,001 – 9,000	27 (7.4)	2(0.5)	0	29(7.9)
9,000 – 12,000	2 (0.5)	0	0	2(0.5)
Above 12000	1 (0.3)	0	0	1(0.3)
Total	308 (84.4)	46(12.4)	11(3.0)	365(100)

() Figures in brackets are percentages

N= 365

6.6.2. Reported Message Recall

The study found that reported message comprehension does not necessarily translate into an equal level of reported message recall. The percentage of farmers who said they were able to recall the messages often were less than those who said

they understood the messages often. Slightly more than half of the respondents (57.5%) indicated that they were often able to recall the messages when they needed to apply them on their farms (see Table 6.20). This figure is lower than the percentage (84.4%) of farmers who said they understood the messages often.

In the study in Kenya cited earlier in this chapter, Stauffer, Frost and Rybolt (1980) found that the memory recall scores of college students, out of school adults, and tenth grade school children were positively related to their scores on comprehension of the messages which was measured through a test. For the illiterate sample in the study conducted by Stauffer, Rybolt and Frost (1980), it was found that they could not translate their recall scores to advantage in the comprehension test. A relationship can be drawn between the Kenyan study and the result of this study. Majority of the farmers in this study were illiterate (77.8%), and their ability to translate the recall of messages to comprehension could just be as weak as the illiterate sample in the Kenyan experiment, who did not perform well in translating their recall scores into equal levels of comprehension. This research and that conducted by Stauffer, Frost and Rybolt (1980), seem to suggest that education has an influence in the ability of people to either translate their recall into message comprehension or to be able to recall messages which they understood at the time of the message delivery. It is important to mention however, that while the study conducted by Stauffer and his colleagues tested unaided recall and comprehension through an experiment, the results discussed in this chapter relied on reported unaided recall and comprehension levels by the farmers.

Table 6.20: Message Recall and Selected Socio-economic and Demographic Characteristics

	Often	Sometimes	Never	Total
Age				
21-30	78 (21.4)	17 (4.7)	5(1.4)	100(27.4)
31-40	72 (19.7)	39 (10.7)	3 (0.8)	114(31.2)
41-50	41 (11.2)	36 (9.9)	11 (3.0)	88(24.1)
51-60	17 (4.7)	26 (7.1)	8 (2.2)	51(14.0)
61-70	2 (0.5)	7 (1.9)	3 (0.8)	12(3.2)
Total	210 (57.5)	125 (34.2)	30(8.2)	365 (100)
Gender				
Male	191(53.3)	105(28.5)	21(5.8)	317(86.8)
Female	19(5.2)	20 (5.5)	9(2.5)	48(13.2)
Total	210(57.5)	125 (34.2)	30 (8.2)	365(100)
Education				
No form of education	138(48.6)	118(41.5)	28(7.7)	284(77.8)
Non-formal education	22(6.0)	5(1.4)	2(0.5)	29(7.9)
Primary School	21(5.8)	1(0.3)	0	23(6.0)
Middle School	7(1.9)	0	0	7(1.9)
Junior Secondary	11(3.0)	1(0.3)	0	12(3.3)
Technical/Vocational	6 (1.6)	0	0	6 (1.6)
Senior Secondary School	5(1.4)	0	0	5(1.4)
Total	210(57.5)	125(34.2)	30(8.2)	365(100)
Income				
Less than 3,000	104(28.5)	73 (20.0)	25(6.8)	202(55.3)
3,000 – 6,000	78(21.4)	48 (23.2)	5(1.4)	131(35.9)
6,001 – 9,000	25(6.8)	4(1.4)	0 (0)	29(7.9)
9,000 – 12,000	2(0.5)	0	0	2(0.5)
Above 12,000	1(0.3)	0	0	19(0.3)
Total	201 57.5)	125 (34.5)	30 (8.2)	365(100)

() Figures in brackets are percentages
N=365

Chi-square analysis was run to determine the relationship between reported message recall and four variables; age, gender, education and income. The results indicated that there were significant relationships between gender and message recall

($\chi^2=11.441$, $df=3$, $p<.003$), between age and message recall ($\chi^2=49.567$, $df=12$, $p<.001$), and between education and recall ($\chi^2=46.608$, $df=18$, $p<.000$). However there was no significant relationship between income and message recall ($\chi^2=21.427$, $df=12$, $p<.06$).

Farmers who were unable to recall the messages gave reasons similar to those that were given by farmers who did not understand the messages, but the percentages differed. Also, a few more reasons were mentioned. The main reasons mentioned were: language used was too technical (17.4%); programme duration is short (13.8%); no interactions with the presenters and panellists during the broadcasts (10%); no practical demonstrations on radio (6.6%); names of agriculture inputs are difficult to remember (3%); and, style of presentation by radio staff is not orderly (1.1%).

6.7. Attitudes towards Local Radio and Perceptions of Source Credibility

6.7.1. Attitudes towards Local Radio

The importance of farmers' attitudes and perceptions of source credibility in radio listening has been copiously reported. Based on theory and empirical research on the importance of attitudes and source credibility on farmers' listenership to a communication source, this study sought to instigate the audience' attitudes towards local radio and their perceived credibility of the radio messages. To measure attitudes, a five-item five-point Likert scale was used. The responses were rank-ordered, using percentages. The "strongly agree" and "agree" responses to positive questions, and the "strongly disagree" and "disagree" to negative questions were considered positive ("strongly agree" or "agree"), whilst the "strongly disagree" or "disagree" to positive questions and "strongly agree" and "agree" to negative questions were considered negative ("strongly disagree" and "disagree").

Data in tables 6.21 and 6.22 reveal that overall the respondents held very high positive attitudes towards local radio. Each statement in the Likert scale recorded an overwhelming majority of "agree" (a combination of strongly agree and agree) responses. The statement "It is not a waste of one's time to listen to radio" recorded the highest score (94.3%) and the lowest score was recorded by the statement, "The local radio is not popular with the people" (85.1%). The farmers' individual total scores were computed for the given statements in the five-point five-item Likert scale. The maximum possible score an individual could obtain was 25, and the minimum

was 5. The results showed that more than 93.5% scored 16 or more. The minimum score was 6 and the maximum was 23. The mean score was 20.3, and the standard deviation was 2.7.

Table 6.21: Rank Order of Respondents' Attitudes towards Radio

Position	Item (Statement)	Percentage of Agreement
1	It is not a waste of time to listen to radio (AGREE AND STRONGLY AGREE)	94.3
2	Local radio is our best companion (AGREE AND STRONGLY AGREE)	93.1
3	I personally do not like listen to radio (DISAGREE AND STRONGLY DISAGREE)	92.3
4	Whether the radio station exists or not makes no difference in my life (DISAGREE AND STRONGLY DISAGREE)	92
5	Local radio is not popular with the people (DISAGREE AND STRONGLY DISAGREE)	85.1

N=365

The percentage of agreement is a combination of "strongly agree" and "agree"

Table 6.22: Respondents' Scores on Attitudes towards Radio

Score Range	Frequency	Percent
5-10	4	1.1
11-15	16	4.4
16-20	141	38.6
21-25	204	55.9
Total	365	100.0

N=365

Mean score = 20.3

SD = 2.7

6.7.2. Perceptions of Source Credibility

Respondents' perceptions of the credibility of the local radio programmes were measured using a five-point five-item Likert Scale, as was done in the case of attitudes. There were both negative and positive questions in the Likert Scale. The percentages of agreement represented a combination of "agree" and "strongly agree" responses to positive questions, and "disagree" and strongly disagree responses to negative questions.

The scores on farmers' perception of the credibility of radio equally suggested high positive perceptions towards the local radio's programmes and messages. The scores ranged from 82.7% to 94% (see Table 6.23). The statement "the local radio station disseminates useful messages" recorded the highest number of *agree* scores (94%), while the lowest score was recorded by the statement "the local radio station always broadcasts accurate information" (82.7%).

The maximum possible total score of an individual farmer was 25, and the minimum was 5. The study found that the lowest recorded score was 10, the highest was 23, and the mean was 20.0. The standard deviation was 2.3. More than half of the respondents (54.8%) scored above 20 (see Table 6.24).

The result of the Pearson product moment correlation, however, indicated that there was no significant relationship between farmers' attitudes and their level of listenership to local radio ($r=.055$, $p<.291$). Similarly, the study found no significant relationship between farmers' perceived credibility of the local radio and its messages and their levels of radio listening ($r=.025$, $p<.580$). Therefore, hypothesis H5 of the study, which states that: *perceived source credibility of the radio messages would be positively related to farmers' level of radio listenership*, was rejected.

Research results and theoretical treatment of the influence of attitudes and perceptions of source credibility on radio listenership runs country to the findings found in this study (Rogers, 1983). Perhaps the generally high attitudes towards radio, and the high perceptions of the credibility of the radio messages, together with the high radio listenership reported by all the farmers, explains why no significant relationships were found between the two psychological variables and level of radio listening.

Table 6.23: Rank Order of Respondents' Perceptions of the Radio Programmes

Position	Statement	Percentage of Agreement
1.	The local radio station disseminates useful information	94.0
2.	The local radio station is trustworthy	91.8
3.	The presenters have full knowledge of the participant matter	91.0
4.	The local radio station sometimes presents false information (STRONGLY DISAGREE AND DISAGREE)	84.2
5.	The local radio station always presents accurate information	82.7

N=365

The percentage of agreement is a combination of "strongly agree" and "agree"

Table 6.24: Respondents' Scores on Perception of Credibility of Radio Programmes

Scores	Frequency	Percent
5-10	3	0.8
11-15	18	4.9
16-20	144	39.5
21-25	200	54.1
Total	365	100.0

() Figures in brackets are percentages

N=365

Mean score = 20.0

SD = 2.3

6.8. Summary

This chapter offered a descriptive and analytical discussion of data gathered through the use of structured survey questionnaires. The study involved 365 small scale rural farmers. The sample was taken from 14 rural communities. The average

age of the respondents was 39.9 years. A majority of them had no formal and non-formal education, and an overwhelming majority was married. Income levels among the farmers were found to be very low, with more than half of them living on one dollar (US\$1) or less a day. The assertion that radio is the most important media for development among poor rural farmers has been found valid by the results of the study. Radio was found to be the medium that is relied on most by the farmers for general information and for agricultural messages.

Radio ownership and listenership were both found to be very high. Television viewing was low and newspaper readership was lowest. The data on radio and television viewing and newspaper readership were highly consistent with findings made by earlier studies in Ghana (Chapman et al., 2003) and in Nigeria (Emenyeonu, 1987). Studies have shown that radio, since the last three decades or more, ceased to be the dominant source of news in the United States and UK (Gunter, 2000). McNair (2003) disclosed that a survey conducted in the United Kingdom in 1990 revealed that television is the main source of information about the world for the people. In his book *“Poor Reception: Misunderstanding and Forgetting Broadcast News”*, Gunter (1987), citing a study by the Independent Broadcasting Authority (IBA), reported that a survey conducted in Britain in 1982 indicated that 58% of the people said they got most of their news from television, 27% mentioned newspapers and only 12% mentioned radio. Gunter (1987) further stated that on the average, about two-thirds of the public of modern industrialised countries claim that television is their main source of domestic and international news.

In sharp contrast to the findings reported by Gunter (1987), this study found that radio remains the most important source of news - general news and agricultural news – for the poor rural farmers in Ghana. Gender and income were found to be associated with radio ownership. This is further indication that poverty is a major hindrance to the acquisition of, and reliance on, television and newspapers for news by the farmers.

The mass media are believed to have strong influence in the dissemination of new ideas (Emenyeonu, 1987) including agricultural messages and innovations. The results of the study demonstrated vividly that whilst Television and newspapers are highly insignificant in agricultural message delivery to farmers, radio remains the most reliable form of agricultural communication, ahead of any medium of mass communication and any form of inter-personal communication. Nearly all the farmers

(98.8%) reported that they listened to radio agricultural programmes, and 60% said they relied most on radio, ahead of extension agents (29%) for agricultural messages. An important finding of the study, however is that more than half (53.7%) of the farmers mentioned the extension agent, ahead of radio and all other forms of mass media and interpersonal communication, as the most credible source of agricultural information. This arouses a valid question: do the farmers rely on the radio simply because it is more available to them than the extension agent or because of its innate qualities as a tool for communication? The farmers' trust in radio does not appear to be in doubt. This is supported by the high scores on attitudes towards radio and the perceptions of the credibility of local radio and its programmes. However, farming is a practical venture: radio can offer as much information as the farmers require, and it can provide the depth of explanation of farming technology as the extension officer may provide, but radio has the huge disadvantage of been unable to offer practical field demonstrations to farmers. The major reasons mentioned by the farmers who indicated that the extension agent was more credible than radio were that: extension communication offers them practical field demonstrations and there is also the opportunity for face-to-face interactions with the extension agent.

The study found also that apart from radio and agricultural extension agents, the farmers also relied on interpersonal communication channels for agricultural news. The farmers mentioned neighbours, family members, fellow farmers, traditional rulers (chiefs, sub-chiefs and heads of clans), assembly members and unit committee members, as well as field staff of non-governmental organizations, as their other sources of agricultural information. Diffusion studies (Rogers, 1962, 1968) and the knowledge gap hypotheses (Tichenor, Donohue and Olien, 1970) are definite on the existence of knowledge gap among members of a community as a result of different levels of education and media exposure. People who seek information vigorously and also learn fast, turn to be the sources of information to others in the same community. In the Ghanaian situation, most of such people in the rural communities tend to be opinion leaders.

Farmers' participation in radio was found to be very low. This finding was rather surprising. A basic reason for the setting up of public service local radio stations was to encourage a two-way communication with the rural folks by encouraging their participation in the radio programmes. The respondents want to get involved in radio

broadcasts, but they are not able to do so because of certain constraints. The respondents said they were not being invited to take part in the radio programmes, and they lack telephone facilities to enable them make calls to the radio stations to contribute to the radio broadcasts.

The study found that age was the most important factor in message comprehension, message recall and the adoption of agricultural messages. Chi-square analyses established an association between age and the three variables. Education was found also to be associated with message recall and message adoption, but not with message comprehension. Also, income had a relationship with only message adoption. The implication of these results is that the youth hold the key to agricultural growth in Ghana. By this result, this thesis research confirms other research findings that reported that education has influence on how much we learn from broadcast news (Stauffer, Frost and Rybolt, 1980; Gunter, 1987), and which categories of farmers, in terms of the socio-economic characteristics, will adopt innovations (Rogers, 1969)

6.9. Conclusion

This chapter was meant to serve as a broad source of information on the characteristics of the farmers, their general media exposure, radio listening habits, attitudes towards radio, and their perceptions of the credibility of the local radio and its messages. An important objective was also to investigate the importance and effectiveness of local radio as a source of agricultural information to the rural farmer. Attempts were made to investigate the perceived message recall, message comprehension and adoption rates of the farmers, from their own perspectives. The next chapter and subsequent ones will describe and discuss results of a series of controlled experiments conducted in the study area to reveal the levels of message recall and message comprehension and to determine the variables and audience factors that influence unaided recall and understanding of radio broadcasts of agricultural messages.

CHAPTER SEVEN

DATA ANALYSES OF THREE EXPERIMENTS: REPEAT BROADCAST (ONCE), REPEAT BROADCAST (TWICE) AND STRAIGHT TALK

7.1. Introduction

This and the next two chapters are devoted to discussions on the eight experiments conducted using 252 farmers as participants. The experiments investigated the relative effectiveness of various programming variables on message recall and comprehension of radio agricultural news broadcasts. The relationships between the radio programme variables, and message recall and message comprehension, were investigated. An attempt was made also to establish the relationship between farmers' socio-economic and demographic characteristics and their scores on message recall and news comprehension.

Eight rural communities in northern Ghana were selected for the study. The researcher needed to have a large measure of control over the design of the radio programmes and the conduct of the experiments to ensure that the right variables were accurately measured. Therefore, all the eight rural communities were selected from the northern region of Ghana, which is the researcher's home region. The researcher has absolute command of two of the most dominant local languages spoken in the area, and a thorough understanding of the culture of the people, including the dynamics of community level mobilization and organisation in rural northern Ghana.

Before each experiment was conducted, several visits were made to the community to put in place all the necessary arrangements, including meeting with the chief.⁵ The purpose was to, as much as possible, reduce interferences that could occur at the times that the farmers were being made to listen to the broadcasts during the experiments, and also to allow for uninterrupted face-to-face interviews with the farmers after they had listened to the radio broadcasts. In each of the communities, the researcher and his team of assistants solicited the support of the Assembly member, unit committee member, the village health volunteer or an opinion leader, to

⁵ A meeting with the chief or village head is normally the first step in community entry in rural northern Ghana. Even before meeting the chief, an elder will have to be contacted, and he will then lead the researcher or development agent to the chief.

help in organising the farmers for the study. The farmers were, on their own accord, allowed to decide whether they wanted to take part in the project or not. At the beginning of each experiment, the researcher informed the participants that they would be interviewed face-to-face and on one-to-one basis after they had listened to the radio broadcasts.

The researcher ensured that the samples were constituted in such a way as to avoid the problems of *internal* and *external* invalidity. The majority of the rural farmers in Ghana are illiterate, and this was reflected in all the samples. The researcher was also mindful of other socio-economic and demographic variables of the people in the rural communities. Thus the principles of *matching* and *randomization* guided the composition of the samples. Care was taken also not to include more than one farmer from a household, and also not to include two or more close family relations in a group. The purpose was to ensure that the participants who took part in the study were very representative of the communities. As Reinhard (1994) noted, sampling groups in such a way that they are not representative of the entire population could have an effect on the research, since the sample could be sensitive to the dependent variable than the other sub-samples within the same population.

The dependent variables in this study were unaided recall and comprehension of broadcast news. The independent variables were production techniques and presentation formats (repeat broadcast, recaps, relevance of messages to farmers' immediate information needs, effect of straight talk and effect of delayed recall) and socio-economic and demographic characteristics (such as age, education, gender, media exposure and income). Two other independent variables were attitudes and perceptions of source credibility. Research and literature on memory recall and comprehension of broadcast news have often investigated the relationship between production variables, position of news items, duration of news items, and socio-economic and demographic characteristics (for example, age, education and gender) and message recall and comprehension (Katz, Adoni and Parness, 1977; Stauffer, Frost and Rybolt, 1978, 1980).

In this study, unaided recall was measured by requesting the farmers to state the main news items or themes that were contained in the broadcasts. The unaided recall technique has been used by researchers in recall studies within the past three decades or more (Katz, Adoni and Parness, 1978; Stauffer, Frost and Rybolt, 1978 and 1980).

This chapter presents an analysis of the data from three of the eight experiments: (1) effect of repeat broadcast (once); (2) effect of repeat broadcast (twice); and, (3) effect of straight talk as a form of repeat broadcast. Each of the experiments is discussed as a separate unit, but in some instances comparisons are made between them as regards results whose explanations may be better understood when put in context. Two hypotheses were tested in this chapter.

7.2. Experiment 1: Effect of Repeat Broadcast (Once)

The purpose of this experiment was to test the effect of repeat broadcast of agricultural messages on farmers' unaided recall and comprehension. There is evidence from literature on recall and comprehension that suggests that messages that are repeated are more likely to be recalled than messages that are broadcast once (Myers, 1998; Hogg and Vaughan, 2005). Findahl and Hoijer (1975) reported that repetition does seem to improve recall of broadcast news. Repetition of messages, according to Petty and Priester (1994) has been found to have a positive impact on the individual's thinking of a message. The repetition should however be in moderation, and the arguments should be positive. However, repeating the same message several times could lead to boredom and weak effect (Petty and Priester, 1994). Research findings therefore support the belief that repetition is important in the message persuasion process.

The experiment tested two hypotheses as follows:

H6: Farmers are more likely to recall messages that are repeated than those that are broadcast only once.

H7: Farmers are more likely to understand messages that are repeated than messages that are broadcast only once.

7.2.1. Method

Design: A-30 minute 12-item radio broadcast was designed and used for the experiment. The radio programme was produced with the help of radio and agricultural experts. The broadcast was recorded in the studio of Radio Savannah

Tamale. The broadcast was in Dagbani, which is the language spoken in the community in which the experiment was conducted.

The messages were on maize cultivation,⁶ and they covered some of the agronomic practices involved in maize production. There was a control group and a treatment group. Each of the two groups was made up of 16 participants. One radio news broadcast was used for the experiment. Thus, the participants in the control group and the experimental group listened to the same broadcast, and within the same duration. However, the experimental group heard the programme twice whilst the control group heard it only once. The main purpose of the experiment was to determine whether a broadcast that is repeated to a group of participants would result in a significant difference in scores by that group over another group that listened to the broadcast only once.

Participants: The participants were 32 farmers living in Sugashei, a predominantly farming rural community in the Tamale Peri-Urban (Tamale Rural) Area in the Northern Region of Ghana. The participants were small scale rural farmers engaged in crop farming as a main economic venture. All the farmers had cultivated maize for the crop season.

Procedure: Participants were informed at the beginning of the experiment that they were going to listen to a radio programme on agriculture, after which they would be required to have face-to-face interviews with the researcher and his research assistant.⁷ The control group and the experimental group listened to the radio broadcast separately, and at different times, but within the same community, on the same day. The two groups were also interviewed separately for unaided recall and comprehension.

The two groups were seated at two different locations in the community. Participants in the control group were made to listen to the broadcast first, and as their unaided recall and comprehension were been tested, the participants in the

⁶ Maize is a staple crop of the people in the study area. Findings from research on the crop are often delivered to the farmers mostly through extension agents, and also through local radio stations using agricultural experts as resource persons for the radio discussions. The broadcast for this experiment contained messages on recent and most appropriate agronomic practices of maize farming.

⁷ For each of the eight experiments, the farmers (participants) were interviewed for unaided recall and comprehension by the researcher and one of his research assistants soon after the farmers had listened to the broadcasts. The farmers were interviewed individually. The researcher and his assistant sat at different locations as they conducted the interviews. The purpose was to avoid a situation where the responses by a farmer could be heard by another farmer.

experimental group listened to the broadcast. The purpose for scheduling the interviews this way was to ensure that no participant of any of the two groups had the benefit of listening to the broadcast at the time they were not expected to do so.

Besides this reason, the other purpose was to make it easier for the researcher and his assistant to record the participants' responses in an orderly manner, and without taking too much time of the participants. Before the day that participants were made to listen to the broadcasts, their demographic and socio-economic characteristics were recorded. This was useful in ensuring that *matching* of some demographic characteristics was done. There were huge disparities in the ages of the participants; ages ranged from 20 years to 70 years. Also, there were very few participants who had education beyond the basic school level. Through *matching*, it was ensured that the two groups had almost an equal number of young and old farmers, and farmers with high levels of formal education.

Box 7.1: An example of a comprehension test question, the expected answer and the scoring procedure

Question:

Mention three benefits to farmers if they avoid burning slash on their farms.

Answer (responses):

- (i). When the slash is left on the farms they decompose and add organic matter to the soil.
- (ii). When slash is not burnt, the moisture in the soil is maintained.
- (iii) The risk of erosion is minimised since the slash on the farm forms a protective cover against the swift flow of water.

Scoring procedure:

Where all the three responses were accurately presented, a farmer scored six points; four points were offered when two accurate answers were provided; and two points were awarded when only one accurate response was given. A response that was partially correct was awarded a point, and no point was given for a wrong answer and for no answer.

Scoring procedure: For unaided recall, one point was given for correctly mentioning any of the items contained in the broadcast. No point was given for incorrect answers and for items that were not mentioned. For comprehension, the actual score allocated to each response depended very much on the accuracy and completeness of the response (Gunter, Berry and Clifford, 1981). An accurate response attracted two points; a partially correct response attracted one point; and a wrong response or no response attracted no point.

Some questions required only one answer, while others required two or more answers. For questions that required more than one answer, each of the two or three answers to such questions was scored two points, if correctly answered. This meant that a question that required three answers was scored a maximum of six points – if all the answers provided by a participant were accurate (see Box7.1)

7.2.2. Demographic and Socio Economic Characteristics

Out of the 32 farmers, only two (6.3%) were females, the rest (93.7%) were males. The average income was 3,500,000 Gh. Cedi (US\$ 368, in 2006). The minimum age was 21 years, the maximum was 65 years, and the mean age was 40.9 years. In terms of education, 75 % of the farmers had no form of education; they were completely illiterate. It was found that 9.45% had non-formal education, 3.1% completed primary school and 12.5% held junior secondary school certificates.

7.2.3. Results

7.2.3.1. Unaided Recall

As indicated above, when the scoring procedure was being discussed, unaided recall was measured by requesting participants to freely state the main items contained in the broadcast. Each correct response was awarded a point. The data in Table 7.1 indicates that out of the 12 news items, the mean unaided recall score for the 32 farmers was 5.34 items (44.5%). Participants in the experimental group however recalled a higher mean unaided recall score of news items than the control group. The mean unaided recall score of the experimental group was 6.06 (50.5%), while the average for the control group was 4.63 (38.5%).⁸

⁸ The statistical calculations for all the experiments were done using ungrouped data

The results of the t-test analysis indicated a significant difference in the mean scores of the two groups ($t=-2.727$, $df=30$, $p<.011$). The results indicate that the repeat broadcast produced a marked effect in the difference in mean unaided recall scores between the two groups. Hypothesis H6 of the study was therefore accepted.

The minimum number of stories recalled per farmer in the control group was 2 (16.7%), while the minimum for the experimental group was 3 (25%). The maximum number of recalled items by the farmers in the control group was 7 (58.3%), where as in the experimental group, one farmer recalled as many as 9 (75%) stories, and another recalled 8 (66.7%) stories. The bulk of the farmers, both in the control group and experimental group, however, recorded between 2(16.6%) and 6 (50%) items. Research all over the world has shown that unaided recall scores for broadcast news is generally poor (Gunter, 1978, 1992; Housel, 1984; Katz, Adoni and Parness, 1977; Stauffer, Frost, and Rybolt, 1978, 1980). According to Gunter (1987), and Katz, Adoni and Parness (1977), even among people with high education, the situation is not reassuring. The apparently low unaided recall figures recorded in this study are therefore in consonance with the generally poor unaided recall rates among audiences, particularly radio listeners (Stauffer, Frost and Rybolt, 1980). Most news bulletins that have been used for studies in news recall and comprehension were within the duration of 10 to 15 minutes (Katz, Adoni and Parness, 1978; Stauffer, Frost and Rybolt, 1978, 1980), but in my study, the radio experiment that was used was of 30 minutes' duration, and one of the news items was of a duration of about four-and- half minutes, yet the recall scores did not appear very different from scores recorded in similar experiments.

Table 7.1: Participants' Unaided Recall Results

Number of Items Recalled	Control Group	Experimental Group	Total Sample
2	2(12.5)	-	2(6.3)
3	1(6.3)	1(6.3)	2(6.3)
4	3(18.5)	2(12.5)	5(15.6)
5	7(43.5)	1(6.3)	8(25.0)
6	1(6.3)	6(37.3)	7(21.9)
7	2(12.5)	4(25.0)	6(18.8)
8	-	1(6.3)	1(3.3)
9	-	1(6.3)	1(3.3)
Total	16(100.0)	16(100.0)	32(100.0)

() Figures in brackets are in percentages

N= 32

Maximum possible score = 12

Mean score for total sample= 5.43, SD=1.63

Mean score for control group=4.63, SD=1.45

Mean score for experimental group=6.06, SD=1.53

7.2.3.2. Item Position and Item Duration

The order in which the stories appeared in the broadcast did not have any significant effect on unaided recall. An analyses of variance (ANOVA) test gave a value of $F=.567$, $df=2$, $p<.586$). Even though there was no statistically significant difference in unaided scores due to item position, the results (see Table 7.2) indicated that the first two items and the last item were the three most recalled items. The item, *appropriate methods of land preparation*, was the first news item on the radio broadcast, coming immediately after the introduction of the programme by the programme host. The study found that 22 out of the 32 participants (68.8%) were able to recall this item.

The next most remembered news item was the second story that contained information on the *appropriate ways to make ridges on slopes and the benefits to be derived from this method*, which was recalled by 21(62.5%). The twelfth item, which was advising farmers on the *proper methods of storing their produce to prevent insect attacks and loss of quality*, was the third most frequently recalled item. A total of 20 participants (59.3 %) were able to recall this item. In spite of the seeming influence of the positions of these three items on participants' unaided recall, this effect, as stated above, was not statistically significant.

Table 7.2: Item Positions, Item Duration and Unaided Recall Scores

News Item	Item Position	Item Duration	Unaided Recall
Land preparation	First	2.0	22(68.8)
Methods of making ridges	Second	2.5	21(62.5)
Techniques of maize storage	Twelve	3.0	20(59.3)
Application of chemical fertilizers	Eight	4.5	18(53.1)
How to make prepare maize seeds	Fourth	4.5	16(50.0)
How to apply weedicides	Seventh	3.5	15(48.0)
Making compost manure	Ninth	2.5	14(46.0)
Hand weeding	Sixth	1.0	11(37.5)
Harvesting	Tenth	1.5	10(31.5)
Planting techniques and periods	Fifth	1.0	10(31.5)
Where to get more information	Third	0.75	7(21.9)
Appropriate drying methods	Eleventh	0.75	5(15.6)

() Figures in brackets are percentages
N=32

Item duration was found to have a significant positive relationship with unaided recall scores of the entire sample ($r=.650$, $p<.021$), and also for the control group ($r=.613$, $p<.027$) and the experimental group ($r=.645$, $p<.012$). This means that the items with the longest duration recorded significantly higher unaided recall scores than those which had shorter broadcast duration. The three items that enjoyed the longest broadcast duration were: *How to apply chemical fertilizers* (3 minutes, 30 seconds; *How to prepare maize seeds* (4 minutes, 30 seconds), and *How to apply weedicides correctly* (3 minutes, 30 seconds). Even though none of these three news items were among the three most frequently recalled stories, they were, nonetheless, recalled by a significant number of participants, 18 (53.1%), 16(50%), and 15(48%), respectively, and they occupied the fourth, fifth and sixth positions in terms of unaided recall.

The three items that recorded the least unaided recall scores were also the items with the least broadcast duration. The items are: *planting techniques and periods*, which had a broadcast duration of 60 seconds and was recalled by only 10 participants (31.5%); *where to get more information*, which lasted for 45 seconds and was recalled by seven participants (21.9%); and, *appropriate drying methods*, which had a broadcast duration of 45 seconds and was recalled by five participants (15.6%).

Findings of the study by Stauffer, Frost and Rybolt (1980) presented a less clear picture as regards the effect of broadcast duration on message recall. They reported that the most remembered item was the first item in the broadcast, and also the one that enjoyed the longest duration (1 minute 45 seconds). Stauffer and his colleagues also found that an item that lasted 47 minutes was remembered by only 4% of the participants, while one that had a shorter duration (40 seconds) was recalled by 38% of the sample. However, in another study by the three authors (Stauffer, Frost and Rybolt, 1978) in Boston, they found conclusive evidence that recall of news items was influenced by the length of air time given to a story.

7.2.3.3. Audience Factors and Unaided Recall

The demographic and socio-economic characteristics that were found to have significant relationship with unaided recall scores were age ($r = -.683$, $p < .001$) and education ($r = .634$, $p < .001$). All other audience factors including income, sex, attitudes, perceptions of source credibility and media exposure were, however, found to have no relationship with recall.

Results of the stepwise multiple regression analyses also indicated that among all the audience factors, only age and education were found to be predictors of unaided recall. The results are presented as follows: For age, the beta value was $\text{Beta} = .489$, $p > .001$, and for education, beta was $\text{Beta} = .383$, $p < .008$. The adjusted R score for age was .466, and for both age and education, it was .583. This means that age and education together accounted for 58.3% in the variance of unaided recall.

7.2.3.4. Comprehension Scores

Comprehension was measured using a series of open-ended questions. The comprehension test sought to elicit responses to questions asking for explanations of issues discussed in the broadcast, description of some agronomic practices, names of places, names of agro-inputs and how to source further information on crop farming. As already mentioned when the scoring procedure was being discussed, two marks were awarded for each correct answer, one mark for a partially correct answer, and no point for a wrong answer or no answers.

The results of the test scores show that the participants in the experimental group performed better than those in the control group (see Table 7.3). The mean score for

the experimental group was 19.3(48.3%), and for the control group, it was 15.1(37.7%). The highest score was 25(60%), and this was recorded by a farmer in the experimental group. The lowest score was 7(17.5%), recorded by a farmer in the control group. The t-test analysis indicated a significant difference in the mean unaided recall score between the control group and the experimental group ($t = -2.537$, $df = 30$, $p < .017$). The experimental group, which is the group that had the benefit of listening to the broadcast twice (first broadcast and repeat broadcast), performed significantly better than the group that listened to the programme only once (the control group). Hypothesis seven (H7) of the experiment was therefore accepted.

Table 7.3: Participants' Scores on Comprehension

Test Scores	Control Group	Experimental group	Total Sample
5-10	2(12.5)	2(12.5)	4(12.5)
11-15	6(37.50)	1(6.25)	7(21.8)
16-20	5(31.25)	5(31.25)	10(31.25)
21-25	3(18.75)	7(43.75)	10(31.25)
26-30	-	1(6.25)	1(3.13)
31-35			
36-40			
Total	16(100)	16(100)	32(100)

() Figures in brackets are percentages

$N = 32$

Maximum possible score = 40

Mean score of total sample = 17.19, $SD = 5.11$

Mean score of control group = 15.1, $SD = 4.34$

Mean score of experimental group = 19.3, $SD = 5.02$

The finding is supported by empirical studies on agricultural technology transfer. Myers (1998) reported the influence of repeat broadcast in knowledge gain and behaviour change in relation to sustainable agriculture and environmental sustainability in a study conducted in Mali.

7.2.3.5. Audience Factors and Test Scores

Similar to the results found in this chapter as regards the relationship between unaided recall and audience factors, the results of the Pearson product moment correlation indicated a significant negative correlation between comprehension and age ($r = -.670$, $p < .001$), a significant positive correlation between education and comprehension ($r = .391$, $p < .027$), and between comprehension and unaided recall scores ($r = .679$, $p < .001$). This means that the younger farmers recorded significantly higher comprehension test scores than the older ones, and farmers with high levels of education recorded significantly higher comprehension scores than those with low levels of education. Those who recorded higher unaided recall scores also recorded significantly higher marks in the comprehension test than those who recorded low unaided recall scores. There was no significant relationship between comprehension and the other audience variables.

The results of the stepwise multiple regression analyses indicated that only age was a predictor of comprehension. The beta value was $\text{Beta} = -.679$, $P < .001$ and the adjusted R square score was .449. Age, therefore, accounted for 44.9% of the variance in comprehension scores. Clearly then age was found to be a good predictor of level of comprehension of broadcast news.

7.2.4. Discussion

The significant difference in unaided recall and comprehension scores between the participants who listened to the broadcast only once and those who listened to it twice, has confirmed that in a radio broadcast, information that is repeated enhances unaided recall and message comprehension (Hogg and Vaughan, 2005). For adult farmers in particular, repeat broadcasts of radio agricultural and environmental messages are better understood, accepted and applied by farmers, than the messages that are broadcast once (Myers, 1998).

The results of the relationship between education and comprehension, and between recall and comprehension are consistent with findings made by Stauffer, Frost and Rybolt (1980). They found in their study in Kenya that the only two variables that had significant relationship with message comprehension were education and the unaided recall scores. Similarly, the findings on the relationship between age and education, and unaided recall are supported by findings of an earlier

study conducted by Stauffer, Frost and Rybolt (1978) in a study on *Literacy, Illiteracy and Learning from Television News*, conducted in Boston. These authors employed a half hour ABE Evening News programme to test recall and comprehension among college students and students of the Philadelphia adult basic education (ABE) programme. The results of their study indicated that the college sample recalled significantly more news stories than the adult basic education sample.

Further, they found that even within the adult learners, significantly higher scores were achieved by the younger students with more formal education; suggesting further the influence education has on recall of broadcast news, and underscoring also the potency of age in news recall. The Kenyan study, in 1980, by the three researchers (Stauffer, Frost and Rybolt, 1980) also found a significant relationship between education and news recall, but found no relationship between recall and other demographic variables, including age.

7.3. Experiment 2: Effect of Repeat Broadcast (Twice).

This experiment sought to investigate the effect of repeat broadcast beyond one repetition. The proposition was that when a broadcast is repeated twice (which means it is broadcast three times) to participants it might result in boredom and dwindled interest in the participants by the time they listened to the third broadcast. The assumption therefore was that when a whole radio broadcast is repeated several times, this would result in less gain in unaided memory recall and comprehension (Bernard and Coldevin, 1985). Therefore, in this experiment an attempt was made to investigate the difference in message comprehension and unaided recall between a control group that listened to a radio programme once and an experimental group that listened to the same programme three times.

Because of the long duration (30 minutes) of the broadcast that was used in the first experiment discussed earlier in this chapter, it was thought that using a news broadcast with a shorter duration would be appropriate for this experiment. The reasoning was that, to use a broadcast with duration of 30 minutes would make the total listening period too long (90 minutes) for the participants in the experimental group. Therefore, a different radio broadcast, shorter than the one of 30 minutes' duration, was designed and used for this experiment.

7.3.1. Method

Design: A-seven minute 8-item radio broadcast was designed and used for the experiment. The broadcast was produced in Gonja, which is the main language spoken by the people in the community in which the experiment was conducted. The broadcast was designed and produced with the help of agriculture and media experts. It was recorded in an audio cassette and played back to the farmers in their community. The messages were on the *larger grain borer*, an agricultural pest.⁹ Even though the larger grain borer bears physical resemblance to some of the normal pests that farmers know, it has some distinguishing physical characteristics. It also causes greater havoc to crops than all other pests. Participants in the control group and experimental group heard the same broadcast, but the participants in the experimental group had listened to the programme three times, while those in the control group had listened to it once. In the earlier experiment in this chapter, it was found that when a programme was repeated once, participants who heard the repeat broadcast recorded significantly higher recall and comprehension scores than those who heard the broadcast only once ($t=-2.727$, $df=30$, $p=.011$). The main purpose of this experiment was to find out whether a programme that is repeated twice (that means it was broadcast three times) would be recalled and understood better than a programme that is broadcast only once.

⁹ The larger grain borer has been identified, quite recently as one of the pests that cause severe damage to crops. Most farmers were unaware of the destruction caused by the insect, and the few who had the idea about the pest, did not have much information on how, when and where it begins to attack crops, and how to control the pest and to protect their crops.

Box 7.2: An example of a comprehension question, the expected answer, and the scoring procedure

Question 1:

What are the physical features that distinguish the larger grain borer (LGB) from other weevils?

Answers (correct responses):

- (i) LGB has very big eyes
- (ii) It is strikingly dark in colour
- (iii) It has large mouth parts
- (iv) LGB has a big and round head

Scoring:

Two marks were awarded for each correct response, one mark for a partially correct response, and no mark for a wrong response. Therefore, the question was scored over a maximum of eight marks.

Participants: The participants were 30 farmers living in Yipala, a small rural farming community in the Central Gonja District of the Northern Region of Ghana. They were all small scale farmers engaged in crop farming as their main economic venture.

Procedure: The procedure for the conduct of this experiment was the same as the one used for the first experiment, except that in this experiment, the experimental group listened to the broadcast three times, while the control group listened to it only once.

Scoring procedure: The scoring procedure for unaided recall and comprehension was also similar to that used in the first experiment. However, the maximum number of items to be recalled and the total scores on comprehension for this experiment were different from the first experiment. In this experiment, the broadcast contained eight (8) news items; therefore the total possible maximum score on unaided recall for an individual participant was eight (8), whilst the total for the first experiment was 12. Also, the total number of marks for the comprehension test was 44, which is higher than the total score of 40 marks for the first experiment. Box 7.2 above contains an example of a question, expected accurate responses, and scoring system for this experiment.

7.3.2. Demographic and Socio-economic Characteristics

The mean age of the participants was 39.2 years. The youngest was 24 years and the oldest was 60 years. Average annual income was Gh Cedi 3,223,300 (about US\$339 in 2006). Twenty eight (93.3%) of the respondents were males, and only two (6.7%) were females. Six (20%) of the respondents had formal education, four (13.3%) had non-formal education, and the rest (20 participants, representing 66.7 %,) had no form of education.

7.3.3. Results

7.3.3.1. Unaided Recall

The mean unaided recall scores for the entire sample was 4.13 items (51.25%). With a mean unaided score of 4.66 (58.2%), the experimental group performed better than the control group, which recorded a mean score of 3.6 (45%). The results of the t-test analyses ($t=-2.416$, $df=28$, $p<.023$) indicated a significant difference in the mean scores of the two groups. This suggests that broadcasting a radio programme three times to the experimental group did not result into loss of interest and dwindled attention. Instead it enhanced the memory recall and understanding of the experimental group. Details of the unaided recall scores are contained in Table 7.4. The lowest score for the entire sample was 2 items, recorded by two participants (13.2%) in the control group, and the highest was 7, recorded by two participants (13.2%) in the experimental group.

Table 7.4: Participants' Unaided Recall Results

Number of Items Recalled	Control Group	Experimental Group	Total Sample
2	2(13.3)	-	2(6.7)
3	6(40.0)	3(20)	9(30.0)
4	4(26.7)	4(26.7)	8(26.7)
5	2(13.3)	5(33.3)	7(23.3)
6	1(6.7)	1(6.7)	2(6.7)
7	-	2(13.3)	2(6.7)
8	-	-	-

() Scores in brackets are percentages

$N = 30$

Maximum possible score = 8

Mean score for entire sample = 4.13, $SD = 1.30$

Mean score for control group = 3.60, $SD = 1.12$

Mean score for experimental group = 4.66, $SD = 1.29$

7.3.3.2. Item Position and Item Duration

The results of ANOVA indicated no significant mean effect on participants' unaided recall scores due to item position (F value=.813, $df=3$, $p<.550$). For item duration, the results indicated no correlation with unaided recall scores of the entire sample ($r=.607$, $p<.055$), and the experimental group ($r=.531$, $p<.085$). However, there was a positive correlation between item duration and the unaided recall scores of the control sample ($r=.613$, $p<.050$). This finding suggests that perhaps the two other chances that participants in the experimental group had in listening to the broadcast made it possible for them to retain in memory even the items with shorter duration, thus eliminating the effect of item duration on their unaided recall scores.

Table 7.5: Item Duration, Item Position and Unaided Recall Scores

Item	Item Position	Item Duration	Unaided Recall Score
How to apply agro-chemicals to control LGB	Fourth	1.75	21(70.0)
How to identify the LGB	First	0.75	18(60.0)
Larger grain borer is harmful to crops	Second	1.0	18(60.0)
Recommended pesticides to control LGB	Fifth	0.9	17(56.7)
How to prevent crops from toxic pesticides	Eighth	1.0	17(56.7)
Periods that LGB attacks crops	Third	0.5	15(50.0)
Recommended retail outlets for agro-pesticides	Sixth	0.75	9(30.0)
Sources of information on LGB	Seventh	0.75	9(30.0)

() Figures in brackets are percentages
 N=30

7.3.3.3. Audience Factors and Unaided Recall Scores

The results of a Pearson product moment correlation analysis indicated that unaided recall had a significant relationship with age ($r=-.469$, $p<.009$), education ($r=.394$, $p<.031$), attitudes ($r=-.436$, $p<.016$), and media exposure ($r=.523$, $p<.003$). For age, the relationship with unaided recall was moderate and negative; the younger farmers recorded significantly higher unaided recall scores than the older farmers. Farmers with stronger positive attitudes scored less than those with less positive attitudes towards the local radio station.

Education had a low but positive relationship with unaided recall. Participants with higher levels of education recorded significantly higher recall scores than those with low or no education. Media exposure demonstrated a moderate positive relationship with unaided recall; the farmers who relied on multiple media sources for general news scored higher on unaided recall than those who relied on fewer communication sources. A stepwise multiple regression analysis was done to determine the level of contribution and the predictive capacity of the independent variables to the dependent variable. The results indicated that only age is a predictor of unaided recall. The beta value given was $Beta=-.439$, $p<.015$. The adjusted R square value was .193, indicating that 19.3% of the variance in unaided recall was accounted for by age.

7.3.3.4. Comprehension Scores

The mean score for the control group was 18.2 (41.3%), whilst that of the experimental group was 23.2 (53.6%). The mean score of the entire sample was 20.7 (47%). The highest score was 32 (72.7%), and this was recorded by a participant in the experimental group. The lowest was 8 (18.2%), which was recorded by a farmer in the control group. The t-test analyses indicated that there was a significant difference in the mean scores of the control group and experimental group ($t=-2.354$, $df=28$, $p<.026$). The result means that the experimental group, after listening to the 7-minute broadcast three times, scored significantly higher comprehension scores than the control group, which had listened to the broadcast only once.

Table 7.6: Participants' Scores on Comprehension

Score on Comprehension	Control Group	Experimental Group	Total Sample
5-10	1(6.7)		1(3.3)
11-15	3(20.0)	1(6.7)	4(13.3)
16-20	7(46.7)	4(26.7)	11(36.7)
21-25	1(6.7)	4(26.7)	5(16.7)
26-30	3(20.0)	3(20.0)	6(20.0)
31-35	-	3(20.0)	3(10.0)
Total	15(100.0)	15(100.0)	15(100.0)

() Figures in brackets are percentages

$N = 30$

Mean score of control group = 18.2, $SD=5.42$

Mean score of experimental group = 23.6, $SD=6.61$

Mean score of total sample = 20.7, $SD=6.50$

Maximum possible score = 44

7.3.3.5. Audience Factors and Comprehension Scores

The Pearson product moment correlation and chi-square analyses indicated that there was no significant relationship between message comprehension and any of the audience factors. The results of the analyses between comprehension and the audience variables were: age ($r=-.264$, $p<.159$); education ($r=.246$, $p<.265$); income

($r=-.137$, $p<.471$); media exposure ($r=.309$, $p<.065$); attitudes ($r=-.160$, $p<.397$); and, credibility ($r=.065$, $p<.732$).

The results of the stepwise multiple regression analyses indicated that age is a predictor of comprehension. Age accounted for 16.4% of the variation in unaided recall. The beta value was $Beta=-.405$, $p<.027$, and the adjusted R square value was .164, indicating that age was a predictor of unaided recall, and accounted for about 16.4% of the variance in the unaided recall scores.

The results of the study indicted a significant correlation between unaided recall scores and the test scores ($r=.467$, $p<.009$). This finding suggests a moderate positive correlation between the unaided recall scores and comprehension.

7.3.4. Discussion

This experiment on repeat broadcast (twice), like the first one (where the broadcast was repeated only once to the experimental group), indicated a significant gain for both unaided recall and comprehension by the experimental group over the control group. The experimental group clearly benefited from the repeat broadcasts. The treatment group that heard a repeat broadcast of a 30-minute programme recorded significantly higher unaided recall ($t=2.727$, $df=28$, $p<.011$) and comprehension scores ($t=2.537$, $df=28$, $p=.017$). Literature on recall and comprehension of news supports the view that repetition of news enhances unaided recall and understanding of television and radio contents (Findahl and Hoijer, 1975). However, literature also suggests that too much repetition could reduce interest in the broadcast, and thus will not increase recall and comprehension (Bernard and Coldevin, 1985; Findahl and Hoijer, 1975). Perhaps, listening to the broadcast three times was not considered too much by the participants, or possibly the short duration of the broadcast (seven minutes) was not long enough to cause boredom in the participants even after listening to it three times, which gave a combined listening period of 21 minutes.

The results of the Pearson product moment correlation and the stepwise multiple regression analyses provided contrasting results. While the Pearson product moment correlation indicated a significant relationship between unaided recall and: age ($r=-.469$, $p<.009$); education ($r=.394$, $p<.031$); attitudes ($r=-.436$, $P<.016$); and media exposure ($r=.523$, $p<.003$); the results of the stepwise multiple regression analyses indicated that only age is a predictor of unaided recall. The beta value was $b=-.439$,

$p < .015$. The adjusted R square value was .193, indicating that 19.3% of the variance in unaided recall was accounted for by age.

With comprehension, the Pearson product moment correlation analysis indicated no significant relationship between comprehension and all the audience factors. However, the results of the stepwise multiple regression analysis showed that only age had a significant relationship with unaided recall (with a beta value of $\text{Beta} = -.405$, $p < .027$). The adjusted R square value of .164, suggested that 16.4% of the variance in participants comprehension was explained by age. This finding suggests a possibility that the younger farmers consumed more news media than the older farmers. The reason why the younger farmers consumed more news from the media than the older farmers could in turn be attributed to the fact that the younger farmers have higher levels of education than the older farmers.

7.4. Experiment 3: Effect of Straight Talk as Repeat Broadcast

This experiment investigated the effect of summary material as straight talk within a news broadcast on farmers' comprehension and recall of radio messages. In the two experiments discussed earlier in this chapter, it was found that repeat broadcasts resulted in significant difference in unaided recall and comprehension scores between the control groups and experimental groups. The experimental groups in both experiments performed better and recorded significantly higher mean recall scores than the control groups. In this third experiment, the effect of straight talk,¹⁰ used as mass summary at the end of a broadcast, was investigated. The straight talk did not include all the items contained in the main broadcast¹¹

7.4.1. Method

Design: Two radio news broadcasts were designed and used for the experiment. One of the broadcasts, which the participants in the experimental group listened to, combined a discussion format of 15 minutes and a straight talk format of five (5)

¹⁰ The straight talk is additional verbal material that is normally presented as part of a discussion or magazine broadcast programme format. It involves the use of a voice that is not part of the discussion panel, and which is not also the presenter's voice, to summarise the main issues discussed in a radio broadcast.

¹¹ The straight talk that was used for this experiment repeated only five of the eleven items contained in the broadcast. These items were: *benefits of keeping small ruminants; provide appropriate housing; appropriate feeding; watering the animal; and; how to take care of ecto-parasites.*

minutes' duration. The other broadcast constituted only the 15 minutes' radio discussion format without the straight talk component. This was the broadcast the participants in the control group listened to. The broadcast was in Gonja, a language spoken by the participants of the experiment. Essentially, the messages contained in the two radio broadcast were the same. The straight talk was presented as a form of reminder of some of the items discussed. The two groups heard the programmes separately, and face-to-face interviews were also administered to test for their unaided recall and comprehension. The group that listened to the broadcast first was tested first. As the first group was being tested, the second group listened to the broadcast. Half of the sample was the control group, and the other half was the experimental group.

Participants: The participants were 30 farmers living in Kpatinyan, a rural community in the Central Gonja District of Ghana. They were all engaged in animal rearing (livestock production) as an economic activity, in addition to crop farming. The messages of the programme, which were on small ruminant production, were therefore relevant to all the farmers.¹² An example of one of the questions that sought to measure farmers' comprehension and the expected answers, are provided in Box 7.3.

Procedure: The procedure for conducting this experiment was similar to the procedure used in conducting the two experiments discussed earlier in this chapter. The only addition was the inclusion of another voice that presented a summary of the messages on selected news items in the broadcast for the benefit of the experimental group.

Scoring procedure: The scoring was the same as in the case of the first two experiments discussed in this chapter.

¹² The messages contained in the broadcast were generally on: the benefits of small ruminant production to small-scale rural farmers, the appropriate design of housing for the animals, animal health, watering of the animals, feeding, and sources of information for the animals and importance of recordkeeping.

Box 7.3. An example of a question, the expected answer and the scoring procedure

Question:

Mention the recommended processes involved in disposing off the carcass of a small ruminant that is killed by anthrax.

Answer (expected responses):

- (i). Wear gloves before you touch the dead animal
- (ii). Ensure that blood from the animal is washed
- (iii). Disinfect the animal pen (house)
- (iv). Burry the animal or set in on fire

Scoring

A maximum of eight marks was allotted to this question. Each of the sub-answers attracted two marks if correctly stated, one mark if partially correct, and no mark if no response was given.

7.4.2. Demographic and Socio-Economic Characteristics

The mean age of the participants 37 years, the youngest was 22 years and the oldest as 56 years. More than half (53.3%) of the participants were between 22 years and 35 years. The average annual income was 3,180 Gh. cedis (about US\$334 in 2006). This figure was an indication that the average daily income of the farmers was less than US\$1. Twenty six participants (86.7%) were males and four (13.3%) were females.

7.4.3. Results

7.4.3.1. Unaided Recall Scores

The mean score for unaided recall of the 30 participants was 5.4 (49.1%); the minimum was 2 (18.2%), and the maximum was 9 (81.8%). The mean scores for the control group and experimental group were 4.86 (44.18%) and 6.0 (54.5%) respectively. The t-test analysis gave a value of $t=-2.143$, $p<.056$, indicating that there was no significant difference in the mean scores of the control group and experimental

group (see Table 7.7). In Table 7.8 unaided recall scores in relation to position of item on news broadcast and duration of news item are provided.

Table 7.7: Participants' Unaided Recall Results

Number of News Items Recalled	Control Group	Experimental Group	Total Sample
3	2(13.3)	1(6.7)	3(10.0)
4	5(33.3)	2(13.3)	7(23.3)
5	4(26.7)	3(20.0)	7(23.3)
6	2(13.3)	3(20.0)	5(16.6)
7	1(6.7)	2(13.3)	4(13.3)
8	1(6.6)	2(13.3)	3(10.0)
9	-	1(6.7)	1(3.3)
Total	15(100.0)	15(100.0)	15(100.0)

() Figures in brackets are percentages

N = 30

Maximum possible score = 11

Mean score for control group = 4.86, *SD* = 1.63

Mean score for experimental group = 6.0, *SD* = 1.73

Mean score for total group = 5.4, *SD* = 1.84

Table 7.8: Item Position, Item Duration and Unaided Recall Scores

News Item	Item Position	Item Duration	Unaided Recall
Appropriate Housing for animals	Second	3.0	24(80)
Proper feeding of small ruminants	Fourth	1.25	22(73.3)
Watering small ruminants	Third	1.0	20(66.6)
How to control ecto-parasites in ruminants	Sixth	2.5	20(66.6)
How to control endo-parasites	Eighth	2.5	17(56.6)
Benefits derived from keeping ruminants	First	0.75	13(43.3)
Determining ill-health in ruminants	Eleventh	0.75	12(40.0)
Need to keep proper record of animals	Tenth	1.0	11(36.6)
Need to sell stock when they fully mature	Seventh	0.5	10(33.3)
Avoid in-breeding among ruminants	Ninth	0.5	9(30.0)
Provide comfortable floor for animals	Fifth	0.5	4(13.3)

() Figures in brackets are percentages
N=30

7.4.3.2. Item Position and Item Duration

The study found a positive correlation between duration of the news items and unaided recall for the entire sample ($r=.750$, $p<.008$). Also for the control group ($r=.610$, $p<.046$), and experimental group ($r=.647$, $p<.016$), the results showed a significant correlation between unaided recall and news item duration. The results therefore suggest that news stories with higher duration recorded significantly higher unaided recall scores than those with shorter duration. The influence of position of news item on the level of unaided recall did not show any significant mean effect. The ANOVA test conducted indicated an F value of 2.910, $df=2$, $p<.112$. This means that item position did not have a significant effect on the mean scores both within the two groups, and between the participants.

The first item in the broadcast (*benefits derived from keeping small ruminants*) was recalled by 13 (43.3%), whilst the last item (*How to determine ill-health in small ruminants*) was recalled by 12 participants (40%). These two items were in the “favourable positions” in the broadcast, but they were each recalled by less than half of the participants. The three most recalled items appeared second, third and fourth in the news broadcast. The most recalled item – *Appropriate Housing for Small Ruminants* - which was recalled by 24 participants (80%), was the second item in the broadcast, whilst the first item in the broadcast – *Benefits derived from keeping small*

ruminants – was the sixth most recalled item, and it was recalled by 13 (43.3%) participants. The sixth item (*how to control ecto-parasites*) and the eighth (*how to control endo-parasites*) placed fourth and fifth respectively in terms of unaided recall scores. The item that was most recalled (*Appropriate housing for small ruminants*) had a broadcast duration of 3 minutes (with additional half a minute duration in the straight talk component of the broadcast). The fourth and fifth most recalled items (*How to control ecto-parasites* and *How to control endo-parasites*) had duration of 2 minutes, 30 seconds each. The item on *ecto-parasites* had an additional duration of 1 minute 15 seconds in the straight talk, giving it a total broadcast duration of 3 minutes 45 seconds. This item was recalled by more participants (20 participants) than the item, *How to control endo-parasites*, which was recalled by 17 participants. The two items were in unfavourable positions in the broadcast, yet one of them performed better in terms of unaided recall scores. The logical conclusion that can be drawn is that the longer duration of the item explains its better performance.

7.4.3.3. Unaided Recall and Audience Factors

The study found that among all the demographic and socio-economic variables measured in the study, only age had a significant relationship with participants' unaided recall scores. The value of the relationship between age and unaided recall was $r = -.439$, $p < .015$, suggesting a significant moderate negative correlation. This result means that the younger farmers scored significantly higher unaided recall scores than the older farmers. For the stepwise multiple regression analysis, age again was the only variable that provided significant contribution to the variance in recall. The beta value was $b = -.523$, $p < .003$, and the adjusted R square value was .247. This suggests that age accounted for about 25% in the variance of the comprehension scores.

7.4.3.4. Comprehension Scores

The test results measured the comprehension of the messages the participants had listened to. Table 7.9 contains details of the scores on participants' comprehension. The results indicated that the experimental group scored higher comprehension scores than the control group. The mean score for the control group was 21.6(47.9%), the

mean score for the experimental group was 23.3(52.3%), and for the total sample, the mean score was 22.0(50.5%).

Even though the experimental group (the group that had the benefit of listening to additional five minutes of straight talk as part of the programme) scored higher mean comprehension scores than the control group (the group that listened to only the main broadcast of 15 minutes), the difference was not statistically significant. The t-test analyses gave a value of $t=-.969$, $df=28$, $p<.341$.

Table 7.9: Participants' Scores on Comprehension

Score on Comprehension	Control Group	Experimental Group	Total Sample
10-15	2(13.3)	2(13.3)	4(13.4)
16-20	6(40.0)	5(33.4)	11(36.7)
21-25	4(26.7)	4(20.0)	8(26.7)
26-30	3(20.0)	1(13.3)	4(13.4)
31-35	-	3(20.0)	3(10.0)
Total	15(100.0)	15(100.0)	30(100.0)

() Figures in brackets are percentages

$N = 30$

Mean score of control group = 21.6, $SD=6.8$

Mean score of experimental group = 23.33, $SD=6.2$

Mean score of total sample = 22.0, $SD=6.2$

Maximum possible score = 44

7.4.3.5. Audience Factors and Comprehension Scores

The findings of the study showed a significant relationship between age and message comprehension. The results of the Pearson-product moment correlation indicated a value of $r=-.405$, $p<.027$. This result suggests that age had a moderate negative relationship with comprehension scores. The older farmers recorded significantly less comprehension scores than the younger farmers. All other audience factors were found to have no significant relationship with comprehension. The relationship between comprehension and the other audience factors were as follows:

education ($r=.168$, $p<.375$); income ($r=-.036$, $p<.692$); attitude ($r=.054$, $p<.774$); source credibility ($r=.026$, $p<.894$); media exposure ($r=.081$, $p<.672$); and, gender $X^2=18.8$, $p<.065$).

There was a significant correlation between unaided recall scores and comprehension scores. The results of the Pearson-product moment correlation analyses indicated a value of $r=.702$, $p<.000$.

The Stepwise multiple regression analyses showed that only age had a predictive value in the variance for unaided recall. With a beta value of $b=-.523$, $p<.001$, and an adjusted R square value of .247, age accounted for 24.7% of the variance in comprehension.

7.4.4. Discussion

Although the treatment group recorded higher marks than the control group in both unaided recall and comprehension, the difference in scores was not statistically significant. The additional five minutes of straight talk provided less effect on unaided recall and comprehension as compared to the effect demonstrated by repeat broadcasts in the first two experiments (in this chapter).

This finding is significant to local radio programme producers in northern Ghana. *Straight talk* is often used either as part of a radio magazine programme format or used alone as a radio programme format for agricultural broadcast. Another important finding in this experiment is that apart from age, all other demographic and socio-economic variables were found to have no significant relationship with participants' unaided recall and comprehension scores. The value of the relationship between age and unaided recall, and age and message comprehension, were $r=-.439$, $p<.015$, and $r=-.405$, $p<.027$ respectively. These results mean the younger farmers scored significantly higher unaided recall and comprehension scores than the older farmers. The results of the study indicated a significant correlation between unaided recall scores and comprehension scores. The results of the Pearson-product moment correlation analyses that was run indicated a value of $r=.702$, $p<.001$. This result showed a strong positive correlation between the recall scores recorded by the participants and their scores on comprehension.

7.5. General Discussion

In two of the three experiments discussed in this study, — repeating a broadcast once, and the effect of repeating a broadcast twice — it was found that there was significant difference in the mean scores of the control groups and the experimental groups. The experimental groups, in both experiments, recorded significantly higher unaided recall and significantly higher comprehension scores than the control groups. By these results, Hypotheses H6 (*Farmers are more likely to recall messages that are repeated than those that are broadcast only once*), and H7 (*Farmers are more likely to understand messages that are repeated than messages that are broadcast only once*) were accepted.

The results confirmed that in a radio broadcast, information that is repeated enhances unaided recall and message comprehension (Hogg and Vaughan, 2005). Repeat broadcasts of agricultural and environmental messages on radio are better understood, accepted and adopted by farmers than the messages that are broadcast once (Myers, 1998). Additional verbal information does enhance recall and comprehension of broadcast news (Findahl and Hoijer, 1975; Son, Reese and Davie, 1987). This additional information could be in the form of summary of portions of a broadcast or repetition of the whole broadcast.

For the third experiment, it was found that though the treatment group recorded higher scores than the control group for both unaided recall and comprehension, the difference in scores in both cases was not statistically significant ($t=-2.143$, $df=28$, $p<.056$ and $t=-.969$, $df=28$, $p<.341$). The additional five minutes of straight talk provided less increase in comprehension and unaided recall as compared to the gain in comprehension and unaided recall by the experimental groups in the earlier experiments on the effect of repeat broadcast. The plausible reason for this is that the straight talk gave additional information on only some of the items, and not all. Perhaps repeating the broadcast by using the straight talk format (the original broadcast used was a discussion format) to cover all aspects of the broadcast could have resulted in significant difference between the experimental and control groups in terms of recall and comprehension scores

For all the three experiments, the ANOVA test indicated that item position had no significant influence on the mean unaided recall scores between and within participants. The Pearson product moment correlation analyses indicated a positive

correlation between unaided recall scores and item duration for the first and third experiments, and not for the second experiment (twice repeat broadcast). In the second experiment, there was no significant relationship between item duration and unaided recall for the entire sample and the experimental group (the group that had listened to the broadcast three times). However, for the control group, there was a positive correlation between item duration and unaided recall scores ($r=.613$, $p<.050$). Perhaps because the participants in the control group heard the programme once, the items with the shorter duration (most of which were less than 60 seconds) faded more easily from memory than those which lasted for a minute or more.

For all the three experiments, age was found to have a significant relationship with unaided recall and comprehension. Older farmers scored significantly lower unaided and comprehension scores than did the younger farmers. Education and reported media consumption had a significant relationship with unaided recall in the first experiment. Education and age had significant relationship with unaided recall but not with comprehension, in the third experiment. However, an important finding was that only age was a good predictor of farmers' unaided recall and comprehension scores, according to the results of the stepwise multiple regression analyses. There was also significant relationship between unaided recall scores and comprehension scores for all the three experiments; an indication that those who recorded higher scores in the unaided recall also scored significantly higher scores on message comprehension.

The significant relationship between education and comprehension and between recall and comprehension are consistent with findings made by Stauffer, Frost and Rybolt (1980).

7.6. Conclusion

This chapter presented three experiments that examined: effects of repeating a broadcast once; effects of repeating a broadcast twice; and, the effect of repeating part of a broadcast through the straight talk format. The repeat broadcasts (repeating a broadcast programme once, and repeating a broadcast twice) were found to be effective in enhancing both unaided recall and comprehension, as they showed significant difference in the mean unaided recall scores between the control group and the experimental group. However, repeating part of a broadcast through *straight talk*

did not result into any significant difference in unaided recall and comprehension scores between the control group and experimental group

The next chapter presents three more experiments on the effects of recaps on broadcast news recall and comprehension. The three main forms of recaps are: recaps at the end of the broadcast; recaps at the beginning of a broadcast; and, distributed recaps.

CHAPTER EIGHT

RECAPS AT THE END OF A BROADCAST, RECAPS AT THE BEGINNING OF A BROADCAST AND DISTRIBUTED RECAPS.

8.1. Introduction

This chapter discusses three experiments which were conducted to investigate the effects of recap material on audience unaided recall and comprehension of broadcast news. Three programme formats were produced to test the three types of recaps. The first experiment used a broadcast format that placed the recaps at the end of the broadcast, the second placed the recap material throughout the broadcast, and the third placed the recap material at the end of the broadcast. Thus in each of the three experiments, a form or type of recaps or repetition is offered and its effect is investigated. According to Gunter (1987), repetition of verbal information can be massed or distributed. The distributed repetition is the type that provides recaps or review of material that is interspersed within the body of the broadcast, while the massed repetition is the one that occurs only at the beginning or at the end of the broadcast. This type of recap is commonly used in broadcast television news bulletins (Gunter, 1987). In the Ghanaian context, the massed summary (recaps), whether at the end or at the beginning of a broadcast, is popular with radio presenters of agricultural messages.

Experimental psychologists, Gunter (1987) observed, have established that these methods – massed summary and distributed summary – have differential levels of effect under different conditions. A few studies, as cited by Gunter (1987), have offered conflicting results on the relative effects of massed summary and distributed (spaced) summary. Maccoby and Sheffield (1961), Underwood and Erkstrand (1967) Rothkopf (1968) and Ash and Jaspan (1953) have all reported that spaced or distributed summary is more effective than massed summary (Gunter, 1987). They all however indicated that this result was found in only some particular learning situations. For example, Maccoby and Sheffield (1961) identified spaced summary to be more superior to massed summary in the mastering of sequential learning tasks, where as Rothkopf's (1968) finding on the superiority of spaced or distributed

summary over massed summary was found in relation to the retention of verbal and motor skills (Gunter, 1987).

In broadcast media, repetition or additional verbal information and pictures have been found to enhance recall of broadcast news (Bernard and Coldevin, 1985; Findahl and Hoijer, 1975; Gunter, 1987; Perloff, Wartella and Becker, 1982; Son, Reese and Davie, 1987). According to Gunter (1987), brief news headlines serve as devices for getting audience hooked at the beginning of a broadcast. Son, Reese and Davie (1987) reported that redundancy in words and pictures does improve recall of television news, but has no significant effect on story learning. The redundant visuals that Son Reese and Davie (1987) used in their study resulted in a general increase in recall of the news items.

After a study in Ohio, in the United States, which involved the use of recaps and pause between stories, Perloff, Wartella and Becker (1982) reported that recaps did indeed produce a significant effect on recall. In their study, Findahl and Hoijer (1975) proposed that providing additional background to a story and expanding a story through recaps or repetition enhances recall and comprehension. The two researchers presented radio news stories containing additional information. They found that the additional information that stressed the areas that were difficult to understand in a broadcast enhanced the listeners' cognitive organisation of the story content. They reported also that information that may not be very easy to process at one hearing, for example names of locations and names of those involved in events in the news, are processed better when they are repeated. Stauffer, Frost and Rybolt (1980) reported after their study in Kenya that those stories that were repeated in the broadcast that was used for the study were recalled more by the participants than those that were not repeated. Bernard and Coldevin (1985) investigated the effect of short headline type recaps on recall of items in a broadcast, and found that the recaps were useful in enhancing only the gist of the stories, but not necessarily the comprehension of the messages. Their conclusion was that recapping is effective for directing viewers and listeners' attention towards particular message contents.

In spite of the existence of several research reports supporting the view that recaps do enhance recall of broadcast news, few studies however found recaps either counter productive or less effective in enhancing recall and understanding of broadcast news. Wulfemeyer and McFadden (1985), in a study, assigned 282 students

to two groups –143 for the control group and 139 for the experimental group. The study reported that, the college students who listened to the three-and half minute simulated radio newscast that had no actualities scored significantly higher in a multiple test for recall. The same group also rated newscast more interesting than did the group that listened to a newscast that had actualities. Wulfemeyer and McFadden's (1985) findings contradicted the results of other works on the effects of recaps, repetition and actualities in broadcast. This chapter presents a discussion of three experiments conducted using three kinds of recaps or summary: recaps at the end of a broadcast, distributed recaps, and recaps (review) at the beginning of a broadcast.

8.2. Experiment 1: Effect of Recaps at the End of a Broadcast

This experiment investigated the effect of recap material at the end of a news broadcast on farmers' comprehension and unaided recall. As mentioned earlier in this chapter, this form of recap is what is most commonly used by local radio presenters for agricultural broadcasts in Ghana.

8.2.1. Method

Design: This study used a 30-minute 12-item radio broadcast, which was in Dagbani, the language spoken by the participants of the experiment. The voices on the broadcasts were radio presenters and agricultural extension officers who were well known by the rural farmers in the study area. The idea was to make the broadcasts appear as real as possible. The broadcasts were produced in the recording studio of Radio Savannah Tamale, and recorded into audio cassettes. The recorded cassettes were played back to the farmers during the interview at the community. Two groups of farmers were used for the experiment. One group (the control group) listened to a 30-minute broadcast without recaps (brief summary of news items), and the other (the experimental group) listened to the same broadcast but which contained an additional three (3) minutes summary (recap) at the end of the discussion. The recaps were a kind of reminder of the main issues discussed, but with scanty details, especially as regards figures and measurements. In Box 8.1, the text of a main item and the text of the summary (recap) for the item are provided. The two groups heard the programmes separately, and the oral interviews were also administered to them separately.

Participants: The participants were 30 rural farmers living in Dungu in the Tamale Peri-Urban area of the Northern Region of Ghana. They were all engaged in farming as an economic venture and they had all cultivated maize.

Procedure: The 30 farmers were divided into two groups – control group and experimental group. The control group was the group that listened to the broadcast without recaps, and the experimental group listened to the 30 minutes programme, with recaps presented within a further three minutes' period¹³. The two groups were each positioned at different locations within the village. One research assistant and a unit committee member were requested to supervise the groups so that no exchange of information, knowledge and ideas would occur between members of the two groups and within members of each group. Besides, they helped in organising the participants for the experiments. The purpose was to prevent interferences from other people outside the groups. Also this ensured that there was no noise from within the group that could cause distraction to some members of the groups. As soon as the first group had listened to the broadcast, they were interviewed. As the interviews for the first group were going on, the second group listened to the broadcast. The participants were randomly placed in the two groups – the control group and the experimental group. Before the experiment was conducted, the participants' demographic characteristics were recorded. This revealed the composition of the participants in the two groups to ensure that no group had a higher number of participants with some particular demographic characteristics such as age, education and gender, than the other. The two groups were therefore equally matched in terms of certain characteristics that could have some influence on the groups' scores on unaided recall and comprehension.

Scoring procedure: The farmers' unaided recall of the news items and their comprehension of the messages were measured soon after they listened to the broadcasts. Unaided recall was measured by requesting the participants to mention the main news items or themes that were discussed in the radio broadcast. There were 12 items contained in the radio broadcast, and farmers were awarded a point each for being able to recall an item. Thus, the maximum possible unaided recall scores a farmer could obtain was 12. A correct response was adjudged to be one that was accurately stated in terms of conveying the same meaning as the item presented in the

¹³ The recaps lasted between 10 seconds and 25 seconds for each item.

radio broadcast, with or without using the same words that were contained in the broadcast.

Comprehension was measured by providing 16 questions to which the respondents were made to provide answers. The questions were open-ended and they aimed mostly at eliciting responses on *how*, *when* and *why* (Mesbah, 2006) some agricultural techniques and inputs are used, and in some cases, *where* to request or seek agricultural information. The questions sought to investigate farmers' level of understanding of basic farming techniques, their ability to explain the use of some agro-chemicals, their understanding of *when* and *how* to use these agro-inputs, and *where* and *how* to procure the inputs. In Box 8.2, examples of two questions, expected answers and the scoring system are provided.

The measurement of comprehension differed from the unaided recall. In measuring comprehension, the farmers were provided with cues as to the information sought, whilst in the case of unaided recall, they were provided no cues. For almost all the questions, farmers had to produce two or three short statements as explanations to the *why* and *how* questions, or two or three names of places, figures and measurements. Each correct explanation, figure or name provided was awarded two marks; partially correct answers were awarded a point. Wrong answers and no answers attracted no marks.

Box 8.1: An example of the main message of an item and the recap

The first important step in maize cultivation is *land preparation*. The success of your farming venture depends a lot on the techniques of land preparation that you adopt. Land preparation involves clearing of weeds and all physical obstacles from your maize field before planting. Weeds are particularly what should be tackled in land preparation. A farmer should ensure that all the weeds on the farm are cleared a few months before the onset of the rains. It is advisable to allow the slash that has been cleared to rot on the farm before you begin making your ridges. The slash should not be gathered and heaped at one place; spread them all over the field. If there are hills or slopes on your field, please ensure that you place the slash across the slopes. Also when making your ridges, do not gather the slash and heap them at one place. Instead, allow them to lie in-between the ridges. This will check erosion on the field and ensure that the slash is not washed away. It is strongly recommend that you do not burn the slash on your field. When the slash decomposes they add organic matter to the soil; burning will result into killing of the organisms that would have added nutrients to the soil. Besides this, there is another advantage in not burning the slash on your farm. When you allow the slash to stay on your farm, they offer protection to the soils against the effect of strong rains and running water. This will ensure that you protect your farmland against erosion. It is important also for framers to use slash to guard against dry conditions on the farm. When slash is left on the farm, it helps to retain moisture in the soil.

Recap of Message

Land preparation is the first important agronomic practice that a farmer must tackle. It is beneficial if you apply good land preparation techniques on your maize field. A useful advice to farmers is; avoid burning slash on your farm after clearing the field. It is useful to allow the slash to decompose on the field. This will add more nutrients to the soil, protect your farm from erosion, and add moisture to the soil.

Box 8.2: Examples of two comprehension test questions, the expected answers and the scoring procedure.

Question 1

Why is it advisable for farmers to make ridges across slopes and not along the slopes?

Answer (Expected answer)

1. To prevent run-off of the top fertile soils
2. To protect the plants from being washed away
3. To ensure that enough moisture is available between the ridges

Question 2

What are the three recommended methods of disposing off weedicide containers after applying the chemical to your crops?

Expected answer

1. Bury the container
2. Burn the container
3. Destroy it by perforating it

Scoring

Each of the two questions was scored over six marks. This means each of the sub-answers in both questions attracted a maximum of two marks if correctly answered, one mark if partially accurate, and no mark if wrongly answered or if no answer was given.

The hypothesis that was tested in the experiment was:

H8: Farmers who listen to radio programmes that contain summary material (recaps) at the end of the broadcast will record higher scores on unaided recall than those who listen to the same broadcast without summary (recaps).

8.2.2. Demographic and Socio-economic Characteristics

The youngest respondent was 21 years, the oldest was 65 years, and the mean age of the entire sample was 41.6 years. Twenty percent had formal education from primary school through middle school to junior secondary school, 3% had non-formal adult education and 76.3% were completely illiterate. Mean annual income was

3,500,000 Gh. Cedis (US\$358 in 2006). Most of the farmers were males (93%) and the rest (7%) were females.

8.2.3. Results

8.2.3.1. Unaided Recall

The study found a significant difference in the mean recall scores between the control group and the experimental group ($t = -2.420$, $df = 28$, $p < .022$). The experimental group (the group that benefited from the recaps) recorded significantly higher unaided recall scores than the control group, which did not have the benefit of listening to the recaps. The mean recall score for the experimental group was 6.3 stories (52.8%), and for the control group, it was 4.8 (40%). The average score for the total sample was 5.6 (46%). The least score on recall was 2 stories (17.6%), which was recorded within the control group, and the highest was 9 (75%) recorded by a farmer in the experimental group (see Table 8.1).

8.2.3.2. Audience Factors and Unaided Recall

Stepwise multiple regression and Pearson product moment correlation were run to determine which variables would have significant relationship with unaided recall and comprehension, and also determine the predictors of the dependent variables – unaided recall and comprehension. The Pearson product moment correlation test indicated a strong negative correlation between age and recall, ($r = -.694$, $p < .001$), and a positive correlation between education and recall ($r = .635$, $p < .001$). For all other audience variables, no significant relationship was found between them and unaided recall and comprehension. The results of the stepwise multiple regression analyses also indicated that only age and education provided significant explanations in the variance of unaided recall and comprehension. The beta values for age and education were $-.534$, $p < .001$ and $.413$, $p < .003$ respectively. The adjusted R square value for the age was $.469$, and for both age and education together, it was $.603$. This means that age accounted for 46.9% in the variance in the unaided recall, and age and education accounted for 60%. In relation to the influence of age and education on recall of broadcast news, studies by Stauffer, Frost and Rybolt (1980; 1983) support the findings of this study. In the study by Stauffer, Frost and Rybolt (1983), 597 respondents who had listened to the evening's newscast, were requested to state the

news stories they had heard from the newscast between two and three hours after the event. It was reported that the respondents who had graduate and college level education recalled significantly more news item than those with high school and lower than higher school level education. In the same study, the researchers found that respondents who were younger than 60 years recalled more stories than those who were 60 years and over.

Table 8.1: Participants' Unaided Recall Results

Number of Items Recalled	Control Group	Experimental Group	Total Sample
2	1(6.7)	-	1(3.3)
3	3(20.0)	1(6.7)	4(13.3)
4	4(26.7)	1(6.7)	5(16.7)
5	1(6.7)	2(13.3)	3(10.0)
6	3(20.0)	5(33.3)	8(26.7)
7	2(13.3)	2(13.3)	4(13.3)
8	1(6.7)	3(20.0)	4(13.3)
9	-	1(6.7)	1(3.3)
Total	15(100.0)	15(100.0)	30(100.0)

() Figures in brackets are percentages

N=30

Minimum possible score = 1

Maximum possible score =12

Mean score for total sample=5.6, SD=1.76

Mean score for experimental group=6.3, SD=1.59

Mean score for control group=4.8, SD=1.78

Table 8.2: Item Position, Item Duration and Unaided Recall

Item	Item Position	Item Duration (in minutes)	Score on recall
Land preparation	First	2.0	20(66.7)
How to make ridges	Second	2.5	17(56.7)
Appropriate ways of applying fertilizers	Eighth	4.5	16(53.6)
Techniques of maize storage	Twelve	3.0	16(53.6)
How to apply weedicides	Seventh	2.5	15(50.0)
How to get good maize seed	Fourth	4.5	14(46.7)
How to make compost	Ninth	2.5	14(46.7)
Harvesting	Tenth	1.5	14(46.7)
Planting techniques and periods	Fifth	1.0	12(40.0)
Hand weeding	Sixth	1.0	10(33.3)
Where to get more information	Third	0.75	9(30.0)
Appropriate drying methods	Eleventh	0.75	6(20.0)

() Figures in brackets are percentages

N=30

8.2.3.3. Item Position and Item Duration

The study found a positive significant correlation between item duration and unaided recall for the entire sample ($r = .582$, $p < .047$), and for the control group ($r = .500$, $p < .049$). However, for the experimental group, the results indicated no significant correlation between duration and unaided recall scores ($r = .470$, $p < .123$). This finding suggests that in general, the stories with the longer duration were recalled significantly more than those with shorter duration. Data in Table 8.2 indicate that the items with the longest duration were: *how to apply chemical fertilizers* (4 minutes, 30 seconds), *techniques of maize storage* (3 minutes) and *how to get or prepare maize seeds* (4 minutes, 30 seconds), placed third, fourth and six respectively in terms of unaided recall scores, yet none of them were within the positions considered “favourable” in broadcast news production. Also, the two items with the shortest duration - *where to get information*, and *appropriate drying methods for maize* - which were third and eleventh in the broadcast were the least recalled. It appears vivid that their short duration of 40 seconds (0.75 minutes) each in the broadcast, accounted for their dismal performance in terms of unaided recall scores.

Item position was found to have no significant relationship with unaided recall. The study showed that there was no significant mean difference in unaided recall

between and within the participants as a result of item position. The ANOVA test indicated an F value of 1.928, $df=2$, $p<.585$.

8.2.3.4. Comprehension Scores

The mean score on comprehension by the control group was 15 .06 (38.25%), and for the experimental group, it was 19.4 9 (49%). The mean score for the entire sample was 17.19 (44.95%). The minimum score for the entire sample was 22.5%, recorded by illiterate and elderly respondents (65 years and 53 years) from the control group, whilst the highest score was 70% recoded by a 27 year old farmer in the experimental group who had completed junior secondary school. The details of the comprehension scores are contained in Table 8.3.

The t-test analysis suggests a significant difference in mean scores between the control group and the experimental group ($t=-.3.165$, $df=28$, $p<.004$). The result therefore supports hypothesis H8 of the study.

Table 8.3: Participants' Scores on Comprehension:

Score	Control group	Experimental Group	Total Sample
0 - 10	3(20)	-	3(10.0)
11-15	4(26.6)	2(13.4)	6(20.0)
16-20	6(40.6)	8(53.3)	14(46.7)
21-25	2(20.0)	3(20.0)	5(16.7)
25-30	-	2(13.4)	2(6.7)
Total	15(100.0)	15(100)	30(100.0)

() Figures in brackets are percentages

$N=30$

Mean score foe experimental group=19.49, $SD=4.0$

Mean score for control group=15 .06, $SD=4.4$

Mean score for total sample=17.19, $SD=4.8$

8.2.3.5. Audience Factors and Comprehension Scores

The Pearson product moment correlation analyses indicated a strong negative correlation between age and message comprehension ($r= -.678$, $p<.001$), and a moderate positive correlation between education and comprehension ($r= .519$, $p<.003$). The younger farmers recorded significantly more comprehension scores than the older farmers, and farmers with higher levels of education recorded significantly

higher comprehension scores than those with lower education. The stepwise multiple regression analysis, however, indicated that only age had a significant relationship with comprehension; the beta value was $B = -.694$, $p < .05$. The adjusted R square value was 0.46, indicating that age accounted for 46% in the variance in comprehension. Once again, age proved to have a strong relationship with rural farmers' unaided recall scores, as evidenced by the results of both the Pearson product moment correlation and the stepwise multiple regression analyses. The study found no correlation between gender and message comprehension and between income and message comprehension. The Pearson product moment correlation analyses also indicated a very strong positive correlation between the unaided recall scores and the comprehension scores ($r = .865$, $p < .001$).

8.2.4. Discussion

The results of the study indicated that there was a significant difference in the mean scores of the control group (which heard the broadcast without recaps at the end) and the experimental group (which listened to the broadcast with recaps at the end). The findings of the study therefore supported hypothesis H8, which was postulated for the experiment. Additional verbal information and pictures have been reported to enhance recall and comprehension of television and radio broadcasts (Bernard and Coldevin, 1985; Findahl and Hoijer, 1975; Perloff, Wartella and Becker, 1982; Son, Reese and Davie, 1987). Son, Reese and Davie's (1987) study on *The Effects of Visual-Verbal Redundancy and Recaps of Television News Learning*, found that redundancy in words and pictures significantly improved recall of television news, but did not have a significant effect on story learning. The redundant visuals that were employed throughout the individual stories resulted in a correspondingly general increase in recall of the news items.

The Pearson product moment correlation analysis indicated a strong negative correlation between age and message comprehension ($r = -.678$, $p < .001$), and a moderate positive correlation between education and comprehension ($r = .519$, $p < .003$). The stepwise multiple regression analysis, however, indicated that only age had a significant relationship with comprehension; the beta value was $B = -.694$, $p < .05$. The adjusted R square value was .46, indicating that age accounted for 46% in the variance in comprehension.

8.3. Experiment 2: Effect of Recap (Preview) at the Beginning of a Broadcast

In the previous experiment the effect of recaps on memory recall and comprehension was discussed in general terms. Thus we noted that recaps or summary material whether at the beginning or end of a broadcast, do have an effect on recall and understanding of news. After examining a number of production factors in news broadcast, Gunter (1987) noted that recaps or summary of the main items in a broadcast, when presented at the beginning, appears to have a greater effect in enhancing memory performance. The nature of the effect of recaps on recall and comprehension of broadcast news depends largely on the positions of the recap material in the broadcast (Gunter, 1987). Gunter (1987) stated that “memory performance is enhanced when verbal or pictorial topic headlines are presented before a written and auditory passage but not when they come after it” (Gunter, 1987:278). Such recaps offer clues to audiences or readers about the nature of detailed information to be expected in the broadcast. They also give an indication of the areas of existing knowledge with which the new information to be presented may be integrated (Gunter, 1987).

The results of the first experiment in this chapter indicated a significant mean difference in free recall and comprehension scores between the control group and the experimental group ($t = -2.420$, $df = 28$, $p < .022$ and $t = -.3.165$, $df = 28$, $p < .004$), Farmers who listened to the broadcast that contained recaps at the end of the broadcast recorded significantly more scores on both recall and comprehension than the group that listened to the broadcast without the recaps.

In this experiment, an attempt was made to investigate the effect of recaps that are placed at the beginning of a broadcast. The purpose was to determine whether recaps at the beginning of a broadcast would have an effect on recall and comprehension of broadcast news.

8.3.1. Method

Design: Two groups of participants were used for this experiment, a control group and an experimental group. Two versions of the same broadcast were used for the experiment. One version contained a 30-minute broadcast, and the other contained a 30-minute broadcast with additional three (3) minutes of recaps, that were placed at the beginning of the broadcast. The two broadcasts were in Dagbani, the language

spoken in the community where the experiment was conducted. The control group listened to the radio programme without recaps, and the experimental group listened to the same 30-minute programme, but with an additional three (3) minutes of recaps that preceded the main broadcast.

Box 8.3: An example of an item in the broadcast and a recap of the item

Main Message

Appropriate Methods of Making Ridges

After preparing your land for maize cultivation, the next agronomic activity is to make your ridges on which you will plant your maize. Making ridges the right way is very crucial in maize farming. It is a good start in maize production. Most farmers make ridges along the slopes of hills and high grounds. They believe that as water flows down slope from the high grounds through their farmlands, their maize farms will have adequate volume of water to support plant growth. This practice is not recommended. You will not be able to trap water on your farm if you make ridges along the slopes. On the contrary, you will lose all the water and your plants if you make ridge along the slopes. Making ridges along slopes is one of the major causes of soil infertility. This unsuitable farming practice also poses problems of retention of moisture in the soil. You cannot conserve water in your soil if you use this inappropriate method of making ridges. We recommend that on high grounds and on undulating lands, ridges should be made across the slopes. The benefits that accrue from making your ridges across high grounds are several. The ridges serve as contour bonds; they trap and retain water on your farm, thereby allowing the farm to have enough moisture, even during periods of insufficient rainfall. Besides this, the ridges serve as checks to severe soil erosion. This is because it prevents the top fertile soils from being washed away by the running water that flows from the high grounds, even when the rains are severe and torrential. Also, when ridges are made across slopes they prevent the maize plants from being washed away. You will save your farmlands if you make your ridges across slopes. These are the benefits you will derive if you avoid the practice of making ridges along slopes. Please, let us accept this advice so that we can make good harvest each year from our farms. We recommend this practice to farmers.

Recap material

Most farmers make ridges along slopes. This practice is harmful to the soil, to your crops, and to the environment. This is what has been responsible for poor annual crop harvests and the degradation of our farmlands. The Ministry of Agriculture recommends that farmers whose fields are along slopes should make their ridges across the slopes, not along the slopes.

The recap material contained in the broadcast was the same material that was used in the earlier experiment (Experiment 1, in this chapter), but in this present experiment, the recaps were placed at the beginning of the broadcast. An example of the messages and the recap material contained in the second item of the broadcast is provided in Box 8.3.

Participants: Thirty two (32) rural farmers living in Moglaa, in the Savelugu-Nantong District in northern Ghana participated in this experiment. The farmers were divided into two groups of 16 farmers each, representing the control group and the experimental group.

Procedure: The procedure adopted for the conduct of the experiments was the same as in the case of the first experiment.

Scoring procedure: This experiment adopted a similar scoring procedure as the earlier one in this chapter. An example of the questions that sought to measure comprehension, the expected responses, and the scoring procedure are provided in Box 8.4.

Box 8.4: An example of a comprehension test question, the expected Answer(s) and the scoring procedure

Question:

What are the recommended periods for weeding a maize farm within a crop season?

Answer (expected response)

- (i). First weeding is done 2-3 weeks after the maize has germinated
- (ii). Second weeding is done 5-6 weeks after the germination of the maize.

Scoring procedure

This question was scored over a maximum of four marks. Each of the two sub-answers to the question was allotted two marks if accurately answered, one mark if partially answered. No mark was given for wrong answers, and also for no answers.

8.3.2. Demographic and Socio-economic Characteristics

The average age of the 32 farmers was 40.3 years, the youngest was 21 years and the oldest was 60 years. Mean annual income was 3,309,370 Ghana cedi (about US\$368 in 2006). About two-thirds of the participants (65.6%) earned less than 3,600,000 Gh. Cedi (US\$378 in 2006) per annum. Nearly one-fifth of the farmers (18.7%) had formal education between the primary school and secondary school level, 6.3% had non-formal adult literacy education, and 75% had no education at all. An overwhelming majority (90.6%) were married, and only 9.4% were single. Majority (81.3%) were males and 18.7% were females.

8.3.3. Results

8.3.3.1. Unaided Recall Scores

The results (see Table 8.4) indicated a mean unaided recall score of 4.75 items (39.59%) for the control group, 5.5 items (45.83%), for the experimental group, and 5.1 (42.5%) for the entire sample. This showed a mean difference in unaided recall score of 0.75 (about 6%) between the control group and the experimental group. The highest individual unaided recall score was 9 items (75%), and the lowest was 2 items (16.6%). The t-test analysis showed no significant difference between the control group and the experimental group in terms of unaided recall ($t = -1.260$, $df = 30$, $p < .217$). This means that the recaps did not result into any significant difference in the unaided recall scores between the experimental group and the control group.

8.3.3.2. Audience Factors and Unaided Recall

The pattern of results obtained in this experiment as regards the relationship between selected socio-economic and demographic factors and farmers' unaided recall scores are similar to those found in the first experiment in this chapter. Whilst gender and income had no significant relationship with unaided recall, age and education had significant influence on unaided recall. The Pearson product moment correlation analysis indicated that age had a significant negative correlation with unaided recall ($r = -.759$, $p = .001$), and education had a positive correlation with unaided recall ($r = .690$, $p < .001$). The findings suggest that younger farmers recorded

higher unaided recall scores than older farmers, and farmers with higher levels of education remembered more news items than those with lower levels of education and no education

Attitudes towards local radio had no significant relationship with unaided recall, but perceptions of the credibility of local radio messages was found to have a moderate correlation with unaided recall ($r=.496$, $p<.004$). The finding suggests that the farmers who perceive the local radio agricultural programmes as credible recorded significantly higher scores on the unaided recall than those who rated low in their perceptions of the credibility of the radio programmes. The stepwise multiple regression analysis was run to determine the level of relationship and the predictive capacity of the independent variables of the study to unaided recall. The results of this analysis indicated that only age ($\beta=-.440$, $p<.007$) and education ($\beta=.399$, $p<.013$) were found to be predictors of unaided recall. The adjusted R square for the two variables gave a value of .355, suggesting that the two variables explained 35.5% of the variance in unaided recall scores.

Table 8.4: Participants' Unaided Recall Results

Items Recalled	Control Group	Experimental Group	Total Sample
2	1(6.3)	-	1(3.1)
3	2(12.5)	2(12.5)	4(12.5)
4	5(31.3)	3(18.8)	8(26.7)
5	3(18.8)	4(25.0)	7(21.9)
6	3(18.8)	3(18.8)	6(18.8)
7	1(6.3)	3(6.3)	4(12.5)
8	1(6.3)	2(12.5)	3(9.7)
9	-	1(6.3)	1(3.1)
Total	16(100.0)	16(100.0)	32(100.0)

$N = 32$

Minimum possible score = 1

Maximum possible score = 12,

Mean score for total sample = 5.1, $SD=1.6$

Mean score for control group = 4.75, $SD=1.57$

Mean score for experimental group = 5.50, $SD=1.78$

Table 8.5: Item Position, Item Duration and Unaided Recall

Item	Position of item In broadcast	Duration (in minutes)	Score on recall
Land preparation	First	2.0	17(66.7)
Techniques of maize storage	Twelve	3.0	17(53.7)
How to make ridges	Second	2.5	15(56.7)
Chemical fertilizers	Eighth	4.5	15(53.6)
How to get good maize seed	Fourth	4.5	15(46.7)
How to apply weedicides	Seventh	2.5	13(50.0)
How to make compost	Ninth	2.5	10(46.7)
Harvesting	Tenth	1.5	11(46.7)
Where to get more information	Third	0.75	8(30.0)
Planting techniques and periods	Fifth	1.0	7(40.0)
Hand weeding	Sixth	1.0	7(33.3)
Appropriate drying methods	Eleventh	0.75	6(20.0)

() Figures in brackets are percentages
N=32

8.3.3.3. Item Position and Item Duration

Item duration had a significant positive correlation with unaided recall for the entire sample ($r=.768$, $p<.004$), for the control group ($r=.680$, $p<.015$), and for the experimental group ($r=.775$, $p<.003$). *Appropriate techniques of applying fertilizers* seemed to have benefited from its long duration of 3 minutes, since its position on the broadcast was unfavourable (eighth). The last four items in terms of performance in unaided recall scores were: *where to get more information*, *planting techniques and periods*, *hand weeding techniques*, and *appropriate drying methods*. These four items had the shortest duration among the twelve news items in the broadcast.

Data from table 8.5 indicate that *land preparation*, which was the first item on the broadcast, and *techniques for storing maize*, the last item on the broadcast, benefited from their favourable positions in the broadcast. However, the results demonstrated that overall, item position had no significant effect on unaided recall. An F-value of 1.270, $df=2$, $p<.384$ was recorded, indicating that there was no significant difference in the mean scores of the participants, both within and between the groups in terms of item position

Table 8.6: Participants' Scores on Comprehension:

Scores	Control Group	Experimental Group	Total Sample
0- 10	3(18.8)	3(18.8)	6(18.8)
11-15	6(37.5)	1(6.3)	7(21.5)
16-20	5(31.3)	7(43.8)	12(37.5)
21-25	2(12.5)	1(31.3)	6(18.8)
26-30	-	1(6.3)	1(3.1)
Total	16(100.0)	16(100.0)	32(100.0)

N = 32

Maximum possible score = 40

Mean score of total sample = 16.96, *SD* = 4.63

Mean score for control group = 15.06, *SD* = 4.68

Mean score for experimental group = 18.87, *SD* = 5.98

8.3.3.4. Comprehension Scores

The results in Table 8.6 indicate that the experimental group (the farmers who listened to the radio broadcast of 30 minutes duration in addition to the *recap* at the beginning of the broadcast) performed better than the control group (the group that did not have the benefit of listening to the *recap*) in the comprehension scores. The mean comprehension score for the entire sample was 16.96 (42%); the experimental group scored a higher mean comprehension score of 18 (47.17%), while the control group scored 15.06 (37.75%). The difference was barely statistically significant ($t = -2.024$, $df = 30$, $p < .050$).

This finding is consistent with the idea that the recaps at the beginning of the radio broadcast made a significant difference in the mean comprehension scores between the experimental group and the control group. The study found that the highest individual score on comprehension was 75%, and the lowest was 17.5%. More than two-thirds of the entire sample recorded less than 50% of the comprehension scores. The comprehension scores were found to correlate with the unaided recall scores ($r = .769$, $p < .001$).

8.3.3.5. Audience Factors and Comprehension Scores

As was the case with unaided recall, age and education were the two socio-economic and other demographic variables that had significant relationship with comprehension. Age was negatively correlated with comprehension ($r = -.598$, $p < .001$), and education had a moderate positive correlation with comprehension ($r = .518$, $p < .002$). These results suggest that the younger farmers performed better at comprehension of the broadcast news than the older farmers. Also, the farmers with higher levels of education showed better understanding of the broadcast news than those with low or no education.

Perception of the credibility of local radio programmes was also found to be significantly related to comprehension. The Pearson product moment correlation analysis showed a moderate but definite correlation between credibility of local radio messages and comprehension ($r = .415$, $p < .018$). This result is an indication that in this experiment the farmers who rated high in their perceptions of the local radio stations' programmes scored significantly higher scores on comprehension of the radio news broadcast than those who rated low on perception of the credibility of local radio and its messages.

The study found also a moderate correlation between reported media exposure and comprehension ($r = .522$, $p < .002$). The farmers who reported that (other than radio) they relied also on mass media sources such as television and newspapers for general news recorded higher comprehension scores than those who relied less on the mass media sources for general news. This result is consistent with findings of research on the influence of media exposure on news comprehension (Gunter, 1987) and general knowledge on innovations (Rogers, 1983). Stepwise multiple regression analyses was ran to determine the predictive capacity of the audience factors in comprehension. The results indicated that age and education, with beta values of $\beta = -.440$, $p < .006$ and $\beta = .417$, $p < .009$, respectively, accounted for 37.3% in the variance in comprehension (adjusted R square = .373).

8.3.4. Discussion

The farmers who listened to the 30 minutes broadcast with recaps placed at the beginning of the news broadcast recalled averagely higher scores on free recall and message comprehension than the farmers who listened to the 30-minute broadcast

without recaps. The mean differences in scores between the two groups for free recall was not statistically significant ($t = -1.260$, $df=30$, $p < .217$), but for comprehension, the difference in the mean score between the two groups was significantly correlated ($t = -2.024$, $df=30$, $p < .050$).

There is evidence available from literature and empirical studies to suggest that in general recaps (Stauffer, Frost and Rybolt, 1978, 1980), including recaps at the beginning of a broadcast (Gunter, 1987) do enhance memory and understanding of the news. The experiment on recaps at the end of a radio broadcast showed a significant difference in the recall and comprehension scores between the group that listened to the broadcast without recaps at the end, and the group that listened to the same broadcast but inclusive of an additional three minutes of recaps. However, in this experiment no significant difference in unaided recall and comprehension between the control group and the experimental group was recorded. The summary material perhaps served as clues for the farmers in the experimental group about the nature of the detailed information to be expected in the broadcast (Gunter, 1987). As observed by Kozminsky (1977), headlines or titles help individuals to create contexts that are useful in enhancing comprehension (Gunter, 1987).

In general, however, comprehension of the messages was very low for the entire sample. The mean comprehension score was 16.96 marks (42%) for the entire sample. A further important point was that even the participants who benefited from the recaps did not perform very well; their mean score was 18.87 (47.18%). The mean score for the control sample was 15.6 (37.8%).

The Pearson product moment correlation analysis indicated that age had a significant negative correlation with unaided recall meaning that the younger farmers recorded significantly higher unaided recall scores than the older farmers. Also, education and media exposure each had positive correlation with unaided recall. This means that the farmers who rated high in terms of education and media exposure also recorded significantly higher unaided recall scores. However the results of the stepwise multiple regression analysis indicated that age and education were the only predictors of comprehension. The two variables accounted for 37.3% of the variance in message comprehension.

8.4. Experiment 3: Effect of Distributed Recaps

In the two previous experiments, the effects of bullet points at the end of a news broadcast and at the beginning of a radio programme were discussed. The effect of distributed recaps is investigated in this third experiment.

8.4.1. Method

Design: Two radio broadcasts were used for this experiment. One combined a discussion format of 15 minutes with an additional three minutes of recaps. The recaps were in the form of bullet points that interspersed the broadcast. The other broadcast contained only the discussion component. The broadcast that was used for the experiment contained eleven (11) items. Each of the items was recapped¹⁴. The recapped material followed immediately after each item was discussed¹⁵. Box 8.5 contains an example of a main message and a recap of the main message. The contents of the recap material were a brief re-statement of the main issue(s) discussed under each item. The two earlier experiments discussed in this chapter (recaps at the end of a broadcast, and recaps (preview) at the beginning of a broadcast) were conducted using a radio broadcast that contained messages on maize cultivation. For this experiment, the messages were on small ruminant production.

Participants: The participants were 30 farmers living in Ntereso in the Central Gonja District of northern Ghana. The language that was used for the broadcast is Gonja. The farmers volunteered to take part in the experiment. An important criterion that was considered in accepting the participants for the study was that they all had to own small ruminants, basically sheep or goats, or both. The idea was to be sure that the messages were relevant to their agricultural information needs.

Procedure: The procedure for the conduct of this experiment was the same as the procedure adopted for the conduct of the two experiments discussed earlier in this chapter.

Scoring procedure: The scoring procedure was also similar to the one adopted in the earlier experiments in the study. In Box 8.6, examples of two of the questions that measured comprehension are provided together with the expected answers and scoring procedure.

¹⁴ Each of the eleven (11) recaps lasted between 10 and 25 seconds.

¹⁵ The recaps were done by the programme presenter. After each item was discussed he re-emphasised the central theme contained in the item.

Box 8.5: An example of a main message in an item, and a recap of the item

Watering Small Ruminants

Water is essential for the healthy growth of small ruminants. We advise farmers to give adequate attention to the watering of their small ruminants. There are a few important issues to share with you on how to provide drinking water to your animals. First, we recommend that you give clean water to the animals. Most farmers still believe that animals need not drink clean water. We advise that the water you give to your animals should be as clean as the water you drink. We also advise farmers to ensure that every morning they clean the container or trough from which the animals drink water. This will protect the animals from drinking water that is infested with parasites that cause ill health. Farmers should ensure regular supply of water to the animals throughout the day. Finally, make sure that the urine and faecal waste of the animals do not get into the drinking water.

Recap of the Main Message

We recommend that farmers pay attention to the provision of drinking water to their small ruminants. The water provided must be clean and regular. Your animals will be healthier if you give them not only nutritious fodder and supplements, but also clean water.

Box 8.6: Examples of two comprehension test questions, expected responses, and scoring procedure

Question 1

Mention the symptoms of PPR in small ruminants.

Answer (expected responses)

1. The ruminants develop running (watery) nose
2. The animals develop severe and continuous cough
3. The animals experience difficulty in breathing

Question 2

Name the recommended agencies from which farmers can buy Veterinary medicines

Expected responses

1. Wumpini Company Limited.
2. Veterinary Services.
3. Vansaddo Limited

Scoring procedure

Question one was scored over a maximum of six (6) points; two marks for each of the six sub-answers. Question two was also scored over a maximum of six marks. For each of the sub-answers, two marks were allotted for a correct response, and one mark for a partially correct. No point was given for no response or for a wrong response.

8.4.2. Demographic and Socio-Economic Characteristics

The mean age of respondents was 38.7 years, the youngest was 22 years and the oldest was 60 years. Average income was 3, 165 Ghana cedi (about US\$330, in 2006). Majority (66.7%) were illiterate; they had no form of education and they could not read and write. Six respondents (20%) had non-formal education and four respondents (13.3%) had formal education, ranging from primary level to secondary school level.

8.4.3. Results

8.4.3.1. Unaided Recall

The mean unaided recall of items for the entire sample was 5.16 (46.9%). The mean for the control group was 4.66 (42.3%), and the mean for the experimental group (the group that heard the programme with distributed recaps) was 5.8 (52.7%). The highest score per participant in the entire sample was 9 (81.8%), and this was recorded by a participant in the experimental group. The lowest score was 2 (18.8%), and this was recorded by a participant in the control group. The details of the scores are presented in table 8.7. The t-test analyses that was done indicated a significant difference between the two groups in terms of unaided recall scores ($t=2.076$, $df=28$, $p<.047$). This indicates that the distributed recaps had significant positive effect on unaided recall.

Table 8.7: Participants' Unaided Recall Results

Number of News Items Recalled	Control Group	Experimental Group	Total Sample
2	1(6.7)	-	1(3.3)
3	5(33.3)	2(13.3)	7(23.3)
4	3(20.0)	2(13.3)	5(16.6)
5	2(13.3)	2(13.3)	4(13.3)
6	2(13.3)	3(20.0)	5(16.6)
7	-	3(20.0)	3(20.0)
8	2(13.3)	2(13.3)	4(13.3)
9	-	1(6.7)	1(3.3)
Total	15(100.0)	15(100.0)	15(100.0)

() Figures in brackets are percentages

N=30

Maximum possible score = 11

Mean score for control group = 4.66, SD=1.84

Mean score for experimental group = 5.8, SD=1.84

Mean score for total group = 5.16, 1.95

Table 8.8: Item Position, Item Length and Unaided Recall Scores

Item	Position In Broadcast	Item Duration	Unaided Recall Score
Appropriate Housing for animals	Second	3.0	21(70.0)
Proper feeding of small ruminants	Fourth	1.25	19(63.3)
Watering small ruminants	Third	0.75	19(63.3)
How to control endo-parasites	Sixth	2.30	18(60.0)
Benefits derived from keeping ruminants	First	0.75	15(50.0)
How to control ecto-parasites in ruminants	Sixth	2.50	15(50.0)
Determining ill-health in ruminants	Eleventh	0.75	14(46.7)
Avoid in-breeding among ruminants	Eighth	0.50	10(33.3)
Need to keep proper record of animals	Tenth	1.0	10(33.3)
Need to sell stock when they fully mature	Seventh	0.5	7(23.3)
Provide comfortable floor for animals	Fifth	0.5	7(23.3)

() Figures in brackets are percentages

N=30

8.4.3.2. Item Position and Item Duration

The results of the study indicated that both item duration and item position had significant effect on unaided recall. A Pearson product moment correlation analyses indicated that broadcast duration had a significant positive relationship with unaided recall for the entire sample ($r=.609$, $p<.023$), for the control group ($r=.526$, $p<.048$), and for the experimental group ($r=.564$, $p<.035$). This means that the news items with longer duration were recalled significantly more than those with shorter duration. It was found that the news item that recorded the highest unaided recall scores was the second item on the broadcast, which also happens to be the longest item in terms of duration (3 minutes). The items that recorded the lowest unaided recall scores, *need to sell stock when they fully mature* and *need to provide comfortable floor for the animals*, were the shortest in terms of broadcast duration, each lasting only 30 seconds.

For item position, the results of the ANOVA test indicated an F value of 2,457, $df=2$, $p<.011$. This result suggests that the position of the items in the broadcast had a significant effect on the unaided recall scores of the various items, both within the groups and between the groups. The three items that recorded the highest recall scores - *appropriate housing for small ruminants*, *feeding of small ruminants*, and *watering of small ruminants* – were also the second, third and fourth respectively in the broadcast; positions that were close to the favourable first position. Also the first item on the broadcast and the last item were recalled by 15 (50%) and 14 (46.7%) of the sample respectively, an indication that they did not perform abysmally.

Data in Table 8.7 support the results from the ANOVA and Pearson product moment correlation analyses. For example, the item, *Appropriate housing for small ruminants*, recorded the highest unaided recall scores by virtue of both its favourable position and its duration in the broadcast. It had the longest duration (three minutes) than any other item in the broadcast, and it was also second in terms of position in the broadcast. If duration alone was responsible for the high unaided recall scores recorded by the item on *appropriate housing for small ruminants*, then two other items, *How to control endo-parasites* and *How to control ecto-parasites in ruminants*, which were recalled by 18(60%) and 15(50%), should have performed better. The two items had duration of 2 minutes 30 seconds each, and they were the sixth and eighth items respectively in the broadcast. It might seem that the second

item on the broadcast benefited from both its favourable position and its duration in the broadcast, while the sixth and eighth items were adversely affected by their positions in the broadcast, in spite of their relatively long broadcast duration. The least recalled items – *provide comfortable floor for animal* (7 participants or 23.3%), and *need to sell stock when they fully mature* (7 participants or 23.3%) – were among the three items that received the least broadcast time. They were also the fifth and seventh items in the broadcast. Their positions in the broadcast were neither at the top nor at the end of the broadcast; positions that are considered “unfavourable”. The poor recall scores of the two items therefore could be as a result of both their “unfavourable” position and their short duration in the broadcast.

8.4.3.3. Audience Factors and Unaided Recall

The Pearson product moment correlation and stepwise multiple regression analyses both indicated significant relationships between age and unaided recall and education and unaided recall. The results of the Pearson product moment correlation analysis showed that age had a moderate negative correlation with unaided recall ($r = -.493$, $p < .006$) and education had a moderate positive correlation with unaided recall ($r = .438$, $p < .001$). This means the younger farmers recorded significantly higher recall scores than the older farmers, and farmers with higher levels of education performed significantly better than those with lower levels of education. The results of the stepwise multiple regression analysis indicated that age (with a beta value of $\beta = -.560$, $p < .007$) and education ($\beta = .471$, $p < .013$), were the predictors of unaided recall. With an adjusted R square value of .748, the two variables together accounted for 74.8% in the variance in unaided recall.

8.4.3.4. Comprehension Scores

The mean comprehension score for the entire sample was 21.8 (49.57%), the mean for the control group was 21.06 (47.86%), and for the experimental group, it was 22.53 (51.2%), suggesting that the experimental group scored slightly higher comprehension scores (about 1.5 marks or 3.37%) over the control group (Table 8.9). This difference in scores was however not statistically significant. The results of the t-test analysis indicated a value of $t = .628$, $df = 28$, $p > .535$. This result suggests that the

distributed recaps (summary) did not result into a marked impact on comprehension as it did on unaided recall.

Table 8.9: Participants' Scores on Comprehension

Score	Control Group	Experimental Group	Total Sample
0-10	1(6.7)	0	1(3.3)
11-15	2(13.3)	1(6.7)	3(10.0)
16-20	4(25.0)	6(40.0)	10(31.1)
21-25	2(13.3)	4(25.0)	6(20.0)
26-30	1(6.3)	2(13.3)	3(10.0)
Total	15(100.0)	15(100.0)	30(100.0)

() Figures in brackets are percentages

N= 30

Maximum possible score =44

Mean score for total sample=21.8, SD=6.33

Mean score for the control group as 21.06, SD=6.58

Mean score for experimental group=22.53, SD=6.20

8.4.3.5. Audience Factors and Comprehension

As was the case with unaided recall, age and education were the two socio-economic and demographic variables that had significant relationship with comprehension. Age was negatively correlated with comprehension ($r=-.598$, $p<.001$), and education had a moderate positive correlation with comprehension ($r=.518$, $p<.002$). These results suggest that the younger farmers performed better at comprehension of the broadcast news than the older farmers, whilst the farmers with higher levels of education showed better understanding of the broadcast news than those with lower levels of education.

Perception of the credibility of local radio programmes was also found to be significantly related to comprehension. The results of the Pearson product moment correlation suggested a moderate but definite correlation between credibility of local radio messages and comprehension ($r=.415$, $p<.018$). This result is an indication that in this experiment the farmers who rated high in their perceptions of the local radio

stations' broadcasts scored significantly higher scores on comprehension of the radio news broadcast than those who rated low on perception of the credibility of local radio and its messages. The study found also a moderate but significant relationship between media exposure and comprehension ($r=.522$, $p<.002$). The farmers who reported that (other than radio) they relied also on other mass media sources such as television and newspapers for general news, recorded higher comprehension scores than those who relied less on the mass media sources for general news. Out of the four variables (age, education, credibility and media exposure), only two (age and media exposure) were strong predictors of comprehension. The stepwise multiple regression analysis indicated a beta score of $\beta = -.480$, $p<.001$, for age, and $\beta = .382$, $p<.010$ for media exposure. The adjusted R square value for age and media exposure was .458; meaning that the two variables together accounted for 45.8% in the variance of the comprehension scores

8.4.4. Discussion

The results of the study indicated a significant difference between the two groups in terms of unaided recall scores ($t=2.076$, $df=28$, $p<.047$). This means the distributed recaps had significant positive effect on unaided recall, but failed to register any marked difference between the two groups in terms of comprehension ($t=.628$, $df=28$, $p<.535$). The reason for this may be that the distributed recaps generally contained very scanty information. The recaps served more like a reminder of the main items of the study than a re-statement of facts and information in the broadcast. They were also very brief; lasting not more than 25 seconds in each case. Such very brief recaps, targeted mainly to the main items, should be expected to enhance memory for the main items but not to enhance comprehension. This is because they offered very scanty or no additional details to the main discussions.

The findings of this study confirms the results reported by Bernard and Coldevin (1985), Findahl and Hoijer (1975) and Perloff, Wartella and Becker (1982). Bernard and Coldevin (1985), after investigating the effects of short headline type of recaps on recall and comprehension of broadcast news, reported that the recaps increased retention of the "gist" of the stories in a television newscast, but did not enhance retention of specific details. Similarly, Son, Reese and Davie (1987) investigated the effects of audio-video redundancy and oral recaps on news recall and comprehension

from television newscast, and found that redundancy placed between the pictures and words significantly improved story understanding, less so with general recall. In their study, *Increasing Learning from Television News*, Perloff, Wartella and Becker (1982), after assigning 55 participants to one of five conditions (involving a combination of recaps and various forms and duration of pause), reported that recapping of television news enhances recall. They concluded that though summarising the main points improves recall, summaries are insufficient.

The results from my experiment on distributed recaps has produced results that seem to suggest that distributed recaps, presented in very brief fashion, can enhance memory recall but may not necessarily be effective in producing significantly higher comprehension of the messages.

The results of this experiment also found that age and education have significant relationship with unaided recall, and are also good predictors of unaided recall, accounting for 74% of the variance in unaided recall of the participants. Further, the study found from the results of the Pearson product moment correlation analysis that age and media exposure had significant relationship with comprehension. The results of the stepwise multiple regression analysis, therefore, found age and media exposure (and not education) to be predictors of comprehension. The two variables jointly explained 45.8% in the variance in comprehension.

8.5. General Discussion

The effect of recaps in enhancing memory does not appear to be in doubt. Studies have found that recaps have positive effects on memory recall and comprehension (Bernard and Coldevin, 1985; Findhal and Hoijer, 1975; Son, Reese and Davie, 1987; Stauffer, Frost and Rybolt, 1980), even if the reported evidence have shown varying degrees of the influence of recaps in learning from broadcast news. The discrepancies in levels of influence of recaps on recall and understanding of broadcast news could be due to recapping procedures (Son, Reese and Davie, 1987). According to Son, Reese and Davie (1987), one of the issues that can affect the level of effect of recaps on recall and comprehension is the nature of the recaps in terms of how brief or lengthy the recaps are. In this thesis research, the three types of recaps have indeed shown different levels of effectiveness.

Thus, it appears that the position of recaps and the length of the recap material both exerted different degrees of influence on unaided recall and comprehension in this study. In this study, the recaps at the end of a radio broadcast was found to have the most impact on rural farmers' level of unaided message recall and message comprehension of radio broadcast news among the three recap strategies - recaps at the beginning of a broadcast, distributed recaps, and recaps at the end of a broadcast.

Results from the first two experiments reported in this chapter indicated that the recap material showed a significant difference in unaided recall between the control group and the experimental group, depending upon the position of the recap material. When the recaps were placed at the end of the broadcast for the experimental group, the group recorded statistically significant unaided recall score than the control group. However, the results showed no statistically significant difference in unaided recall between the control group and the experimental group when the recaps were placed at the beginning of the broadcast (for the experimental group). This suggest that placing recaps at the end of a broadcast appears to have had the *recency* effect on the farmers. They were useful in activating the cues to the messages produced in the main broadcast that preceded the recaps. However, in terms of comprehension, the two massed recap formats (recaps at the beginning of a broadcast, and recaps (preview) at the end of a broadcast) both indicated significant difference in mean comprehension scores of the control groups and experimental groups.

The results of the experiment accepted hypothesis H8 of the study, which stated that: *Farmers who listen to radio programmes that contain summary material (recaps) at the end of the broadcast will record higher scores on unaided recall than those who listen to the same broadcast without summary.*

The interpretation that seems to be suggested by the findings in this study is that although *massed summary* or *recaps* enhance recall and comprehension, the effect is greater when the *recap* is placed at the end of the news broadcast than at the beginning. Also massed summary at the end of a broadcast is superior to distributed summary in enhancing unaided recall and comprehension. The distributed summary in this study proved effective in enhancing unaided recall, but was less potent in enhancing message comprehension. This finding is supported by the results reported by several researchers (Bernard and Coldevin, 1985; Findhal and Hoijer 1975; and Perloff, Wartella, and Becker, 1982).

Item duration was found to have significant relationship with unaided recall in all the three experiments. In general, in each experiment the items with the longer duration were recalled significantly more than the items with the shorter duration. However, for item position it was found that in two of the experiments, the positions of the items in the broadcast had no significant mean effect on unaided recall of the participants. In the experiment on distributed recaps, however, item position was found to have an impact on the mean scores of the participants. No possible reason has been found for this result, however, it could perhaps be suggested that when recaps are distributed in a broadcast, they strengthen the effect of the positions of the various items in the broadcast.

Age and education are the most potent socio-economic and demographic variables that influence recall and comprehension. In all the three experiments, age has been found to have a significant negative relationship with unaided recall and comprehension. The consistent finding therefore has been that younger farmers were superior to the older farmers in terms of recall and comprehension of the messages presented in the three experiments.

8.6. Conclusion

This chapter presented and discussed three experiments on the effect of summary material or bullet points on unaided recall and comprehension of broadcast news. The findings in this chapter support the view that recaps in a broadcast do have influence on unaided recall and comprehension. However, recaps at the end of a broadcast showed the most marked influence on audience recall and comprehension of broadcast news. Item duration was found to have a significant correlation with unaided recall scores in all the three experiments, suggesting that rural farmers recall broadcast items with longer duration than those with shorter duration. The next chapter discusses the effect of message relevance and effect of delayed recall on unaided recall and comprehension in two separate experiments.

CHAPTER NINE

EFFECT OF DELAYED RECALL AND EFFECT OF MESSAGE RELEVANCE

9.1. Introduction

This chapter presents a report on two experiments. The chapter discusses the design of the experiments, procedures for conducting the experiments, the scoring procedures, and discussion of the findings. The two experiments are: effect of delayed recall and effect of message relevance. In relation to the investigation on the effects of delayed recall, the proposition was that the messages that farmers listen to from radio are forgotten with time. The purpose of the experiment therefore was to find out whether there would be any significant difference in unaided recall and comprehension scores between farmers who are tested for recall and comprehension immediately after listening to a radio broadcast, and farmers who are tested for recall and comprehension a week after listening to the same broadcast. The second experiment sought to investigate whether messages that are of immediate use to farmers would have a significant effect on unaided recall and comprehension.

9.2. Experiment 1: Effect of Delayed Recall

The purpose of this experiment was to measure the effect of time delay on message recall and comprehension. A person's memory of an event, according to Kellermann (1985), can change as a result of the information that is given to the person after the event. This is because; accessing a schema during the retrieval process normally involves a reconstruction of events from stored information. There is the chance that the reconstruction of the already stored knowledge could be affected by errors (Kellermann, 1985). Therefore, events that occurred and are stored in memory after the-to-be-recalled item could interfere with recall of the event. Retrieval of information can also be adversely affected by interference. The new information taken in can disrupt the retrieval of the to-be-recalled item (Kellermann, 1985). There is lack of empirical research data on the effects of delayed recall to support the formulation of hypothesis for the experiment. There was therefore no research hypothesis proposed for this experiment.

9.2.1. Method

Design: A-30 minute 12-item radio programme was designed and used for the experiment. The broadcast was in Dagbani, the main language of the people in the community in which the experiment was conducted. The broadcast, as in the case of all the experiments, was designed and produced in the studio of Radio Savannah, Tamale. The messages were on maize cultivation. The broadcast was recorded on an audio cassette and played to the participants in their community. One control group and one experimental group were used for the study. Participants in the two groups listened to the same broadcast, within the same duration, but one group was tested immediately after the broadcast, while the other group was tested a week after they had listened to the broadcast.

Participants: The participants were 32 farmers living in Mbanayilli in the Tamale Peri-Urban area in the Northern Region of Ghana. They were all engaged in crop farming as a main economic venture, and all of them cultivated maize.

Procedure: A control group of 16 farmers listened to the broadcast first. At the beginning of the experiment they were told that they would have some discussions with the researcher after they had listened to the broadcast. After the broadcast, the researcher and his assistants got the farmers engaged in discussions on the development issues and problems relating to their community. The researcher promised to meet the farmers a week later so that the discussions would continue. During the next visit, which was a week after the first meeting, the group that listened to the broadcast earlier was made to respond to the oral interviews. A second group, made up also of 16 farmers, was seated at the other end of the community where they listened to the broadcast for the first time. The first group was used as the experimental group, and the second group of farmers, who were interviewed soon after the broadcast, was used as the control group

Scoring procedure: For unaided recall, one point was given for correctly mentioning any of the items contained in the broadcast. No point was given for incorrect answers and for items that were not mentioned. Comprehension was measured by allocating a maximum of two points to each accurate response, one point for a partially correct or partially answered question, and no point for a wrong answer or no answer. Some questions required only one answer while others required two or more answers. Each of the two or three answers to such questions was scored two

points, if correctly answered. This meant that a question that required three answers was scored a maximum of six points – if all the answers provided by a participant were accurate. Box 9.1 below contains an example one of the questions, expected responses and the scoring system that were adopted.

Box 9.1: Example of a question, the expected response (answer), and the scoring system

Question:

Mention two ways by which a farmer can determine that his maize farm is ready for harvesting.

Expected Answer

1. When the maturity date of the maize is up (every maize seed has a maturity date).
2. When a black spot appears on the area between the tip of the grain and the maize cob.

Scoring:

This question was allotted a maximum of four marks; two marks for each of the answers. An accurate response was scored two marks, a partially accurate response attracted one mark, and a wrong answer or no response was given no mark.

9.2.2. Demographic and Socio Economic Characteristics

The mean age of the 32 farmers was 40.8 years, the youngest respondent was 22, and the oldest was 66. About two-thirds had no education, 15.6% had non-formal education, 3.5% had primary education and the rest (12.5%) had education up to the middle school and senior secondary school level. Majority were males (87.5%), the rest were females (12.5%). Average annual income was 3,350,000 Gh.Cedi (about US\$350, in 2006). The lowest reported annual income was 1,000,000 Gh. Cedi (US\$110 in 2006), and the highest was 9,000,000 Gh. Cedi (US\$1,000 in 2006).

9.2.3. Results

9.2.3.1. Unaided Recall

The results of the study (Table 9.1) showed that the mean score for the entire sample was 4.7 items (39.2%). The control group (the group that was interviewed soon after the broadcast) recorded a mean recall score of 5.1 (42.5%) and the experimental group recorded an average recall of 4.1 stories (34.16%). This means there was a mean difference in score of one news item (about 8.3%) between the control group and the experimental group. Results of the t-test analysis indicated a significant difference in the mean unaided recall scores of the control group and experimental group ($t=2.043$, $df=30$, $p<.047$). The results showed that the one week delayed recall by the experimental group led to a significantly lower mean score. This suggests that there was deterioration in memory by the experimental group within the one week period.

9.2.3.2. Item Position and Item Duration

Item position did not show any significant effect on unaided recall. The results of the ANOVA test indicated an F value of 1.010, $df=2$, $p<.402$. The study found that item position did not result in any significant difference in unaided recall scores of the individual news items that the participants of the experiment had listened to. The results however indicated a positive correlation between unaided recall and item duration for the entire sample ($r=.705$, $p<.005$), and for the control group ($r=.728$, $p<.007$). However, for the experimental group, the relationship between unaided recall and item duration was not statistically significant ($r=.515$, $p<.086$). Perhaps the one week delayed recall for the experimental group caused a reduction in the effect of the duration of the news items.

Table 9.1: Participants' Unaided Recall Results

Number of Items	Control group	Experimental Group	Total Sample
2	-	2(12.5)	2(6.3)
3	2(12.5)	3(18.8)	5(15.6)
4	4(25.0)	5(31.3)	9(28.2)
5	4(25.0)	3(18.8)	7(21.9)
6	3(18.8)	3(18.8)	6(18.8)
7	2(12.5)	-	2(6.3)
8	1(6.3)	-	1(3.1)
Total	16(100.0)	16(100.0)	32(100.0)

() Scores in brackets are percentages

N=32

Maximum possible score =12

Mean for control group=5.1, SD=1.5

Mean for experimental group was 4.1, SD=1.3

Mean for total sample was 4.7, SD=1.5

Table 9.2: Item Position, Item Duration and Unaided Recall Scores

Item	Item Position	Item Length	Unaided Recall
Land preparation	First	2.0	18(56.3)
Techniques of maize storage	Twelve	3.0	16(50.0)
How to get good maize seed	Fourth	4.5	16(50.0)
How to make ridges	Second	2.5	15(46.8)
Chemical fertilizers	Eighth	4.5	14(43.7)
How to apply weedicides	Seventh	3.5	13(40.6)
How to make compost	Ninth	2.5	13(40.6)
Harvesting	Tenth	1.5	10(31.3)
Hand weeding	Sixth	1.0	10(31.3)
Where to get more information	Third	0.75	9(28.1)
Planting techniques and periods	Fifth	1.0	9(28.1)
Appropriate drying methods	Eleventh	0.75	8(25.0)

() Scores in brackets are percentages

N =32

9.2.3.3. Unaided Recall and Audience Factors

Two audience factors, age ($r=-.557$, $p<0.01$) and education ($r=.443$, $p<.011$), had significant relationships with unaided recall. The relationship between age and recall was moderate and negative. The younger farmers scored significantly higher recall

scores than the older farmers. The farmers with higher education were also those who scored significantly higher scores on unaided recall. The results of the stepwise multiple regression analyses however indicated that age and media exposure contributed significantly to the variance in unaided recall; the two variables were therefore the predictors of unaided recall. The Beta value for age was. Beta= -.591, $p < .000$, and for media exposure, the value was Beta=.392, $p < .017$. The adjusted R square value for the two predictor variables was .467, indicating that the two variables contributed 46.7% of the total variance in unaided recall.

9.2.3.4. Comprehension Results

The study found that the mean score of the experimental group 14.18 (34.5%) was less than the mean score of the control group 16.22 (40.2%). The mean for the entire sample (see Table 9.3) was 15.09 (37.8%). A t-test analysis, however, showed that the difference in mean scores between the control group and experimental group was not statistically significant ($t=1.457$, $df=30$, $p < .156$). This finding is counter to that on unaided recall of the two groups. With the unaided recall scores the difference in scores between the two groups was found to be statistically significant. One explanation for this finding may be that while the unaided recall provided no cues for the farmers, the comprehension questions, by the way they were framed, possibly provided the farmers with cues to re-organise their memory and to answer the questions put to them. For instance one of the questions posed was: *What benefits (according to the broadcast), will a farmer reap from decomposed slash?* This question, by the way it was framed, will provide a kind of cue to a searching mind that had lost, or partially lost, some information. In this study the low unaided recall scores recorded by participants in the experimental group as compared to their performance in the comprehension test could be a result of the lack of cues for the unaided recall, and the presence of prompts in the comprehension test.

Table 9.3: Participants' Scores on Comprehension

Scores on Comprehension	Control Group	Experimental Group	Total Sample
8-10	3(18.8)	1(6.3)	4(12.5)
11-15	8(50.0)	7(43.7)	15(46.9)
16-20	3(18.8)	4(25.0)	7(21.9)
21-25	2(13.7)	4(25.0)	6(18.8)
Total	16(100.0)	16(100.0)	32(100.0)

() Figures in brackets are percentages

N = 32

Maximum possible comprehension score = 40

Mean for total sample = 15.09, *SD* = 4.07

Mean for experimental group = 14.18, *SD* = 3.71

Mean for control group = 16.22, *SD* = 4.39

9.2.3.5. Audience Factors and Comprehension Scores

Similar to the results recorded in relation to unaided recall and audience factors, this study found that age, education and media exposure were the only audience variables that had significant relationship with comprehension. The relationship between age and comprehension indicated a significant and negative correlation ($r = -.419$, $p < .001$). This means that the younger farmers recorded significantly higher unaided recall scores than the older farmers. It was found also that those with higher levels of education recorded higher comprehension scores ($r = .361$, $p < .043$).

Results of the stepwise multiple regression analysis, however, indicated that only age contributed significantly to the variance in comprehension. As the only predictor variable of comprehension, age had a beta value of $\text{Beta} = -.616$, $p < .001$. The adjusted *R* square value was .318, suggesting that age contributed 35.8% of the variance in comprehension.

9.2.4. Discussion

The purpose of this experiment was to investigate the effect of delayed recall on farmers' unaided recall and comprehension. As reported elsewhere in this experiment, there was a significant difference between the mean scores of the control group and the experimental group in terms of unaided recall ($t=2.043$, $df=30$, $p<.047$), but there was no significant difference in mean comprehension scores between the two groups ($t=1.457$, $p<.156$). Some researchers have argued that it is possible for recall results to be different from comprehension results, even though the two are highly correlated (Berry, 1999).

Findahl and Hoijer (1985), and Woodall, Davies, and Sahin (1983), have proposed therefore that participants in an experiment can remember information that was not understood. It has also been shown that participants can accurately understand information that is not correctly remembered (Berry, 1999). This assertion appears to squarely explain the current findings in my study. Even though the experimental group performed dismally in the unaided recall, their ability to comprehend the messages without necessarily remembering them well was demonstrated in the comprehension test.

Age had a significant negative relationship with unaided recall ($r=.557$, $p<.001$), suggesting that the younger farmers recorded significantly higher unaided recall scores than the older farmers. Education had a significant positive relationship with unaided recall ($r=.443$, $p<.011$), meaning that the farmers with higher education were also those who recorded significantly higher scores on unaided recall.

Again, age had a negative correlation with message comprehension ($r=-.398$, $p<.001$), and education had a significant correlation with comprehension ($r=.361$, $p<.043$). This means the younger farmers understood the messages better than the older farmers, and the farmers with higher levels of education recorded higher comprehension scores than those with lower levels of education. The two variables are strongly linked in the sense that most of the farmers with formal education tended to be the younger ones.

Equally linked to the issue of education and age is the issue of the relationship between unaided recall scores and the scores on comprehension. The relationship between unaided recall and message comprehension was found to be highly significant ($r=.681$, $p<.001$). This probably suggests that the ability of the farmers to

store information in memory was related to their ability to comprehend the messages. The farmers with higher education, probably drawing on their skills of testing and examination as a result of their longer years in formal school system (Stauffer, Frost and Rybolt, 1980), performed better than their illiterate colleagues in both the free recall and comprehension scores.

9.3. Experiment 2: Effect of Message Relevance

Research on mass media effects suggest that message relevance has an effect on recall and comprehension of broadcast news. According to Kellermann (1985), literature from media research supports the salience-recall relationship. Booth (1970) reported that people tend to recall news stories that are salient to them than those that are not. Information that is salient to an individual is relevant to that person.

Relevance could mean usefulness, proximity, and importance. Recall of information is influenced by several factors. According to Lang et al. (2004) observed that the amount of resources that people allocate to the processing of messages is based on their own motivations and goals. They stated that when a message is interesting and relevant to a person, that person will pay attention to it.

The perception of the relevance of messages could arouse some motivation to listen to the news. However, not much evidence is available to assert that there is a conclusive influence of individual motivation on level of news recall (Gunter, 1987).

This experiment investigated the influence of message relevance on rural farmers' unaided recall and comprehension of a radio agricultural broadcast. Message relevance was conceptualised as the usefulness of messages to the immediate information needs of farmers. In this respect, the farmers to whom the radio messages would be useful to are those who had cultivated maize for the crop season. It was assumed that those who would not find the messages useful to their needs were those who did not cultivate maize during that crop season.

It was assumed that there would be different levels of arousal among the farmers to learn from the broadcast. According to Gunter (1987), learning of relatively simple information can be facilitated by arousal. The level of arousal could determine the level of attention given to a news broadcast, and the level of learning from the news broadcast could in turn be a product of the level of attention.

The hypotheses that were formulated and tested for this experiment were as follows:

H9: Messages that are of immediate relevance to farmers will be better recalled than those that do not have immediate relevance to farmers' information needs.

H10: Broadcast messages would be better understood by farmers who have immediate use of the messages than those who do not have immediate use of them.

9.3.1. Method

Design: The 30 minute 12-item radio programme that was used for the first experiment in this chapter was used also for this experiment. The broadcast was in Dagbani. The messages were on maize cultivation and they covered the agronomic practices involved in maize production. The experiment had two groups of farmers – those who had cultivated maize for the crop season, and those who had not cultivated maize. Two groups of farmers were used for this experiment.

Participants: The participants were 36 rural farmers living in Lumo in the Tolon-Kumbungu District in the Northern Region of Ghana. They were all engaged in crop farming as a main economic venture.

Procedure: There was no treatment or manipulable variable in this study.¹⁶ The two groups in the study both heard the same broadcast under the same conditions. What the research sought to do was to find out whether the farmers who had cultivated maize for this season would record higher unaided recall scores than the farmers who had not cultivated maize.

The 36 farmers were therefore divided into two groups – Group I and Group 2. A first group of 18 farmers first listened to the radio broadcast. They were the farmers who had cultivated maize for that year.

¹⁶ The two groups were exposed to the same broadcast material under the same conditions. The only difference was that they differed under a pre-existing variable or characteristic -- those who had started maize cultivation for the crop season, and those who had avoided the cultivation of the crop, at least for that crop season.

Soon after they listened to the broadcast and were being interviewed, the second group of 18 farmers who had not cultivated maize were made to listen to the broadcast at a different location in the same community. Participants in the second group were tested for unaided recall and comprehension after the participants in the first group had been interviewed.

Scoring procedure: The scoring procedure for unaided recall and comprehension was similar to the one used in the first experiment discussed in this chapter. Box 9.2 below provides an example of one of the questions that were used to measure message comprehension, together with the expected responses and scoring system.

**Box 9.2: An example of a comprehension test question,
the expected answer and the scoring procedure**

Question:

What are the three effects of a delay in harvesting maize after the maturity date?

Expected answer (response)

1. The grains are attacked by insects
2. The grains loose quality
3. The cobs fall to the group and begin to rot

Scoring

The question is allotted two marks. Two marks are allotted to each of the three answers to the question. If a response is accurate to maximum marks are scored. One mark is allotted for a partially correct answer, and no mark is given for a wrong answer or no response.

9.3.2. Demographic and Socio-economic Characteristics

Participants' mean age was 39.8 years; the youngest was 22 years and the oldest, 67 years. The mean annual income of the farmers was 3, 440, 000 Ghana Cedi (about US\$362 in 2006). A total of 88% were married, 8.3% were single, and only one

respondent (2.8%) was a widow. Less than a fifth of the farmers (13.9%) were males, and the rest (86.1%) were males. More than two-thirds (69%) could not read and write, a further 13.9% had some form of adult literacy education; a non-formal education training. Only 17.1% had formal education.

9.3.3. Results

9.3.3.1. Unaided Recall Scores

Group 1 (the farmers who had cultivated maize within the crop season) performed better in the free recall than Group 2 (the farmers who had not cultivated maize within the crop season). The highest number of items recalled among the total sample of 36 farmers was eight (8) items, and this was recorded by a farmer in Group 1; and the lowest score of two (2) items was recorded by three farmers in Group 2 (see Table 9.4).

The mean score for the unaided recall of the 36 farmers was 4.58 (38.1%) items, out of a total of 12. The mean for Group 1 (the group that had cultivated maize) was 4.8 (39.1%) items and the mean for Group 2 (the farmers who had not cultivated maize) was 4.4 items (37%).

The results of a t-test analysis indicated a value of $t=.439$, $df=34$, $p<.664$; suggesting that there was no significant difference in the mean scores of the two groups. By this result, hypothesis H9 of the study, which stated that: *Messages that are of immediate relevance to farmers will be better recalled than those that do not have immediate relevance to farmers' information needs*, was rejected.

This finding suggests that although the farmers in Group 2 (those who had planted maize) recorded higher unaided recall scores than the farmers in Group 1 (the farmers who did not cultivate maize for that crop season), the mean difference in the unaided recall scores for the two groups was not statistically significant. It would have been expected that the farmers who had planted maize for that crop season would have performed better than those who had not planted maize, since the messages were expected to be more relevant to them than those farmers who had not planted maize.

9.3.3.2. Audience Factors and Unaided Recall

The results showed that age and education had significant effects on message recall. The Pearson product moment correlation analysis indicated that there was a negative correlation between age and unaided recall ($r = -.517$, $p < .001$) and a positive correlation between education and unaided recall ($r = .502$, $p < .002$). Younger farmers recorded significantly higher unaided recall scores than older farmers. Farmers with higher levels of education also recorded significantly higher recall scores than those with lower levels of education.

A further analysis was conducted, this time using stepwise multiple regression. The results indicated that the predictor variables for unaided recall were age, education and media exposure. The beta scores for the three audience variables were: age ($B = -.414$, $p < .006$), education ($B = .359$, $p < .016$), and source credibility ($B = .280$, $p < .039$). The three variables together had an adjusted R square value of .417, indicating that 41.7% of the total unaided recall score is explained by age, education and perception of source credibility

Table 9.4: Participants' Unaided Recall Results

Number of Items Recalled	Group 1	Group 2	Total Sample
2	-	3(16.6)	3(8.3)
3	4(22.2)	3(16.6)	7(19.4)
4	6(33.3)	2(11.2)	8(22.2)
5	3(16.6)	6(33.3)	9(25.0)
6	2(11.2)	3(16.6)	5(13.8)
7	2(11.2)	2(5.5)	4(1.1)
8	2(5.5)	-	-
9	-	-	-
Total	18(100.0)	18(100.0)	36(100.0)

Figures in brackets are percentages

N = 36

Minimum possible score =1

Maximum possible score =12

Mean for total sample=4.6, SD=1.30

Mean for group 1= 4.7, SD=1.57

Mean for group 2= 4.4, SD=1.46

Table 9.5: Item Position, Item Duration and Unaided Recall Scores

News Item	Item Position	Item Length	Unaided Recall Scores
Chemical fertilizers	Eighth	4.5	20(55.5)
Techniques of maize storage	Twelve	3.0	19(52.7)
How to get good maize seed	Fourth	4.5	19(52.0)
Land preparation	First	2.0	18(50.0)
How to make ridges	Second	2.5	18(50.0)
Harvesting	Tenth	1.5	14(38.8)
How to make compost	Ninth	2.5	11(30.5)
How to apply weedicides	Seventh	3.5	10(27.7)
Hand weeding	Sixth	1.0	9(25.0)
Planting techniques and periods	Fifth	1.0	8(25.5)
Appropriate drying methods	Eleventh	0.75	8(25.0)
Where to get more information	Third	0.75	5(13.8)

() Figures in brackets are percentages

N=36

9.3.3.3. Item Position and Item Duration

The results of the Pearson product moment correlation indicated a positive correlation between unaided recall and item duration for the entire sample ($r=.768$, $p=.002$), the control group ($r=.740$, $p<.006$), and the experimental group ($r=.770$,

$p < .003$). This finding suggests that the participants in both the experimental and control conditions recorded significantly higher recall scores with the items with longer duration than the items with shorter duration. Data in Table 9.5 shows that the three most recalled items were the items with the longest broadcast duration. *Appropriate methods of applying chemical fertilizer*, which was the most recalled item, had a broadcast duration of 4 minutes 30 seconds, and was the eighth in terms of positioning in the broadcast. More than half (20) of the participants, representing 55.5%, remembered this item. The second most remembered item was the last item in the broadcast (*Techniques for maize storage*), recalled by 19 participants (52%). This item had a broadcast duration of three minutes. The item appeared to have benefited from both its favourable position and its duration on the broadcast. *How to get good maize seeds*, which was the third most recalled story, also had a long broadcast duration of 4 minutes and 30 seconds. The least most recalled items: *appropriate drying methods* and *where to get more information*, were also the items that had the least broadcast duration. The two items had a broadcast duration of only 45 seconds each.

Item position was found to have no significant relationship with unaided recall. The ANOVA test indicated an F value of .701, $df=2$, $p < .643$, suggesting that item position did not make any significant difference in the mean scores of the participants, both within and between the participants. The first and second items on the broadcast, *Land preparation* and *How to make ridges* were the fourth and fifth most recalled items respectively. The two items did not seem to have benefited much from their favourable positions in the broadcast.

Table 9.6: Participants' Scores on Comprehension

Score on Comprehension	Group 1 N=18	Group 2 N=18	Total Sample N=36
0-10	-	-	-
11-15	-	1(5.6)	1(2.8)
16-20	3(16.6)	7(38.8)	10(27.8)
21-25	3(16.6)	2(11.2)	5(13.9)
26-30	5(27.8)	5(27.8)	7(19.4)
31-35	4(22.2)	2(11.2)	6(16.6)
36-40	2(11.7)	1(5.6)	3(8.3)
41-45	-	-	-
Total	18(100.0)	18(100.0)	36(100.0)

() Figures in brackets are percentages

N= 36

Maximum possible score =70

Mean score for total sample=26.2, SD=6.91

Mean score for Group 1=28.1, SD=6.60

Mean score for Group 2=25, SD=6.83

9.3.3.4. Comprehension Scores

The results of the comprehension test followed a similar pattern as that of the free recall. The highest score for the entire sample was 44 (62.8%), and this was recorded by a 29 year old junior secondary school leaver, and the lowest score was 11(15.7%), recorded by a 65 year old illiterate farmer. The experimental group, again, performed poorer than the control group (Table 9.6). The mean score for the entire sample was 26.22(37.5%). The mean score for the experimental group was 25(35.8%), whilst the mean score for the control group was 28.1(40.14%), showing a mean difference of about 5% in the scores of the two groups. The t-test analysis, however, indicated that there was no significant difference between the two groups as regards comprehension ($t=1.735$, $df=34$, $p<.092$). By this result, hypothesis H10 was rejected.

9.3.3.5. Audience Factors and Comprehension

The Pearson product moment correlation was run to determine the relationship between some selected audience factors and message comprehension. Education, age and media exposure were found to have significant relationship with message comprehension. The relationship between age and message comprehension indicated a low but definite negative correlation ($r = -.398$, $p < .001$), and that of education and comprehension was a positive moderate correlation ($r = .614$, $p < .001$). The relationship between media exposure and comprehension was moderate and positive ($r = .573$, $p < .001$). This result corroborated with the results of the stepwise multiple regression analysis. Age, education and media exposure showed significant relationship with message comprehension, with beta values of $B = .365$, $p < .001$; $B = .405$, $p < .003$; and, $B = .279$, $p < .021$ respectively. The three variables together contributed 54.4% of the variance in unaided recall (adjusted R square value was .544).

The study also found a high positive correlation between unaided recall scores and scores on comprehension ($r = .681$, $p < .001$). This is an indication that those who scored higher marks on unaided recall tended to score high marks also on comprehension.

9.3.4. Discussion

The purpose of this experiment was to investigate the level of influence of message relevance on farmers' unaided recall and comprehension. As reported elsewhere in this experiment, there was no significant difference between the mean scores of the control group and the experimental group in terms of unaided recall. The results of a t-test analysis indicated a value of $t = .439$, $df = 34$, $p < .664$; suggesting that there was no significant difference in the mean unaided recall scores of the two groups. Hypothesis H9 was therefore rejected. Equally, the study found no significant difference in the comprehension scores of group 1 and group 2. The t-test results indicated that a value of $t = 1.735$, $df = 34$, $p < .092$. By this result, hypothesis H10 of the study was also rejected. The probable reason for this is that farmers in both groups considered the messages on maize production relevant to them as maize is the main staple food crop in the area. There could have been a difference in the degree of relevance farmers ascribed to the broadcast, depending upon whether they had

cultivated maize or not, but in general, the broadcast was relevant to all the farmers. This is because even those farmers who did not cultivate maize for that current crop season (2006) could cultivate maize the next season. Besides this, the experience gained in maize production over the years by farmers in both groups could have induced an enhanced cognitive processing of the new messages that were contained in the broadcast. In deed there probably was the same priming effect for farmers in the two groups because they have all over the years been maize farmers.

Age and education proved very potent in influencing unaided recall and message comprehension. Age had a moderate negative correlation with unaided recall ($r=-.517$, $p<.001$) and a moderate negative correlation with message comprehension ($r=-.398$, $p<.001$). Education also correlated moderately with unaided recall ($r=.502$, $p<.002$) and demonstrated a strong correlation with message comprehension ($r=.614$, $p<.001$). The two variables are strongly linked in the sense that most of the farmers with formal education tended to be the younger ones. Equally linked to the issues of education and age is the issue of the relationship between unaided recall scores and the scores on comprehension. The relationship between unaided recall and message comprehension was found to be highly significant ($r=.681$, $p<.001$). This probably suggests that the ability of the farmers to store information in memory was related to the farmers' ability to comprehend the messages.

9.4. General Discussion

This chapter presented and discussed the data on two of the eight experiments conducted in the study. The effects of delayed recall and the effect of relevance on unaided recall and message comprehension of radio broadcasts were investigated.

In the first experiment (delayed recall), there was clear evidence that time-delay is an important factor in memory recall. The one week that elapsed before the farmers in the experimental group were tested for recall and comprehension resulted in a significant mean difference in unaided recall between the control group and the experimental group. Memory decay could have been the reason that accounted for the lower unaided recall by the farmers in the experimental group. However, the one week delay did not result in a significant mean difference in comprehension scores of the two groups, even though the experimental group again recorded lower scores. Perhaps

the comprehension test questions served as cues for the farmers in the experimental group to remember some of the information they had forgotten.

The second experiment in this chapter sought to investigate the effect of message relevance on unaided recall and comprehension of broadcast news to farmers. The preposition was that message relevance will have a significant influence on farmers' level of free recall and comprehension. The 36 farmers that constituted the sample were divided into two groups; one group was made up of farmers who cultivated maize for the 2006 crop season, and the other group was made up of those who did not cultivate maize within the same crop season. The assumption was that the farmers who had cultivated maize would find the radio messages relevant to their information needs, and those who had not cultivated maize would consider the messages as not been immediately relevant.

The hypotheses that were proposed for the experiment (H9 and H10) were both rejected. There was no significant mean difference in message comprehension between the group that had immediate use for the messages and the group that did not have immediate use for them. Similarly, the mean scores on unaided recall indicated that the group that had immediate use for information on maize did not perform significantly better than the group that did not have immediate need for the messages.

The results run contrary to the literature on cognitive response theory and the elaboration likelihood theory. According to Kellermann (1985), the lack of focussed attention by a viewer or listener enlarges the potential stimuli that impacts on the person's sensory register, thus placing more demands on the limited short term memory (STM) for information selection and processing. As a result more information is likely to decay before they could be transferred into long term memory (LTM). By extension, this suggests that if the information received is not what the farmers immediately sought; the unsought information may easily decay. Thus, it was expected that for the farmers who did not cultivate maize within that cropping season, storage and retrieval of the messages on maize cultivation would have been poorer than those who had cultivated maize.

Perhaps, the previous knowledge on maize cultivation that all the farmers in the two groups already possessed, as already mentioned in this chapter, was useful in enhancing cognitive processing of the new messages that were contained in the

broadcast. Therefore, whether the farmers had cultivated maize for that crop season or not, did not make any difference in the uptake of information from that broadcast.

The study found that item duration had a significant effect on unaided recall of participants in both experiments. The items with the longer duration were recalled significantly more than the items with shorter duration. However, item position was found to have no significant impact on unaided recall. The effect of item position did not make a significant difference in the mean scores of the participants, both within and between the groups.

From the Pearson product moment correlation, chi-square and stepwise multiple regression analyses, age, education and media exposure were the audience factors that had significant relationship with free recall and comprehension. The younger farmers understood the messages better, and recalled more of the items than the older farmers. The findings of the relationship between education and unaided recall and comprehension, and also between media exposure and unaided recall and comprehension, suggest that people with higher education, and those who relied more on mass media for general news and information, performed better in free recall and comprehension. The influence of education on learning from broadcast news has been supported by literature from research results on recall and comprehension of broadcast news (Findhal and Hoijer, 1985; Gunter, 1987; Stauffer, Rybolt, and Frost, 1978, 1980).

For age, the relationship was a negative correlation with recall and comprehension for each of the two experiments, suggesting that the younger farmers among the participants recalled significantly more stories. They also recorded significantly higher comprehension scores than the older ones. Though less straightforward as compared to their findings on education and recall, Findhal and Hoijer's (1985) experiment conducted among residents in Stockholm, Sweden, also provides relevant support to the potency of education in influencing recall of broadcast news. They found that whilst the age group of 36-45 years recorded very high recall scores, women with low education within the 56 and 65 years age group recorded the lowest scores. Very much related to age and education among the farmers in Ghana, is media exposure. Most of the young adults in Ghana rank higher, generally, in education than the older farmers; and the level of media exposure among the rural farmers is directly related to level of education, and inversely related to age. Younger farmers in Ghana are

therefore more likely to have higher education, and to rely on other media sources (apart from radio) such as television and newspapers for general news and agricultural information than the older farmers.

Research results on studies in memory recall, comprehension and learning from broadcast news are definite that persons who rank high on socio-economic variables such as education benefit more from broadcast news as a result of their advantage as aggressive information seekers, as a result of the knowledge they have already stored, and as result of the skills gained through the formal educational system (Gunter, 1987). Rogers (1983) observed that research has demonstrated that better educated farmers are able to deal better with information, they have access to external information, and they are early adopters of information as well. This study consistently found a significant relationship between farmers' level of education and their scores on recall and comprehension of the radio messages broadcast to them. Illiterate populations clearly are not as successfully as the educated in remembering and retaining messages. Perhaps their legendary skills in recounting history through oral and traditional folklore (Alemna, 2003) are not brought to bear on the reception of messages from a mass media source – particularly radio. As noted by Stauffer, Frost and Rybolt (1978), there is anecdotal data that suggest that non-literate adults in tribal societies have well developed mental abilities to recall oral messages (Stauffer, Frost and Rybolt, 1978), but this has not been found to translate into high levels of recall and comprehension in most research studies, including this current study.

9.5. Conclusion

Two experiments were discussed in this chapter; the effect of message relevance, and the effect of delayed recall. Two hypotheses were formulated and tested, and these were rejected by the findings of the study. The next chapter (chapter ten) presents a general discussion of the study. The chapter also explains the limitations of the study, and its contribution to knowledge. Also the chapter suggests possible areas for further research in recall and comprehension of broadcast news in predominately poor rural settings where agriculture is the main economic activity. The chapter provides also a conclusion to the study.

CHAPTER 10

GENERAL DISCUSSIONS AND CONCLUSIONS

10.1. Introduction

This thesis research was planned to cover ten chapters. It offered discussions under various sections in the last nine chapters. This chapter provides a general discussion of the main findings of the study. The sections covered under this chapter are: general discussion, which provides a treatment of the main findings of the study; limitations of the study; the study's contribution to knowledge, suggestions for further research; and, a conclusion to the study.

The study was conducted to assess the potential of local radio for agricultural communication in Ghana. In this respect, an investigation into retention of agricultural news after broadcast and the level of reliance of farmers on radio for agricultural messages were found useful in assessing the potential of radio for agricultural knowledge transfer to rural farmers. The research used field experiments and survey questionnaires as the methodological tools to collect and analyse data, draw relationships between the dependent and independent variables, and to test ten research hypotheses.

The experimental methodology involved a series of field experiments, which were used systematically to explore the effects of the specific radio broadcasts on the information acquisition of farmers about agricultural policies and practices. The effects of relevance of messages to the needs of the farmers, and the effect of time-delay on farmers' unaided recall and comprehension, were also investigated. The survey methodology, on the other hand, was used to profile rural radio listeners in Ghana. It examined the general sources of news for rural farmers, their levels of reliance on radio for agricultural messages, radio listening behaviours, radio programme format preferences, attitudes towards radio, and perceived credibility of the radio messages. In addition, the survey offered an investigation into farmers' perceived levels of recall and comprehension of the local radio agricultural messages.

The study's hypotheses were drawn from mass communication and social psychology theories. The cognitive response theory explains the processes involved in yielding to persuasive communication (Petty and Priester, 1994). According to Petty

and Priester (1994) information processing in the cognitive response theory involves processes and sub-processes that are performed on stimuli by a person in a communication situation. Memory therefore is a composite of the interplay of the processes of encoding, storage and retrieval of messages and information that people are exposed to (Lang, 2000). The level of message content a listener can recall will depend upon the amount of the message that the listener is able to encode, store and retrieve (Gunter, 1987). An important factor in the encoding, retrieval and storage processes also has to do with how much resource the listener or viewer possesses and can afford to allocate to the message (Petty and Priester, 1994).

In relation to local radio, and in relation to this thesis research, it is expected that how much of a radio message a listener can recall and comprehend will depend upon the amount of the message the listener is able to encode, store and retrieve. A proposition of this thesis research, therefore, is that production variables and audience factors do have influence on the amount of information uptake from radio agricultural news broadcasts.

The diffusion model provided a basis for analysing and presenting the findings of the data gathered through the survey research. The diffusion theory is emphatic that media behaviour, position in the social structure and personal characteristics have great value in distinguishing the early adopters from the late adopters of innovations in a social system (Rogers, 1969, 1976). Perceived credibility by message recipients of the source of the message, and the perceived relevance of the message disseminated by the source to the receiver have been identified also by Rogers (1969) as factors that influence message reception and adoption. These variables were investigated in this study.

10.2. General Discussion of Main Findings

10.2.1. Survey Data

10.2.1.1. Respondents' Demographic and Socio-economic Characteristics

The average age of the 365 respondents was 39.9 years; most of the farmers were below the age of 50 years, with only 3% older than 60 years. This finding is most significant to agricultural development in Ghana, as it suggests that the farmers are

generally within the youthful and active working group. Age is an important factor in agricultural development in Africa, since it has an influence in agricultural information accessibility and utilization. Younger farmers are more responsive to new ideas and practices while older farmers are generally conservative and not responsive to new ideas and practices. The results demonstrated that, in Ghana, even though the mass movement of the young to the urban centres still persists, the agricultural sector has not been left for only the elderly.

More than three-quarters of the farmers (77.8%) had no formal education; this figure is higher than the national average of 59.9%. The massive proportion of illiterates among the rural farmers could pose a danger to knowledge acquisition of farmers and a danger to increased agricultural production in Ghana. This is because illiteracy and low level of education do have negative effects on the diffusion of agricultural innovations to and acceptance of new technology (Rogers, 1962, 1969).

Ghana is a developing country, where the majority of the population have very low incomes. Farmers particularly are among the groups with very low incomes. This study found that about half of the farmers earn, on the average, US\$1 or less, a day. Farming has always been regarded an activity for people with low or no education. This study revealed that this assertion is valid.

An overwhelming majority of the farmers were males. In Ghana, even though most of the farming activities are done by women, they are often not considered full-time farmers; they are seen more as housewives providing labour to help their husbands on their farms. Most women are therefore denied access to land, especially in a highly patrilineal society like northern Ghana (Yazdani, 2000).

10.2.1.2. Radio Ownership and Radio Listening Behaviour

The assertion that radio has great value for agricultural development among poor rural farmers (Monu, 1982) has been found valid by the results of the study. Most of the farmers own radio sets. Indeed radio ownership has been found to be high, even among poor rural farmers in Africa, particularly in Ghana (Chapman et. al., 2003) and in Nigeria (Emenyeonu, 1987). Radio has become a common commodity largely because it has become the main source of information to rural farmers, and partly because of the availability of cheap dry cell radio sets in the African markets. The acute problem of lack of electricity has been circumvented by the availability of

acute problem of lack of electricity has been circumvented by the availability of portable radio sets that are powered by dry cells (Chapman et al., 2003). In Ghana, the liberalization of the air waves within the past decade has promoted the setting up of more private FM Radio Stations, particularly in the urban centres (Kafewo, 2007). The rural communities also continue to benefit from the proliferation of radio stations in Ghana.

The localisation of public service radio through the establishment of regional radio stations, has made radio an important source of communication for both the urban and rural populations in the country (Kafewo, 2007).

In this thesis research, radio ownership and listenership were both found to be very high, recorded at 87% and 100% respectively. This finding was expected, given that the use of radio for rural and community development is growing rapidly in Ghana.

10.2.1.3. Television Viewing and Newspaper Readership

The study found that as radio becomes more and more pervasive, television viewing and newspaper readership remain confined to the urban centres, with a painfully slow rippling effect on the rural communities. In my study, television viewing was found to be very low and newspaper readership was lowest. The data on radio and television viewing and newspaper readership were highly consistent with findings made by previous studies in Ghana by Chapman et al. (2003) and in Nigeria by Emenyeonu (1987). Studies have shown that radio, since the last three decades or more, ceased to be the dominant source of news in the United States and in the United Kingdom (Gunter, 1987). McNair (2003) disclosed that a survey conducted in the United Kingdom in 1990 revealed that television is the main source of information about the world for the people. Gunter (1987), citing a study by the Independent Broadcasting Authority (IBA), reported that a survey conducted in Britain in 1982 indicated that 58% of the people said they got most of their news from television, 27% mentioned newspapers and only 12% mentioned radio. Gunter (1987) further stated that on the average, about two-thirds of the public of modern industrialised countries claim that television is their main source of domestic and international news. In sharp contrast to the findings reported by Gunter (1987), this study found that radio remains the most important source of news - general news and agricultural news – for the poor rural farmers in Ghana.

Gender and income were found to be associated with radio ownership. This is further indication that poverty is a major hindrance to the acquisition of, and reliance on, television and newspapers for news by farmers in Ghana.

10.2.1.4. Sources of Agricultural Information: Local Radio, Agricultural Extension Agents and Interpersonal Communication

This study found that rural farmers in Ghana rely on radio to meet their information needs. The most popular reasons or purposes that farmers cited for listening to radio included: agriculture news, domestic news, development issues, family life education, music, announcements, sports, moral and religious education, and adult literacy programmes. A few farmers mentioned that sometimes they listened to radio “to while away time”. The results of the study demonstrated that while television and newspapers are highly insignificant in agricultural message delivery to farmers, radio remains the most reliable form of agricultural communication. Radio is relied on, more than any other source, for agricultural communication. Nearly all the farmers listened to radio agricultural broadcasts, and about two thirds of them relied most on radio, ahead of extension agents, for agricultural messages. The popularity of radio as a source of domestic news and agricultural communication with rural farmers has been variously claimed and reported (Chapman et al., 2003; Okwu, Kaku and Aba, 2003).

An important finding of the study, however is that slightly over half of the farmers mentioned the extension agent, ahead of radio and all other forms of mass media and interpersonal communication, as the most credible source of agricultural information. This finding invites a possible interpretation. Perhaps the farmers relied on radio more than the agricultural extension agents for agricultural information because the radio simply is more available to them than the extension agent. The farmers have access to their radio sets all day, and they listen to the radio even when working on their farms. They do not have such limitless contact with extension agents. The extension agents’ visits to the rural communities, as this study found, are not very adequate. Farmers responses on the regularity of the visits of extension agents for agricultural messages, indicated that more than half of them had contacts with extension agents once in a month, and a further 12.3% indicated that they had contact

with the extension agents once in more than a month; mostly once in about three months or more. Significantly, the general inadequacy of extension education to the farmers by the agricultural extension services appears to be the most basic reason why the farmers relied more on radio than on extension services for agricultural communication.

The farmers' trust in radio is not in doubt. This is supported by the high scores recorded on farmers' attitudes towards radio and their perceptions of the credibility of local radio and its programmes. However, farming is a practical venture; the radio can provide as much information as the agricultural extension agent can provide, but radio has the huge disadvantage of not been capable of providing practical field demonstrations to farmers in relation to the application of new technology, especially the use of agro-inputs, post-harvest handling and value-added agro-processing.

The major reasons mentioned by the farmers who indicated that the extension agent was more credible than radio were that: (1) extension agents offer practical field demonstrations; and, (2) there is also the opportunity for face- to- face interactions with the extension agents. Perhaps, Monu's (1982) view about the relative importance of radio and extension agents in agricultural communication is instructive. He is clear that radio and extension agents perform different functions in the adoption process. While radio is used mainly to develop and increase awareness of an innovation, extension contact is crucial in the trial and adoption of innovations.

The study found that apart from radio and agricultural extension agents, the farmers relied also on interpersonal communication channels for agricultural news. As noted by Rubin (1994), the media competes with other sources of information for satisfaction of needs by individuals. This suggests that the individual has several needs, and has a wide range of choices that will meet these needs, including face-to face communication. De Fleur (1991) observed that substantial literature that has accumulated over the years demonstrated that important news stories within a system are passed on to secondary audiences by the processes of "diffusion". De Fleur (1991) cited Robinson (1978), who reported that the importance of interpersonal dissemination of messages is not restricted to only societies that remain in oral tradition. This means that even in developed economies, interpersonal communication is still very much prominent in information dissemination.

Johnson (1978), as cited by DeFleur (1991), observed that a number of Americans do not read newspapers, watch television or listen to radio, and thus for many news stories, the sole information channel to such people is through interpersonal communication. However, it is expected that the reliance on interpersonal communication sources for news in Africa would be more pronounced because television ownership is low, and high levels of illiteracy do not permit high levels of newspaper readership. Not surprisingly, therefore, this study found that interpersonal communication channels are an important source of communication of agricultural messages, alongside rural radio, extension agents, television and newspapers. Indeed more than half of the farmers reported that they relied more on interpersonal communication than on television and newspapers for agricultural communication. Bandura (1994) observed that diffusion processes make use of social network structures. He stated: "people are enmeshed in networks of relationships that include occupational colleagues, organisational members, kinships, and friendships, and they are linked by personal relationships" (Bandura, 1994:84).

In this study, the farmers mentioned neighbours, family members, fellow farmers, traditional rulers, assembly members and unit committee members, as their other sources of agricultural information, apart from radio and agricultural extension agents. Such relations do have an impact on people's adoption of innovations because they convey more social information and demonstrate appreciable influences (Bandura, 1994).

Diffusion studies (Rogers, 1962, 1969) and the knowledge gap hypothesis (Tichenor, Donohue and Olien, 1970) have reported the existence of different levels of knowledge among members of a community as a result of different levels of education, income and media exposure. According to the knowledge-gap hypothesis, there indeed exists a knowledge-gap among members of a social system, and the gap widens upon the introduction of information into the system. People who seek information actively and also learn fast, turn to be the sources of information to others in the same community. They are also normally those who rate high on education, income, and general knowledge (Tichenor, Donohue and Olien, 1970).

This study found that traditional rulers, assembly members and even family heads (mostly husbands) do play a role in agricultural information dissemination in rural communities. They appear to be the most influential opinion leaders, with

profiles that are quite different from the opinion leadership described by the diffusion theory (Rogers, 1962) and knowledge gap hypothesis (Tichenor, Donohue and Olien, 1970).

In the Ghanaian situation, we find from the results of this study that most people in the rural communities who tend to be opinion leaders may or may not rate high on income, education and knowledge. However, they would certainly possess one or more of a wide range of power attributes that I will venture to classify as follows: *traditional*, *pseudo-government* and *social*. *Traditional power* is wielded by chiefs, clan heads, and sub-chiefs; *pseudo-government authority* is reflected in the assembly and unit committee concept; and *social power* is reflected in the social responsibility assigned to assembly members, village or town development committee members, leaders of village youth groups, and village health volunteers. These categories of persons offer opinion leadership in rural communities in Ghana. This study found that opinion leaders are useful in agricultural message and information delivery.

10.2.1.5. Respondents' Involvement in Local Radio Agricultural Broadcasts

Farmers' involvement in radio was found to be very low. This finding, though detrimental to the viability of local radio for agricultural communication, was not totally surprising. Only 12 (3.3%) of the 365 farmers, who constituted the sample, participated in radio agricultural broadcasts within the past crop season (from the middle of 2005 to the middle of 2006). Seven of them made phone-ins to the radio stations, three farmers were involved in radio interviews by radio staff as part of radio programme production, and two others were directly involved in a radio programme as panellists.

A basic reason for the setting up of public service local radio stations was to encourage a two-way communication with the rural folks by encouraging their participation in the radio programmes (Karikari, 1994). In this study, the request made by the farmers that they should be involved in the radio discussion programmes, and that they should be assisted and encouraged also to phone-in during programmes, is a legitimate response to the changing media equation in relation to radio broadcasting for development. Berringham (1979) observed that there is enough experience in the field of community participation that amply supports the view that rural communities

are capable of making a firm and positive contribution to the issues relating to their development and the development of their communities.

The low audience' participation in the local radio programmes that the findings of this thesis revealed is due to several factors. The farmers revealed that they are not invited by the radio stations to take part in radio discussion programmes. Also, lack of public telephone facilities and inability of most of the farmers to own mobile phones in are major hindrances to the rural farmers' participation in radio programmes by way of phone-in messages.

The poor rural farmers in Ghana are not craving for sophisticated modern information and communication technology (ICT) gadgets to enable them participate in radio broadcasting and derive maximum gain. Rather what they wish for is access to public telephone facilities to enable them send their views to the radio station and to contribute to radio agricultural broadcasts.

I submit that the lack of a link between farmers and radio stations in Ghana has further alienated the Ghanaian rural farmer from the agricultural information delivery process. Findings of this study suggest clear evidence that the rural farmer remains largely a receiver or listener, and not a partner in the radio communication process in Ghana.

10.2.1.6. Preferred Radio Broadcast Formats

The discussion format was found to be the most preferred agricultural broadcast format among the farmers. Nearly a half of the sample indicated that they preferred the discussion format to all other formats because it ensures that discussions done on radio are thorough, and this promotes understanding of the messages. About a third of the farmers, however, reported that they preferred the drama format, indicating that the drama is the most superior programme format for sustaining interest in the broadcast and arousing their (the farmers) attention when agricultural broadcasts are on air.

The magazine format and the straight-talk formats were the least preferred. Earlier studies on rural radio audiences revealed that the drama and discussion formats were the most preferred by rural audiences (Chapman et al., 2003). In a study on the use of vernacular radio programmes to promote soil and water conservation in northern Ghana, it was found that the drama component of the radio magazine format that was

developed and used for the study was the most popular. They reported that the farmers enjoyed the drama component most (Chapman et. al., 2003).

The drama particularly has been recognized as a potentially effective tool for rural and community development. The drama format in radio broadcasting is an adaptation of the traditional folk media, which is an important component of traditional communication in Africa and most parts of the developing world (Ansu-Kyeremeh, 1997). The use of the drama format in innovation diffusion has the advantage of persuading the people to adopt the messages through a communication strategy that is akin to their values and expressions.

10.2.1.7. Reported Message Recall and Message Comprehension

The farmers reported that they understood most of the agricultural messages that were broadcast to them through local radio. The younger farmers particularly reported that they understood the radio messages than did the older farmers. In relation to gender, it was found that the proportion of males who said they understood the messages often was higher than females who indicated that they understood the messages often.

Gunter (1987) argues that news awareness varies with age and sex. He stated that even though not much research has been done to examine the difference in age and sex in relation to news awareness and knowledge of public affairs, there is evidence to show that the ability to understand and retain news has a relationship with age and sex.

The result of this study indicates that education and income were found not to have any significant relationship with farmers' reported levels of comprehension of radio agricultural news. After an experiment conducted among college students, out of school adults, 10th grade students and illiterate adults in Kenya by Stauffer, Frost and Rybolt (1980), found that recall of broadcast news was significantly related to education. The college students performed better than the other three categories of respondents in a multiple choice test that was designed to test comprehension of all the 392 people in the sample.

In relation to the findings in Chapters Seven, Eight and Nine of this study, the high proportions of farmers who reported in the survey data that they understood the messages often, did not reflect in farmers' performance on unaided recall and message

comprehension. Significantly, however, in the experiments, just as in the self-reported message comprehension levels recorded in the survey, age and education were found to have significant relationship with message comprehension. The younger farmers reported that they understood the messages more than did the older ones; and in the eight experiments, there was also a significant negative relationship between age and message recall and between age and message comprehension. Also, education consistently demonstrated a positive relationship with unaided recall and comprehension scores in the experiments, just as it did with the reported levels of comprehension in the survey data.

10.2.1.8. Attitudes and Perceptions of Source Credibility

Overall, the respondents held very high positive attitudes towards local radio. The farmers' individual total scores were computed for the given statements in the five-point five-item Likert scale. The maximum possible score an individual could obtain was 25, and the minimum was five. The results showed that more than 93.5% scored 16 or more; the minimum score was six and the maximum was 23. Communication is a voluntary activity, and the propensity to get engaged in it will depend to a large extent on the perceived benefits to be derived from it. Our attitudes therefore are expressed by evaluating a objects with a degree of favour or disfavour (Eagly and Chenken, 2001). A positive belief about an object therefore will produce a positive or favourable feeling towards the object (Bohner, 2001) Positive attitudes towards radio therefore are expected to evoke high listener-ship, to, and high participation in the radio station's programmes.

According to Bohner (2001), attitudes modify behaviour, and people's attitudes have marked influence on their perceptions and thinking. Indeed, the high positive attitudes of the farmers, found in this study, appeared to have influenced also their perceptions of the credibility of the local radio programmes. This study recorded a high perception of the credibility of the local radio programmes. Similar to the scoring on attitudes, the maximum possible total score on perceptions of source credibility of an individual farmer was 25, and the minimum was five. The study found that the lowest recorded score was 10, the highest was 23, and the mean was 20. Perceptions of source credibility, like attitudes, have influence on audience members' level of participation in communication and message adoption. Perceptions of credibility of

radio will have an influence on level of listenership. Credibility, which is the degree of perceived trustworthiness and competence that audiences ascribe to a communication source, is an important element in the spread of innovations (Rogers, 1969). The high scores on attitudes towards radio and perceptions of the credibility of the radio broadcasts suggest that the radio has a great potential to provide knowledge and skills to the poor rural farmers if effective programming factors are used.

10.2.1.9. Test of Hypotheses - Survey

Five hypotheses were formulated and tested using the survey data; three were accepted and the rest were rejected. Hypothesis H1 sought to test the level of relationship between media exposure and education. This hypothesis was accepted. The results showed a moderate but definite relationship between education and media exposure.

Research has shown that better educated farmers are more exposed to external sources of information, and they are able to better deal with information (Rogers, 1969; Hornick, 1998). According to Honick, the level of formal and informal education by farmers influences how they will seek information and adopt the messages. This assertion by Rogers and Hornick supports the study's findings as regards the relationship between education and media exposure.

The study also found a significant relation between media exposure and message adoption, in support of Hypothesis H2. This result is supported by literature on the adoption of innovations as presented by the diffusion theory. According to Rogers (1969), better educated farmers are able to deal with information received from the media better than those with low education. Also the better educated farmers have greater access to external information sources, and they are the early adopters of innovations (Rogers, 1969).

The positive significant relationship that was found between education and media exposure (Hypothesis 1) and between media exposure and message adoption (Hypothesis 2) seemed to have reflected also on the results of the analysis that was done to test Hypothesis H3, which stated that: *there will be a significant relationship between level of education and level of adoption of radio agricultural messages*. This hypothesis was also accepted. The results showed a significant positive relationship between education and message adoption. The farmers who rated high on education

also reported higher message adoption levels than those who rated low on education. These findings were confirmed by literature on the diffusion theory and the knowledge gap hypothesis.

Hornick (1998) argued that the level of informal and formal knowledge of farmers determines to a large extent the *technical*, *allocative* and *innovative* efficiencies they can derive from extension. He expressed the view also that education has the capacity to enhance farmers' propensity and openness to new ideas. The proponents of the diffusion theory hold a similar view. According to Rogers (1969), aggressive information seekers in a community or society are often also the adopters of innovation within a social system.

In relation to local radio agricultural messages, this study found that farmers with high levels of education appear also to rate highly on media exposure, and they are also the early adopters of agricultural messages from the local radio.

Hypothesis H4, which proposed a significant relationship between education and farmers' perceived levels of message comprehension, was rejected.

Similarly, the study found no significant relationship between farmers' perceived credibility of the local radio and its messages, and their levels of radio listening. Therefore hypothesis H5 was rejected. Perhaps the generally high attitudes towards radio and the high perceptions of the credibility of the radio messages, together with the high radio listenership reported by all the farmers, explains why no significant relationships were found between the two psychological variables and level of radio listening.

10.2.2. Data on Experiments

10.2.2.1. Levels of Unaided Recall and Comprehension

The study found that generally unaided recall and message comprehension scores of the participants were low. In each of the experiments, more than half of the respondents recalled less than half of the total number of news items contained in each broadcast. The average comprehension scores (for the entire sample) for the experiments ranged from 38.1% (4.7 items, out of a possible 12) to 58.8% (4.66 items, out of a possible 8).

The lowest mean unaided recall of 38.1% was recorded among the participants of the experiment that sought to measure the effect of message relevance on memory and comprehension, and the highest of 55.2 % was recorded in the experiment that measured the effect of repeating a broadcast twice. The experiment that measured the effect of delayed recall also produced a low mean recall score of 39.2% (4.58 items, out of a possible maximum score of 12).

Mean message comprehension scores were equally low. The lowest was 37.5% (17 marks from a possible score of 40), recorded in the experiment on message relevance, and the highest was 50.5% (20.1 marks from a possible score of 40), which was recorded from the experiment on the effect of straight talk as additional verbal material. Similar findings have been reported for free recall and comprehension of broadcast news (Bernard and Coldevin, 1985; Berry, 1999; DeFleur, 1991; Gunter, 1987; Wilson, 1974).

After a study on the effect of medium on loss of information, Wilson (1974) reported that his study “casts some shadow on the overall effectiveness of journalism in general in informing groups of people” (Wilson, 1974, 115). He stated that overall mean loss of information for all the participants was 76.99%, and the greatest loss of information came from the radio, which recorded a loss of 79.92%.

A study by Katz, Adoni and Parness (1977) among television viewers and radio listeners in Israel revealed a very dismal performance of broadcast media in news recall and learning. The study reported that when participants were interviewed an hour or two after viewing a television newscast and listening to a radio broadcast, 34% of radio listeners and 21% of television viewers failed to recall even a single item. The results of this thesis research suggest that even information that is relevant to the occupations and need of a group of audiences may not be appreciably consumed. The participants of the experiment in this thesis research were farmers, and the information contained in the broadcasts were all on crop farming and animal husbandry, yet the farmers still performed abysmally in terms of memory recall and comprehension.

10.2.2.2. Audience Factors and Unaided Recall and Comprehension

The study found that age and education were consistently potent as the audience factors that had significant relationship with unaided recall and message

comprehension (Table 10.1). Among all the audience variables of the study, age was the most potent factor in influencing message comprehension and unaided recall. The Pearson product moment correlation analyses established that there was a significant negative correlation between age and unaided recall for all the eight experiments. The younger farmers recorded higher unaided recall scores than the older farmers. Also age had a significant negative relationship with message comprehension in all but one experiment. The younger farmers understood the broadcast messages better than the older farmers. Education had significant positive relationship with unaided recall in seven of the experiments, and also correlated positively with comprehension in six of the experiments. Media exposure and credibility of local radio showed positive correlation with message comprehension in two of the eight experiments. Also the stepwise multiple regression analyses indicated that in all the experiments, age was either the only predictor variable for unaided recall and message comprehension, or was one of the predictor variables that contributed to unaided recall and message comprehension (Table 10.2).

Traxler (1973) reported that old people are likely to face interference in relation to a set of to-be-remembered items. This is especially so among older people who are less well educated (Gunter, 1987). This appears to be the case in relation to findings of this thesis research. The younger farmers recalled significantly more stories than the older ones.

Gunter (1987) observed that the discrepancies in learning related to age occur at the encoding, storage and retrieval stages. Older people's memory, according to Gunter (1987), benefits more than the younger ones when they are given adequate time to recall words in learning tasks that involve the listing of words.

Table 10.1: Relationship between Audience Factors and Unaided Recall and Message Comprehension

Experiment	Unaided Recall	Comprehension
Experiment 1 Repeat Broadcast (once)	Age ($r=-.683$, $p<.001$) Education ($r=.634$, $p<.001$)	Age ($r=-.670$, $p<.001$) Education ($r=.679$, $p<.001$)
Experiment 2 Repeat Broadcast (twice)	Age $r=-.467$, $p<.009$ Attitudes ($r=.436$, $p<.016$) Education ($r=.394$, $p<.031$), Media Exposure($r=.523$ $p<.003$)	—
Experiment 3 Straight Talk	Age ($r=.439$, $p<.015$)	Age ($r=-.405$, $p<.027$)
Experiment 4 Recaps at end of Broadcast	Age ($r=-.764$, $p<.001$) Education ($r=.635$, $p<.001$)	Age ($r=.678$, $p<.001$) Education ($r=.519$, $p<.003$)
Experiment 5 Recaps at Beginning of broadcast	Age ($r=-.759$, $p<.001$) Education ($r=.690$, $p<.001$) Credibility ($r=.496$, $p<.004$)	Age ($r=-.598$, $p<.001$) Education ($r=.518$, $p<.002$) Credibility ($r=.415$, $p<.008$)
Experiment 6 Distributed Recaps	Age ($r=-.493$, $p<.006$) Education ($r=.438$, $p<.009$)	Age ($r=-.598$, $p<.002$) Education ($r=.518$, $p<.002$) Media Exposure ($r=.522$, $p<.002$) Credibility ($r=.415$, $p<.011$)
Experiment 7 Delayed Recall	Age ($r=-.557$, $p<.001$) Education ($r=.443$, $p<.011$)	Age ($r=-.419$, $p<.001$) Education ($r=.361$, $p<.043$)
Experiment 8 Message Relevance	Age ($r=-.517$, $p<.001$) Education ($r=.502$, $p<.002$)	Age ($r=-.398$, $p<.001$) Education ($r=.614$, $p<.001$) Media Exposure $r=.573$, $p<.001$)

The influence of education and media exposure on unaided recall and comprehension reported in this study is supported by findings from other studies in memory recall and comprehension (Stauffer, Frost and Rybolt, 1980; Gunter, 1987), and by literature from diffusion studies (Rogers, 1969), knowledge gap hypothesis (Techenor, Donohue and Olien, 1970) and cognitive theories (Woodall, Davis and

Sahin, 1983). The process of encoding, according to Woodall, Davis and Sahin (1983), involves an interaction between new information which is being absorbed and the networks of nodes that already exist in the person. Some of these networks are activated by the input information. The level of an individuals' understanding of a message therefore is a product of already stored information (Woodall, Davis and Sahin, 1983). Viewers (and radio listeners, it is expected) with good general knowledge, Woodall, Davis and Sahin (1983) observed, can therefore be taken as having a large semantic network, and thus they are able to recall and comprehend broadcast information better than those with poor general knowledge.

There is the argument that the skills acquired in learning through the formal years of education are useful in influencing learning from broadcast news. As noted by Stauffer, Frost and Rybolt (1980), people with higher education, probably drawing on their skills of testing and examination as a result of their longer years in formal school system do produce better results in unaided recall and message comprehension scores from radio broadcasts than illiterate listeners (Stauffer, Frost, and Rybolt, 1980).

Younger farmers, farmers with high levels of education and those who rate high on media exposure could be used more as contact persons by the radio staff as they seek to establish contact listeners, and also to establish radio listening and discussion groups. Age, level of education and media exposure could also be useful criteria for the selection of contact farmers by the Extension Services Division of the Ministry of Education in Ghana, since these categories of farmers demonstrated higher unaided recall and comprehension levels in this study.

10.2.2.3. Relationship between Unaided Recall and Comprehension

One of the important findings of the study has been the marked relationship between unaided recall and comprehension for all the eight experiments. Berry (1983) does not accept that unaided recall is an important measure for detailed cued recall of messages. His view is that "free topic recall and detailed cued recall cannot be regarded as simply alternative measures of *memory for television*" (Berry, 1983:361). However, Berry did not reject that free recall could have a positive relationship with comprehension of broadcast news. Similarly, Woodall, Davis and Sahin (1983) asserted that remembering any information and understanding that information should be seen as separate different cognitive processes.

Table 10.2 Results of Stepwise Multiple Regression Analyses of Audience Factors and Unaided Recall and Comprehension

Name of Experiment	Unaided Recall	Comprehension
Repeat Broadcast	Age: Beta = -.489, $p < .001$ Education: Beta = .383, $p < .008$ Adjusted R square = .583	Age: Beta = -.679 Adjusted R square = .449
Repeat Broadcast (twice)	Age: Beta = -.439, $p < .015$ Adjusted R square = .193	Age: Beta = -.405, $p < .007$ Adjusted R square = .164
Straight Talk	Age: Beta = -.523, $p < .003$ Adjusted R square = .247	Age: Beta = -.523, $p < .001$ Adjusted R square = .247
Recaps at end of Broadcast	Age: Beta = -.534, $P < .001$. Education: Beta = .413, $p < .003$ Adjusted R square = .603	Age: Beta = -.694, $p < .05$ Adjusted R square = .463
Recaps at the Beginning of Broadcast	Age: Beta = -.440, $p < .007$ Education: Beta = .399, $p < .003$ Adjusted R square = .355	Age: Beta = -.440, $p < .008$ Education: Beta = .417, $P < .009$ Adjusted R square = .373
Distributed Recaps	Age: Beta = -.560, $p < .007$ Education: Beta = -.471, $p < .013$ Adjusted R square = .748	Age: Beta = -.480, $p < .001$ Media Exposure = .382, $p < .010$ Adjusted R square = .458
Delayed Recall	Age: Beta = -.591, $p < .001$ Media Exposure: .393, $p < .017$ Adjusted R square = .467	Age: Beta = -.616, $p < .001$ Adjusted R square = .358
Message Relevance	Age: Beta = -.414, $p < .006$ Education: Beta = .359, $p < .016$ Credibility: Beta = .280, $p < .039$ Adjusted R square = .256	Age: Beta = -.365, $p < .001$ Education: Beta = .405, $p < .001$ Media Exposure = .279, $p < .003$ Adjusted R square = .544

According to Woodall and his colleagues, memory processes involve the storage, retrieval and access to input information, while understanding involves an interaction between incoming information and the knowledge that is already stored in memory. The information then is utilised in the processes of going beyond input information to make a set of inferences (Woodall, Davis and Sahin, 1983). This distinction, according to Woodall, Davis and Sahin (1983), only serves the purpose of accepting the possibility that we can remember things we do not understand, and we can understand things we may not be able to remember later. Like Berry (1983), Woodall, Davis and Sahin (1983) noted that better initial understanding of information at input stage to a cognitive system enhances its later recall.

This was what the evidence in the study overwhelmingly supported. Participants who were able to provide the highest number of “gist” for the stories also tended to demonstrate more comprehension of the broadcast news by being able to abstract, semantically and episodically, the information they received from the broadcast into their existing knowledge structures. The implication of this finding for radio news broadcast to farmers in Ghana is that those farmers who are able to retain the broadcast messages most are also those who are most likely to have better grasps of the understanding and thrust of arguments of the persuasive messages.

10.2.2.4. Item Duration and Item Position

Item duration demonstrated strong and consistent influence on unaided recall and comprehension. In all the experiments except in the case of repeat broadcast (twice), item duration showed a significant correlation with unaided recall scores and comprehension. This finding is consistent with the results reported by Booth (1970), who found, after a study on recall of news items, that the amount of airtime a news item enjoys has a positive relationship with the level of recall of the item.

Booth (1970) further reported that, duration was however less effective than item position in influencing unaided recall and comprehension. However, in this experiment, the reverse has been the case. Item duration has consistently and more vividly demonstrated an influence on memory recall and comprehension than item position. In all the experiments, except one (distributed recaps), item position did not have any significant effect on the difference in mean unaided and comprehension scores between the participants and within the participants.

There are copious findings on the relationship between memory of a news item and the position of the item on a broadcast (Berry, 1997; Stauffer, Frost and Rybolt, 1980). In general item position has been found to have little effect on recall, but the items in favourable positions, such as the first two items and the last items, have been found in most studies to attract higher recall by audience (Berry, 1997).

In studies on recall and comprehension of broadcast news, the first two and the last positions are considered to be the “favourable positions”. Based on this assumption, most researchers who sought to test the effect of serial position on message recall and comprehension have investigated the performance of participants in relation to their recall scores for the items in the favourable positions. In his study on “*Comprehension and recall of Internet news: a quantitative study of web page design*” Berry, (1997), measured the effect of item position by asking each participant to indicate the stories read first and last on the web page. Similar to the findings made by Stauffer, Frost and Rybolt (1980), in their Kenyan experiment, Berry found that apart from the importance of position, proximity or relative importance of a news item to the audience does affect its recall.

10.2.2.5. Test of Hypotheses - Experiments

Chapters seven, eight and nine provided the analyses of the data from the eight experiments that were conducted in the study. Hypotheses H6, H7, H8, H9, and H10 were formulated for testing using the data from the experiments. Hypotheses H6 and H7 of the study were accepted. The results indicated significant difference between the mean scores of the participants who listened to a radio broadcast only once and another group that listened to the same broadcast twice. The group that listened to the repeat broadcast recorded significantly higher recall scores than the group that listened to the broadcast once. Also the experimental group that listened to the broadcast twice recorded significantly higher comprehension scores than the control group that listened to the broadcast once.

To further assess the effectiveness of repeat broadcast beyond one repetition, another experiment that repeated a broadcast twice to an experimental group (the group listened to the broadcast three times) with the control group listening to the broadcast once, was conducted.

The results of that experiment also showed that repeat broadcast significantly enhanced unaided recall and message comprehension. This was further proof of the potency of repeat broadcast as an effective programming variable for rural farmers. This finding is supported by the research results and literature on the effects of additional verbal information on recall and comprehension of broadcast news (Findahl and Hoijer, 1975; Son, Reese and Davie, 1987). According to Findahl and Hoijer (1975) additional verbal information not only enhances retention of the main gist of news items, but also serves to enhance comprehension of the difficult-to-understand aspects of a news broadcast, for example those relating to names.

In Chapter Eight, Hypothesis H8 was tested and accepted. Farmers who listened to the broadcast that contained recaps (recaps at the end of the broadcast) recorded significantly higher recall scores than the participants who listened to the broadcast without recaps. Research has supported the view that summary of news items in a broadcast news enhances audience recall (Bernard and Coldvin, 1975; Findahl and Hoijer, 1976; Gunter, 1978; Perloff, Wartella and Becker, 1982; Son, Reese and Davie, 1987). Son, Reese and Davie (1987), reported after their study on the effects of recaps on Television news learning, that recapping is effective as a technique for enhancing viewers comprehension of broadcast news but may not necessarily increase general recall. This study however found recaps to be effective for increasing unaided recall of the main items or issues discussed in a broadcast. After conducting two studies on recall and comprehension of broadcast news in Kenya and in Boston, Stauffer, Frost and Rybolt (1978, 1980) found that radio news items that were given emphasis by way of recap, recorded higher recall scores those that were not re-emphasised or summarised.

Several other researchers, including, Findahl and Hoijer (1976) supported the view that recap of messages by way of summary of broadcast news enhances recall and retention. Stauffer, Frost and Rybolt's (1980) work in Kenya supports the view that audiences of broadcast news in Africa do benefit from recaps or summaries or additional verbal information to the main broadcasts in radio and television. The findings of this study provide further evidence to this. The recap materials at the end of a broadcast perhaps evoked the *priming effect*, drawing into play the associative networks, and spreading activation of the already stored knowledge (Jo and Berkowitz, 1994) from the messages that were contained in the main broadcast. The

recaps, presumably, activated the semantically related ideas in the broadcast, and hence aided the farmers to process and absorb the messages.

In Chapter Nine, two hypotheses (Hypothesis H9 and H10) were tested. The two hypotheses were however rejected. The study found that the farmers who had immediate need of the messages (those who had cultivated maize) recorded higher mean unaided recall and comprehension scores than those who did not have immediate need for the messages (those who did not cultivate maize). The difference was, however, not statistically significant. A plausible explanation for this is that farmers in both groups considered the message on maize production relevant to them as maize is the main staple food crop in the area. In general, the broadcast could possibly have been considered relevant by all the farmers, because even those farmers who did not cultivate maize for that current crop season could cultivate maize the next season.

Besides this, the experience gained in maize production over the years by farmers in both groups could have induced an enhanced cognitive processing of the new messages that were contained in the broadcast. There probably was the same *priming* effect for farmers in the two groups because they have all over the years been maize farmers. As noted by Woodall, Davis and Sahin (1983), pre-existing knowledge of an issue activates a semantic network when similar messages are broadcast. In this wise, stories that relate to matters familiar to most viewers will be better understood because the viewers can rely on well represented network of nodes acquired through daily experience.

It may appear that besides the role played by pre-existing knowledge of all the farmers (in the both the control and experimental groups), the issue of attention could have impacted on the results recorded in the experiment. Both the control group and experimental group could have paid equal attention to the broadcast because the message on maize production was useful to all them, since basically they were all maize farmers. Kellermann (1985) discussed the attention factor in memory recall. Attentional focus, according to Kellermann (1985), is a product of a person's internal needs and goals, which in turn comes about when information in the long term memory (LTM) is activated and placed in the working memory (WM).

In relation to my study, it is expected that farmers in the control and experimental groups could have rated high on knowledge about maize cultivation, which they had

already stored in long term memory, and thus they were able to evoke this into working memory. Additional information on maize production may therefore not evoke significant difference in unaided recall and understanding between the control group and the experimental group, as was found in this study.

Baron and Bryne (2003) discussed the uptake of relevant information in relation to the working of schema in our memory. They noted that when a person is exposed to information, that person is very much likely to report those aspects of the information that is consistent with schema, even though, sometimes, information that is inconsistent with schema may be present in the person's memory as well. They argued that encoding information that does not fit with the schema in our mind is often ignored. Information that is a focus of a person's mind therefore is more likely to be stored in long term memory. This means it is information that is consistent with our schema that is likely to be encoded (Baron and Bryne, 2003).

In relation to the findings on message relevance on unaided recall and comprehension, it may be argued that the messages of the broadcast on maize production were in consonance with the already stored knowledge of the farmers on maize production which they have gained over the years. Therefore for farmers in both groups (those cultivated maize for the crop season and those who did not), the new information they received from the broadcast was consistent with their schema. Whether they had cultivated maize or not was therefore not so potent an issue that could significantly affect their uptake of the information that was broadcast to them.

10.2.2.6. Effect of Programming Variables and Other Factors

In general the study found that *recaps* of news stories, *delayed recall*, and *repeat broadcasts* all showed significant effect on unaided recall and comprehension. All the three forms of recaps – recaps at the end of a broadcast, recaps at the beginning of a broadcast and distributed recaps – showed positive influence on unaided recall and comprehension. However, for the last two forms of recaps, the influence on unaided recall and comprehension were not statistically significant. One explanation that could be offered for this is that rural farmers in Ghana are used to recaps at the end of a broadcast, and not the other two forms of recaps. The programme producers and presenters often use recaps at the end of the broadcast for agricultural development news, but rarely use the other two kinds of recaps.

Another explanation for the superiority of the recaps at the end of the broadcast over the other two types of recaps could be sought from cognitive information processing. Perhaps the recaps evoke better cognitive processes by providing the cues to retrieval and message retention when they come after the main messages have been provided, than before or within the time the main messages are provided.

Repeating a broadcast once or three times were both found to significantly influence unaided recall and comprehension. It was expected that repeating a programme twice (that is broadcasting it three times to group) might result in boredom, invite waning interest, and hence result into low levels of unaided recall and comprehension, however, this turned out not to be the case in that experiment. The two experiments that tested the effect of repeating a programme (once) and (twice) both suggested significantly enhanced memory recall and comprehension.

Perhaps the reason the broadcast that was repeated three times did not result in dwindling interest and reduced performance in recall and comprehension was that it was a very short broadcast of seven minutes' duration. Listening to a seven-minute broadcast three times suggests an accumulated listening period of only 21 minutes. Perhaps, if the same broadcast that was used to test the effect of one repetition (which was of 30 minutes' duration) was used to investigate the effect of repeating a broadcast twice (broadcasting the same programme three times) perhaps there would have been the adverse effect of waning interest on unaided recall and comprehension.

Delayed recall was found to have a significant effect on unaided recall but not on comprehension. After one group of farmers had listened to a news broadcast once but were interviewed a week later, their mean score on unaided recall was significantly lower than the other group of farmers who listened to the same broadcast once, but were interviewed soon after the broadcast. Only one week delayed recall resulted in significant memory decay among the farmers.

This has implications for broadcast timing of agricultural radio messages to farmers. Time-specific messages need to be broadcast just at the time the rural listeners need them most. Information that is broadcast at the immediate time that farmers are about to begin crop cultivation, for example, would not be drastically lost since the farmers will immediately apply the messages. Timely delivery of messages would work better.

10.3. Contribution to Knowledge

This study, like any academic work at a higher level, is expected to contribute to the bulk of existing knowledge through theory and practical applications. Much has been investigated, reported and documented on recall and comprehension of broadcast news from the developed world, especially in Europe and North America through the use of the experimental methodology (Gunter, Furnham and Gietson, 1984; Son, Reese and Davie, 1987; Stauffer, Rybolt and Frost, 1983). Also attempts have been made to investigate the role and impact of radio in information dissemination among audiences in Africa and other developing countries through the use of the survey methodology and qualitative methods (Emenyenuo (1987; Okwu, Kuku and Aba, 2007). In general, however, the findings of this study from both the survey and the experiments have contributed to the bulk of existing knowledge. The Ghanaian perspective of the way the rural farmers use radio, their attitudes towards local radio and perceptions of the local radio messages, and an assessment of what the radio means to them in their daily lives, and in their quest for agricultural messages have been clearly explored and vividly reported. The performance of rural farmers in unaided recall and comprehension of broadcast news has provided results which will inform the bulk of literature on learning from the media, especially radio. The results of the study offer a basis for comparing performance of broadcast news in typically rural and predominantly illiterate communities in a developing country to the findings of the copious work on broadcast news that exist in other parts of the world, especially the developed world.

Specifically and most importantly, however, this study is the second comprehensive and known work to be conducted in Africa on unaided recall and comprehension of broadcast news; coming next to the study conducted by Stauffer, Frost and Rybolt (1980) nearly three decades ago in Kenya. In the whole of the West African sub-region, however, this study is the first of its kind. It is a trail blazer; a pioneering effort in recall and comprehension of broadcast news. The work would serve as an invaluable source of reference. One more African perspective on learning from broadcast news has been provided nearly three decades after the first effort was made by Stauffer and his colleagues.

Another aspect of the study's contribution to knowledge is that it is the first known comprehensive investigation on message recall and comprehension using

agricultural broadcasts. The copious studies on learning from the broadcast news from all over the world have been on general news bulletins, fictitious or real, but not agricultural messages. A study on the use of radio for disseminating agricultural messages to farmers in Ghana was conducted by Chapman et al. (2003), when they used a 45-minutes' radio programme to disseminate messages on soil and water conservation to farmers in northern Ghana. The focus of the study conducted by Chapman and his colleagues was to measure the impact of a vernacular radio magazine programme in terms of attitude change, knowledge gain and application of soil and water conservation practices. The study was not designed to measure recall and comprehension; neither did it involve the manipulation of programming variables to determine their statistical significance and relative effectiveness.

The methodology used in the study was adopted from the works of researchers in memory recall and comprehension (Bernard and Coldevin, 1985; Findahl and Hoijer, 1975; Perloff, Wartella, and Becker, 1982; Son, Reese, and Davie, 1987; Woodall, Davis and Sahin, 1983). The works of Stauffer, Frost and Rybolt (1987, 1980) particularly influenced the way unaided recall and comprehension was measured in my work. Nonetheless, the processes of designing and measuring unaided recall and comprehension were heavily modified to suit the circumstances that prevail in the rural communities in northern Ghana. Evoking the blessing of the traditional heads, and soliciting the support of a network of opinion leaders who wield political, social, economic and traditional power, is highly useful for a successful research project in rural Ghana. Those aspects of my methodology that were designed to suit the local situation would also serve as knowledge to other researchers confronted with similar situations and who wish to conduct similar studies.

10.4. Limitations of the Study

A few limitations to the study were identified. The first had to do with the ecological validity of the experiments. In all the eight experiments, the ecological setting was artificial and alien to the listening culture of the farmers. The rural folk do not listen to radio in organised groups, without noise, and devoid of interferences from family members, neighbours and friends. They are not put into an almost "straight jacket compartment" in a courtyard of a chief, in a village community centre, zonal sub-district office, or classroom when listening to radio. The stern but polite warning,

“please do not talk to each other”, that was issued to them during the listening and the face-to-face interview processes appeared strange to them. Yet these were the conditions under which the experiments were conducted. The result of this unnatural setting in which the farmers were used for the experiments could possibly have had an effect on their unaided recall and comprehension. It is possible that either very conscious efforts were made by the farmers to perform better at the recall and comprehension tests, or they could have put up a cognitive resistance to fight the *forewarning* that appeared to have been created.

Another limitation of the study was that the duration of the broadcast news that was designed and used for the experiments were different in length from the normal broadcasts they listened to on local radio. Most agricultural broadcasts on local radio in Ghana have minimum duration of 30 minutes, with some broadcasts lasting as much as 45 minutes or more. All the broadcasts used for the experiments had a total duration of between seven minutes and half an hour (30 minutes). Little wonder therefore that at the end of one of the broadcasts, which lasted only seven minutes, a participant was amazed. He found the broadcast too short.

The experiment on *message relevance* conceptualised *relevance* in terms of the maize sewing activities of the farmers. It was assumed that farmers who had cultivated maize for the crop season would find the messages of the broadcast (which were on maize production) more relevant to their information needs than those farmers who did not cultivate maize. Perhaps, a better method of designing and measuring *relevance* as a variable would have been to investigate what is relevant to the farmers, from the farmers own perspective, before designing the experiment.

Finally, the sample sizes for the experiments appeared rather small. All, but one experiment, had either 30 or 32 participants, split into 15 or 16 participants each for the control group and experimental group. The exception was the one which had 36 participants; 18 participants in each of the two groups. Larger samples are preferred for studies that seek to test hypotheses, establish differences and determine relationships between variables. Nonetheless for experiments, a sample size of 30 is acceptable (Reinhard, 1994).

10.5. Suggestions for Further Research

The experiments conducted in this study investigated the effect of programming and audience variables on memory and comprehension of broadcast news. An important variable that might have an influence on levels of recall and comprehension of broadcast news in Ghana is *time of the day effect*. Elsewhere, outside Africa, time of the day effect has been investigated and the results showed significant memory deterioration across the day (Gunter, Furnham and Jarrett, 1984). Results from the survey conducted in this study suggested that the evenings are the most popular listening periods for rural farmers. Majority of the farmers indicated that they preferred listening to radio in the evenings to any other time. In northern Ghana, because the majority of the rural adult population are farmers, most of the agricultural broadcasts from the local radio stations are in the evenings. It will be useful for the time of the day effects to be investigated to ascertain the period that would offer the highest recall and comprehension levels among rural farmers in Ghana.

The *effect of distraction* on recall and comprehension of rural radio listeners would present useful insights into the amount of learning that takes place within rural farmers in Ghana. Most people are engaged in one or more other activities when they are listening to radio or are viewing television. Attention to the news is affected by other activities that audience are engaged in and this distraction adversely affects comprehension and recall of messages by listeners and viewers in a persuasive communication situation (Burkum, 1997).

There is no known study that has investigated distraction as a variable that affects information uptake from broadcast news in Africa. Yet distractions, verbal and non-verbal, do take place during radio listening in the rural communities in most African countries, including Ghana. Indeed there is more communal radio listening than individual listening in deprived rural communities in Africa.

In Ghana, the reason for communal listening to radio is not low radio ownership. Rather the explanation lies in the unyielding and ever present community spirit and sense of sharing, which together form an important cultural trait among rural folks in Ghana. It would be useful to investigate the effect of personal conversation, which characterises radio listening among rural folks. This is an exact ecological setting under which radio listening is done in rural Ghana, and the findings thereof would

reveal the levels of recall and comprehension of broadcast news under the natural rural conditions in Ghana.

10.6. Conclusion

This study set out to assess the potential of local radio for agricultural communication in Ghana. To achieve the study's aims and objectives, two methodological approaches were used – survey and experiments. The survey was useful in gleaning insights into the level of use and reliance on local radio for agricultural communication, and for general news. Specifically the survey investigated the socio-economic and demographic characteristics of rural farmers, their radio listening behaviours, sources of agricultural communication, their preferences of radio programme formats, their attitude towards local radio and their perceptions of the credibility of local radio programmes.

The experiments were conducted to determine the effectiveness of some programming variables and audiences characteristics on unaided recall and comprehension. The diffusion theory underpinned the structure and methodological approach of the survey.

Price and Zaller (1993) argue that self-reported measures of media use as a method of investigating who learns the news is more apt to measuring simple exposure than reception. This study sought to investigate not only the general media use behaviours and levels of reliance by the farmers on radio for general and agricultural news, but also to unearth the issues that influence audience uptake of information and knowledge from radio broadcasts. The use of the experimental methodology filled this need. The experimental study drew heavily on the cognitive response theory to investigate the levels of farmers' comprehension and unaided recall, and to offer explanations of the relationships that were found between audience and programming variables, and levels of unaided recall and comprehension.

No one theory, therefore, was adequate enough to cover the entire study and to provide adequate explanations and interpretation of the findings of the study. The measurement and interpretation of levels of reliance on media for agricultural information, the sources of the agricultural message, and the effects of attitudes and source credibility on message understanding, were informed by the diffusion theory. The cognitive response theory provided the basis for the interpretation and

understanding of the influence of audience and programming variables on unaided recall and comprehension, and learning from broadcast news.

The study's findings from the survey data indicated a heavy reliance on local radio for agricultural information and an almost religious trust in radio by the farmers. This is suggested by the very high positive attitudes they hold towards the local radio and their high perceptions of the credibility of the radio's messages. This, coupled with the high radio listenership, suggests a great potential of radio as an agricultural and community development tool.

Aspects of the study's findings confirmed some of the basic tenets of the diffusion theory. For instance, the study found that high levels of education and media exposure were the basic variables that determined the reported agricultural message adoption rates by the farmers. This finding accords with the diffusion theory. According to Rogers (1962, 1969), in the innovation diffusion process, persons who already have a store of knowledge and information are likely to learn and adopt innovations earlier than those who rate low on education. A relationship between media exposure and education has also been established by the diffusion theory. This study found an association between farmers' level of education and media exposure; further supporting the diffusion theory.

Also, an important finding by this study is that more than half of the farmers (53.1%) received agricultural information from interpersonal communication sources, in addition to the messages from local radio and agricultural extension officers. The interpersonal sources of information to the farmers included neighbours, traditional rulers, assembly members and unit committee members. Traditional rulers and assembly members are opinion leaders within the communities that this study was conducted. The interpretation of this result, therefore, is that opinion leadership does influence message reception and adoption by rural farmers in Ghana. This finding is consistent with an aspect of the diffusion theory. According to Rogers (1969), in the innovation diffusion process, opinion leaders do exert an appreciable measure of influence.

Memory and comprehension for news broadcast were found to be very low, but not surprisingly, they reflected the generally low levels of memory and comprehension from broadcast news reported from all over the world (Gunter, 1987; Findahl and Hoijer, 1975; Stauffer, Frost and Rybolt, 1987, 1980). Recaps of radio

messages at the end of a broadcast and repeat broadcasts, proved to be the most effective radio programme production variables for enhancing unaided recall and comprehension among poor rural farmers in Ghana.

Younger farmers, and farmers with high levels of education performed consistently well in the memory and comprehension scores in all the eight experiments conducted in the study. The younger farmers were also mostly those with formal education. Perhaps their high performance in recall and comprehension of the broadcast news gives support to the explanation that persons who perform well in memory and comprehension from broadcast news are often those who possess the “abilities specifically enhanced by formal education” (Stauffer, Frost and Rybolt, 1980:617).

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APPENDIX 1

ASSESSING THE POTENTIAL OF LOCAL RADIO AS A TOOL FOR AGRICULTURAL COMMUNICATION IN GHANA

Section 1: Respondents' Demographic and Socio-economic Characteristics

Questions in this section are meant to investigate respondents' socio-economic and demographic characteristics

1. What is your age?
_____ ☐
2. Sex: Male () Female () ☐
3. What is your highest educational qualification? ☐
 - No education ()
 - Non-formal education ()
 - Primary School ()
 - Middle School ()
 - Junior Secondary ()
 - Senior Secondary ()
 - Post Secondary ()
 - Higher National Diploma ()
 - Bachelors' Degree ()
 - Postgraduate qualification ()
 - Others (please specify) ()
4. What is your marital status? ☐
 - Married ()
 - Single ()
 - Widow/Widower ()
 - Divorcee ()
5. How many dependents do you have?
_____ ☐

6. How much income did you earn from agricultural activities last crop season?

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7. What other sources of income do you have other than agriculture?

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8. Please indicate the total income you earned last year from all other economic activities?

--	--	--	--	--	--	--	--

Section 2: Respondents Communication Behaviour

This section aims at measuring respondents' media exposure. It also investigates respondents' level of involvement in clubs or groups

9. Do you read newspapers?

Yes ()

No ()

(If the answer is no, please move to question 11)

--

10. If yes, how often do you read them?

Daily ()

5-6 days per week ()

3-4 days per week ()

1-2 days per week ()

--

11. Do you watch television?

Yes ()

No ()

(If the respondents answer is no, please go to question 13)

--

12. If yes, how often do you watch television?

Daily ()

5-6 days a week ()

3-4 days a week ()

1-2 days a week ()

--

13. Are you a member of any voluntary association/club?

Yes ()

No ()

--

14. If yes, name the association(s)/group(s)?

☐

15. Do you own a radio set?

☐

Yes ()

No ()

(If the response is Yes, move to question 18)

16. Do you have access to a radio set?

☐

Yes ()

No ()

17. Who owns the radio set?

☐

M husband ()

My wife ()

My brother ()

My sister ()

A neighbour ()

A friend ()

Other (please specify) _____ ()

18. Do you listen to radio?

☐

Yes ()

No ()

(If the response is No, skip questions 19-22)

19. How often do you listen to radio?

☐

(a) Daily ()

(b) 5-6 days a week ()

(c) 3-4 days a week ()

(d) 1-2 days a week ()

20. What times of the day do you listen to radio?

☐☐

Morning (5 am – 9 am) ()

Late morning (9 am -12 pm) ()

Afternoon (12 pm - 3 pm) ()

Late afternoon (3 pm – 6 pm) ()

Evening (6 pm - 9 pm) ()

Night (9 pm - 12 pm) ()

☐

21. Name the radio stations you listen to.

22. Indicate your reasons(s) for listening to radio

☐

Section 3: Radio Agricultural Programmes

This section is intended to measure respondents' listenership to local radio agricultural programmes, their levels of contact with agricultural extension agents, and the other sources from which they receive agricultural information.

23. Which public service local radio do you listen to most?

- (a) Radio Savannah Tamale ()
- (b) Simli Radio ()
- (c) Radio Upper West ()
- (d) URA Radio ()
- (e) Others (please specify) _____ ()

☐

24. Do you listen to agricultural broadcasts on public service local radio?

Yes ()

No ()

(If the response is No, skip questions 24 -30)

☐

25. How often do you listen to agricultural broadcasts within a week?

- (a) Daily ()
- (b) 5-6 days a week ()
- (c) 3-4 days a week ()
- (d) 1-2 days a week ()

☐

26. Have you ever been directly involved in a local radio agricultural programme?

(a) Yes ()

(b) No ()

(If the answer is No, move to question 29)

☐

27. How many times did you get directly involved in a radio agricultural broadcast within the past one year?

- (a) Once ()
 (b) Twice ()
 (c) Three times ()
 (d) Other (please specify) _____ ()

☐

28. State the radio agricultural programmes you got involved in, and the level of involvement

<i>Programme</i>	<i>Type of involvement</i>
_____	_____
_____	_____
_____	_____

☐

29. Which radio programme format do you prefer most for agricultural broadcast?

- Discussion ()
 Drama ()
 Straight talk ()
 Magazine ()
 Other (please specify) _____ ()

☐

30. Give reasons to your answer to above question (Question 29)

☐

31. How often do you receive agricultural information from extension agents?

- Daily ()
 Once a week ()
 Once in two weeks ()
 Once in a month ()
 Others (please specify) _____ ()

☐

32. Do you consider the information adequate for your needs? Give reasons?

☐

33. Do you understand the messages the extension agents give? Give reasons?

☐

34. Do you apply the knowledge you gain from the extension agents?

Yes ()
No ()

☐

(If the response is No, skip question 35, if Yes, skip question 36)

35. How often do you apply the knowledge you gain from the extension agents?

Always ()
Sometimes ()
Seldom ()

☐

36. Indicate the reasons why you do not apply the messages?

☐

37. Which of the following sources do you rely on for agricultural information?

Agricultural extension agents ()
Local radio ()
Television ()
Newspapers ()
Non-governmental organisations ()
Assembly/ Unit Committee members ()
Chiefs ()
Friends ()
Family members ()
Neighbours ()
Others (please specify) _____ ()

☐

(Multiple responses are permitted)

38. Which source do you rely on *most* for agricultural information?

☐

- | | |
|----------------------------------|-----|
| Agricultural extension agents | () |
| Local radio | () |
| Television | () |
| Newspapers | () |
| Non-governmental organisations | () |
| Assembly/ Unit Committee members | () |
| Chiefs | () |
| Friends | () |
| Family members | () |
| Neighbours | () |
| Others (please specify) _____ | () |

39. Which source of agricultural communication do you consider most credible? Give reasons for your answer?

☐

Section 4: Message Recall, Message Comprehension, Message Adoption, Message Relevance and Suitability of Broadcast Times

Questions in this section aim at investigating farmers' reported levels of message recall message comprehension and message relevance of the agricultural broadcasts to the needs of the farmers. Also the reported levels of adoption of the messages, and farmers' views on the suitability of the broadcasts times are investigated.

40. Do you understand the local radio agricultural messages?

☐

- | | |
|------------------------|-----|
| Yes, always | () |
| I understand sometimes | () |
| I do not understand | () |

41. If you do not understand the messages often, state the reasons for your answer?

☐

42. Are you able to recall the messages when you need to apply them?

☐

Yes, often ()

Sometimes ()

I often do not recall them ()

43. If you often do not recall the messages, please state the reasons?

☐

44. Do you apply the knowledge you gain from local radio?

☐

Yes, always ()

Sometimes ()

I do not apply ()

45. If you do not apply the messages often, please state your reasons?

☐

46. Will you say that the times the agricultural messages are broadcast are suitable to you?

☐

Yes ()

No ()

47. If no, state the times you prefer for agricultural broadcasts

☐

48. Is the duration for the agricultural broadcasts adequate?

☐

Yes ()

No ()

49. If no, please indicate your preferred duration for the broadcasts.

☐

50. Do you find the radio agricultural messages relevant?
Give reasons.

☐

**Section 5: Respondents' Attitudes, and Perceptions
of the Credibility of Local Radio**

This section aims at measuring respondents perceptions of the credibility of local radio and their attitudes towards public service local radio stations and their agricultural broadcasts.

51. Perception of Source credibility

- _____
1 = Strongly agree
2 = Agree
3 = Don't know/Not sure
4 = Disagree
5 = Strongly disagree

(Please check as appropriate)

The local radio station is trustworthy

1 2 3 4 5

☐

The presenters/producers have full knowledge of the agricultural messages they broadcast

1 2 3 4 5

☐

The local radio stations disseminate useful messages

1 2 3 4 5

☐

The radio stations sometimes present false
Information

1 2 3 4 5

☐

The local radio stations always present accurate
information

1 2 3 4 5

☐

52. Attitudes towards Local Radio

The local radio station is my best companion	1	2	3	4	5	<input type="checkbox"/>
It is not a waste of time to listen to local radio	1	2	3	4	5	<input type="checkbox"/>
I personally do not like to listen to local radio	1	2	3	4	5	<input type="checkbox"/>
Whether the local radio station exists or not, does not make any difference in my life	1	2	3	4	5	<input type="checkbox"/>
The local radio station is not popular with the people	1	2	3	4	5	<input type="checkbox"/>

Section 6: Respondents' Suggestions as to How Local Radio Can Be Made More Beneficial to Farmers.

This section intends to investigate respondents' views in relation to how the radio stations' agricultural broadcasts can be improved in order to make farmers benefit more from local radio.

53. Can you offer suggestion(s) to make local radio agricultural broadcasts more beneficial to farmers?

☐

APPENDIX 2:

QUESTIONNAIRES FOR EXPERIMENTS ON: REPEAT BROADCAST, RECAPS AT END OF A BROADCAST, RECAPS (PREVIEW) AT THE BEGINNING OF A BROADCAST, AND DELAYED RECALL

Respondents' ID Number _____

Section 1: Demographic and Socio-Economic Characteristics

Questions in this area sought to investigate participants' demographic and socio-economic characteristics.

- | | |
|--|--------------------------|
| 1. What is your age? | <input type="checkbox"/> |
| _____ | <input type="checkbox"/> |
| 2. Sex: Male () Female () | <input type="checkbox"/> |
| 3. What is your highest educational qualification? | |
| No form of education () | |
| Non-formal Adult Literacy certificate () | |
| Primary school () | |
| Middle School () | |
| Junior Secondary School () | |
| Secondary School Certificate () | |
| Post-Secondary Training Certificate () | |
| Higher National Diploma () | |
| Bachelors' Degree () | |
| Postgraduate Certificate () | |
| Other (please specify) _____ () | |
| 4. How much did you earn as income from agriculture last crop season? | <input type="checkbox"/> |
| _____ | |
| 5. What are your other sources of income apart from agriculture? | <input type="checkbox"/> |
| _____ | |
| 6. How much income did you earn from other economic activities last crop season? | <input type="checkbox"/> |
| _____ | |

7. What is your marital status?

Married ()

Single ()

Widow/widower ()

Divorced ()

8. How many dependants do you have?

Section 2: Media Exposure

This section sought to measure participants' sources of information on and their sources of agricultural news

9. Name the sources of mass media you rely on for news.

Radio ()

Television ()

Newspapers ()

Others (please specify) _____ ()

10. Name your sources of agricultural information.

Agricultural extension agents ()

Television ()

Newspapers ()

Non governmental organisations ()

Assembly/Unit Committee Members ()

Traditional rulers ()

Family member ()

Friends ()

Neighbour ()

Other (please specify) _____ ()

Section 3: Attitudes and Perceptions of Credibility of Radio

This section measured participants' attitudes towards local radio and their perceptions of the credibility of local radio and its broadcasts.

1 = Strongly Agree
2 = Agree
3 = Do not know/Not sure
4 = Disagree
5 = Strongly Disagree

(Please check as appropriate)

11. Perceptions of credibility of local radio

- | | | |
|---|-----------|--------------------------|
| a. The local radio station is trustworthy | 1 2 3 4 5 | <input type="checkbox"/> |
| b. The local radio station disseminates useful information | 1 2 3 4 5 | <input type="checkbox"/> |
| c. The local radio station sometimes presents false information on the agricultural issues they discuss | 1 2 3 4 5 | <input type="checkbox"/> |
| d. The radio programme presenters/hosts have full knowledge of the agricultural issues they present | 1 2 3 4 5 | <input type="checkbox"/> |
| e. The local radio station always presents accurate information | 1 2 3 4 5 | <input type="checkbox"/> |

12. Attitudes towards local radio

- | | | |
|---|-----------|--------------------------|
| a. The local radio station is my best companion | 1 2 3 4 5 | <input type="checkbox"/> |
| b. Whether the local radio station exists or not makes no difference in my life | 1 2 3 4 5 | <input type="checkbox"/> |
| c. It is not a waste of time to listen to local radio | 1 2 3 4 5 | <input type="checkbox"/> |
| d. I personally do not like to listen to radio | 1 2 3 4 5 | <input type="checkbox"/> |
| e. Local radio is not popular with the people | 1 2 3 4 5 | <input type="checkbox"/> |

Section 4: Questions on the Experiment

Measuring Unaided Recall

13. Mention briefly the main items (themes) that were contained in the broadcast.

- i _____
- ii _____
- iii _____
- iv _____
- v _____
- vi _____
- vii _____
- viii _____
- ix _____
- x _____

Comprehension Test

14 a. Why is it advisable for farmers to make ridges across slopes and not along slopes?

- I _____
- II _____
- III _____

b. Mention the three benefits to farmers if they avoid burning slash on their farms.

- I _____
- II _____
- III _____

☐
☐

c. Explain the practical methods by which a farmer can determine the viability of maize seeds.

- I _____
- II _____

☐
☐

d. What are the recommended periods for weeding a maize farm within a crop season?

- I _____
- II _____

☐
☐

e. What are the three recommended methods off disposing off weedicides containers after applying the chemical to your crops?

- I _____
- II _____
- III _____

☐
☐
☐

f. Mention two ways by which a farmer can determine that his maize farm is ready for harvesting.

- I _____
- II _____

☐
☐

g. What are the three effects of a delay in harvesting maize after the maturity date?

- I _____
- II _____
- III _____

☐
☐
☐

- h. What quantity of diluted atelic should be used to treat 100 kilogramme of maize before storage?

☐

- i. What is the minimum period to avoid eating maize that is treated with atelic?

☐

APPENDIX 3:

QUESTIONNAIRES FOR EXPERIMENT ON MESSAGE RELEVANCE

Respondents' ID Number _____

Section 1: Demographic and Socio-Economic Characteristics

Questions in this area sought to investigate participants' demographic and socio-economic characteristics.

- | | |
|---|--------------------------|
| 1. What is your age?
_____ | <input type="checkbox"/> |
| 2. Sex: Male () Female () | <input type="checkbox"/> |
| 3. What is your highest educational qualification? | <input type="checkbox"/> |
| No form of education () | |
| Non-formal Adult Literacy certificate () | |
| Primary school () | |
| Middle School () | |
| Junior Secondary School () | |
| Secondary School Certificate () | |
| Post-Secondary Teacher Training Certificate () | |
| Higher National Diploma () | |
| Bachelors' Degree () | |
| Postgraduate Certificate () | |
| Other (please specify) _____ () | |
| 4. How much did you earn as income from
agriculture last crop season?
_____ | <input type="checkbox"/> |
| 5. What other economic activities are you engaged in?
_____ | <input type="checkbox"/> |
| 6. How much income did you earn from the other
economic activities last year?
_____ | <input type="checkbox"/> |

7. What is your marital status?

Married ()

Single ()

Widow/widower ()

Divorced ()

8. How many dependants do you have?

Section 2: Media Exposure

This section sought to measure participants' sources of Information on general news, and their sources of agricultural news

9. Name the mass media sources that you rely on for news?

Radio ()

Television ()

Newspapers ()

Others (please specify) _____ ()

10. Name your sources of information on agriculture

Radio ()

Agricultural extension agents ()

Television ()

Newspapers ()

Non governmental organisations ()

Assembly/Unit Committee Members ()

Traditional rulers ()

Family member ()

Friends ()

Neighbour ()

Other (please specify) _____ ()

Section 3: Attitudes and Perceptions of Credibility of Radio

This section measured participants' attitudes towards local radio and their perceptions of the credibility of local radio and its broadcasts.

-
- 1 = Strongly agree
2 = agree
3 = Do not know/Not sure
4 = Disagree
5 = Strongly disagree
-

(Please check as appropriate)

11. Perceptions of credibility or local radio

- | | | |
|---|-----------|--------------------------|
| a. The local radio station is trustworthy | 1 2 3 4 5 | <input type="checkbox"/> |
| b. The local radio station disseminates useful information | 1 2 3 4 5 | <input type="checkbox"/> |
| c. The local radio station sometimes presents false information of the agricultural issues they discuss | 1 2 3 4 5 | <input type="checkbox"/> |
| d. The radio programme presenters/hosts have full knowledge of the agricultural issues they present | 1 2 3 4 5 | <input type="checkbox"/> |
| e. The local radio station always presents accurate information | 1 2 3 4 5 | <input type="checkbox"/> |

12. Attitudes towards local radio

- | | | |
|---|-----------|--------------------------|
| f. The local radio station is my best companion | 1 2 3 4 5 | <input type="checkbox"/> |
| g. Whether the local radio station exists or not makes no difference in my life | 1 2 3 4 5 | <input type="checkbox"/> |
| h. It is not a waste of time of listen to local radio | 1 2 3 4 5 | <input type="checkbox"/> |
| i. I personally do not like to listen to radio | 1 2 3 4 5 | <input type="checkbox"/> |
| j. Local radio is not popular with the people | 1 2 3 4 5 | <input type="checkbox"/> |

Section 4: Questions on the Experiment

Unaided Recall

13. Mention the main items that were discussed in the broadcast

- i _____
- ii _____
- iii _____
- iv _____
- v _____
- vi _____
- vii _____
- viii _____
- ix _____
- x _____
- xi _____
- xii _____

☐
☐
☐
☐
☐
☐
☐
☐
☐
☐
☐
☐

Comprehension Test

14.a Why is it advisable for farmers to make ridges across slopes and not along slopes?

- i _____
- ii _____
- iii _____

☐
☐
☐

b. Mention three benefits to farmers if they avoid burning slash on their farms.

- i _____
- ii _____
- iii _____

☐
☐

c. What are the recommended planting spaces for maize (between ridges and along ridges)?

- i (Between Rides) _____
- ii (Along ridges) _____

☐
☐

d. Name the recommended agencies from which farmers can buy veterinary medicines

- i. _____
- ii. _____
- iii. _____

☐
☐
☐

e. Explain the practical methods by which a farmer can determine the viability of maize seeds

- i. _____
- ii. _____
- iii. _____

☐
☐

f. What are the recommended periods within which to apply chemical fertilizers to your maize crops?

- i. _____
- ii. _____

☐
☐

g. What is the recommended quantity of poultry droppings that should be applied to an acre of maize?

☐

h. Mention three of the waste matter that is recommended to farmers for the production of compost manure

- i. _____
- ii. _____
- iii. _____

☐
☐

i. Explain briefly the steps involved in making compost manure

- i. _____
- ii. _____
- iii. _____
- iv. _____

☐
☐
☐
☐

k. What are the three recommended methods of disposing off weedicides containers after applying the chemical to your crops?

- i _____
- ii _____
- iii _____

☐
☐
☐

j. Mention two ways by which a farmer can determine that his maize farm is ready for harvesting

- i _____
- ii _____

☐
☐

k. What quantity of diluted atelic should be used to treat 100 kilograms of maize before storage?

☐

l. What are the three effects of a delay in harvesting maize after the maturity date?

- i _____
- ii _____
- iii _____

☐
☐
☐

m. After applying atelic to maize, how many hours should the maize be dried under normal day time temperatures before they are stored?

☐

n. What is the maximum period within which maize that is treated with atelic is free from insect infestation?

—

☐

APPENDIX 4

QUESTIONNAIRES FOR EXPERIMENTS ON: EFFECT OF STRAIGHT TALK AND DISTRIBUTED RECAPS

Respondents' ID Number _____

Section 1: Demographic and Socio-Economic Characteristics

Questions in this area sought to investigate participants' demographic and socio-economic characteristics.

1. What is your age?
_____ ☐
2. Sex: Male () Female () ☐
3. What is your highest educational qualification? ☐
 - No form of education ()
 - Non-formal Adult Literacy certificate ()
 - Primary school ()
 - Middle School ()
 - Junior Secondary School ()
 - Secondary School Certificate ()
 - Post-Secondary Teacher Training Certificate ()
 - Higher National Diploma ()
 - Bachelors' Degree ()
 - Postgraduate Certificate ()
 - Other (please specify) _____ ()
4. How much did you earn as income from agriculture last crop season? ☐

5. What other economic activities are you engaged in?

6. How much income did you earn from the other sources of income last year? ☐
_____ ☐

7. What is your marital status?

- Married ()
Single ()
Widow/widower ()
Divorced ()

8. How many dependants do you have?

Section 2: Media Exposure

This section sought to measure participants' sources of General information, and their sources of agricultural messages

9. Which mass media sources do you rely on for news?

- Radio ()
Television ()
Newspapers ()
Other (please specify) _____ ()

10. Name your sources of information on agriculture

- Radio ()
Agricultural extension agents ()
Television ()
Newspapers ()
Non governmental organisations ()
Assembly/Unit Committee Members ()
Traditional rulers ()
Family member ()
Friends ()
Neighbour ()
Other (please specify) _____ ()

Section 3: Attitudes and Perceptions of Credibility of Radio

This section measured participants' attitudes towards local radio and their perceptions of the credibility of local radio and its broadcasts.

1 = Strongly agree
2 = agree
3 = Do not know/Not sure
4 = Disagree
5 = Strongly disagree

(Please check as appropriate)

11. Perceptions of credibility or local radio

- | | | | | | | |
|---|---|---|---|---|---|--------------------------|
| a. The local radio station is trustworthy | 1 | 2 | 3 | 4 | 5 | <input type="checkbox"/> |
| b. The local radio station disseminates useful information | 1 | 2 | 3 | 4 | 5 | <input type="checkbox"/> |
| c. The local radio station sometimes presents false information of the agricultural issues they discuss | 1 | 2 | 3 | 4 | 5 | <input type="checkbox"/> |
| e. The radio programme presenters/hosts have full knowledge of the agricultural issues they present | 1 | 2 | 3 | 4 | 5 | <input type="checkbox"/> |
| f. The local radio station always presents accurate information | 1 | 2 | 3 | 4 | 5 | <input type="checkbox"/> |

12. Attitudes towards local radio

- | | | |
|---|-----------|--------------------------|
| g. The local radio station is my best Companion | 1 2 3 4 5 | <input type="checkbox"/> |
| h. Whether the local radio station exists or not makes no difference in my life | 1 2 3 4 5 | <input type="checkbox"/> |
| i. It is not a waste of time to listen to local radio | 1 2 3 4 5 | <input type="checkbox"/> |
| j. I personally do not like to listen to local radio | 1 2 3 4 5 | <input type="checkbox"/> |
| k. Local radio is not popular with the people | 1 2 3 4 5 | <input type="checkbox"/> |

Section 4: Questions on the Experiment

Measuring Unaided Recall

13. Mention the main items discussed in the broadcast

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

Measuring Comprehension

14. a. What is the recommended space per animal when constructing a pen (house) for small ruminants?

<input type="checkbox"/>

b. What are the effects of inbreeding on the production of small ruminants?

- I. _____
- II. _____
- III. _____

☐☐☐

c. What are the symptoms of ill-health in sheep?

- I. _____
- II. _____
- III. _____

☐☐☐

d. Name the agencies that provide free extension education to farmers on small ruminant production.

- I. _____
- II. _____
- III. _____

☐☐☐

e. What is the name of the recommended medicine for controlling ecto-parasites?

☐

f. Mention the symptoms of PPR in small ruminants

- I. _____
- II. _____
- III. _____

☐☐☐

g. Name the recommended agencies from which farmers can buy veterinary medicines

- I. _____
- II. _____
- III. _____

☐☐☐

h. Mention the recommended processes involved in disposing off the carcass of a small ruminant that is killed by anthrax.

- I. _____
- II. _____
- III. _____
- IV. _____

☐☐☐☐

Name the ecto-parasites that attack small ruminants.

- I. _____
- II. _____

☐☐

APPENDIX 5

QUESTIONNAIRES FOR EXPERIMENT ON REPEAT BROADCAST (TWICE)

Respondents' ID Number _____

Section 1: Demographic and Socio-Economic Characteristics

Questions in this area sought to investigate participants' demographic and socio-economic characteristics.

1. What is your age?

☐

2. Sex: Male () Female ()

☐

3. What is your highest educational qualification?

☐

- | | |
|---|-----|
| No form of education | () |
| Non-formal Adult Literacy certificate | () |
| Primary school | () |
| Middle School | () |
| Junior Secondary School | () |
| Secondary School Certificate | () |
| Post-Secondary Teacher Training Certificate | () |
| Higher National Diploma | () |
| Bachelors' Degree | () |
| Postgraduate Certificate | () |
| Other (please specify) _____ | () |

4. How much did you earn as income from agriculture
last crop season?

--	--	--	--	--	--	--

5. What other economic activities are you engaged in?

--	--	--	--	--	--	--

6. How much did you earn from these activities last year?

☐

7. What is your marital status?

Married ()
Single ()
Widow/widower ()
Divorced ()

8. How many dependents do you have?

Section 2: Media Exposure

*This section sought to measure participants' sources of
General information, and their sources of agricultural messages*

9. Which mass media sources do you rely on for news?

Radio ()
Television ()
Newspapers ()
Other (please specify) _____ ()

10. Name your sources of information on agriculture?

Radio ()
Agricultural extension agents ()
Television ()
Newspapers ()
Non governmental organisations ()
Assembly/Unit Committee Members ()
Traditional rulers ()
Family member ()
Friends ()
Neighbour ()
Other (please specify) _____ ()

Section 3: Attitudes and Perceptions of Credibility of Radio

This section measured participants' attitudes towards local radio and their perceptions of the credibility of local radio and its broadcasts.

1 = Strongly agree
2 = agree
3 = Do not know/Not sure
4 = Disagree
5 = Strongly disagree

(Please check as appropriate)

11. Perceptions of credibility or local radio

- | | | |
|---|-----------|--------------------------|
| a. The local radio station is trustworthy | 1 2 3 4 5 | <input type="checkbox"/> |
| b. The local radio station disseminates useful information | 1 2 3 4 5 | <input type="checkbox"/> |
| c. The local radio station sometimes presents false information of the agricultural issues they discuss | 1 2 3 4 5 | <input type="checkbox"/> |
| d. The radio programme presenters/hosts have full Knowledge of the agricultural issues they present | 1 2 3 4 5 | <input type="checkbox"/> |
| e. The local radio station always presents accurate information | 1 2 3 4 5 | <input type="checkbox"/> |

12. Attitudes towards local radio

- | | | |
|--|-----------|--------------------------|
| a. The local radio station is my best companion. | 1 2 3 4 5 | <input type="checkbox"/> |
| b. Whether the local radio station exists or not makes no difference in my life. | 1 2 3 4 5 | <input type="checkbox"/> |
| c. It is not a waste of time o listen to local radio. | 1 2 3 4 5 | <input type="checkbox"/> |
| d. I personally do not like to listen to radio. | 1 2 3 4 5 | <input type="checkbox"/> |
| e. Local radio is not popular with the people | 1 2 3 4 5 | <input type="checkbox"/> |

Section 5: Questions on the Experiment

Measuring Unaided Recall

13. Mention the main items that were discussed in the broadcast?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

☐
☐
☐
☐
☐
☐
☐
☐

Comprehension Test

14. a. What are the physical features that distinguish the larger grain borer (LGB) from other weevils.

- I. _____
- II. _____
- III. _____
- IV. _____

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b. Mention the ways that the LGB causes damage to crops.

- I. _____
- II. _____

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☐

c. Name the two chemicals that are most effective for controlling the LGB.

- I. _____
- II. _____

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☐

d. What is the recommended quantity of super-atelic that is applied to maize to prevent the infestation of the LGB?

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e. What are the conditions that predispose maize to attack by the LGB?

- I. _____
II. _____

☐☐☐

f. Name the agencies that offer free extension education to farmers on the control of the LGB.

- I. _____
II. _____

☐☐☐

g. Name the retail outlets that are recommended to farmers for the Purchase of chemicals to control the LGB.

- I. _____
II. _____

☐☐☐

h. At which production stages does the LGB attacks crops?

- I. _____
II. _____
III. _____

☐☐☐

i. Mention the four processes involved in the application of super-atelic to a 100 kilogram bag of maize.

- I. _____
II. _____
III. _____
IV. _____

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