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Examining the Level of Rice Farmers' Awareness about Sources of Agricultural Information in Bunkure, Kano State, Nigeria

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ABSTRACT

Agricultural information is essential to effective farming activities and related decisions, however, farmers need to find the best sources of agriculture information. Despite numerous sources of information, rice farmers still find it challenging to identify convenient information sources due to time and cost effectiveness. The purpose of this study was thus to examine the level of rice farmers' awareness about the sources of agricultural information in Bunkure, Kano State, Nigeria -West Africa. The study adopted a descriptive research design and targeted 2,203 households with a sample size of n = 220 heads of farmers' household. The sample size determination was based on Krejcie and Morgan sample size determination table for ±5% precision and 95% confidence levels. The study utilized Questionnaire, for data collection. The instruments were pilot tested to ensure it measures the expected objectives. Data on farmers' demographic profile were analysed descriptively using frequencies and percentages then translated on tables and graphs. While the study objective was analysed quantitatively based on the study design. The study findings revealed that the sources of agricultural information farmers in Bunkure were aware of included agricultural agents at 31%, radio 19%, farmer association 16%, agricultural show 12%, and TV 6%, farmers groups 4%, newspaper 3%, Facebook 3%, agricultural database 2.6%, library 2.4% and internet 2.4%. The study also found that information awareness had significant association with agricultural productivity at 0.05 (1-tailed) (r = 0.278, n =634, p<1268). The study concludes that most of the rice farmers in Bunkure, Kano State, Nigeria are aware of multiple sources of agricultural information and awareness of sources of agricultural information is essential for these rice farmers to improve their production and profitability. The study thus recommends that the government and other stakeholders should use a participatory approach in involving rice farmers in Bunkure, Kano State.

Key Words: *Rice farmers, information awareness, agricultural information, Bunkure, Kano State*

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1.0 Introduction

Agricultural information plays a crucial role in farmers' decision-making and overall agricultural performance. According to a study by Ifeanyi-obi, Wigwe, Adesope and Obafemi (2023), farmers who use agricultural information sources have significantly higher crop yields than those who do not. Similarly, in a study by Tanti, Jena, and Aryal (2022), farmers who access agricultural information through mobile phones reported higher adoption rates of new farming practices and technologies. However, the effectiveness of information sources can vary based on factors such as

farmers' age, education level, and access to technology (Ifeanyi-obi *et al*., 2023). Therefore, it is important for agricultural extension services to consider these factors when designing and delivering information to farmers, to maximize its impact on agricultural performance.

The life and livelihood of rice farmers around the world, especially in developing countries, are often fraught with challenges. A study by Thapa and Joshi (2019) examined the socioeconomic factors affecting the productivity of rice farmers in Nepal. They found that, despite the country's high dependence on rice farming, many farmers continue to use traditional farming methods due to limited access to modern technologies. The lack of access to credit facilities and education further compounds these challenges, leading to lower productivity and incomes. In contrast, a study by Ochieng *et al*. (2020) in Kenya showed that the adoption of System of Rice Intensification (SRI) among rice farmers led to improved yields and income. SRI involves changes in rice farming practices such as planting younger seedlings, using organic fertilizers, and managing water more efficiently. The study found that farmers' access to education and training significantly influenced their willingness to adopt SRI.

Information sources are tools or carriers that provide required information to an individual. Farmers obtained agricultural information from several sources of information such as print and non-print bibliographic sources; books, encyclopaedias, magazines, electronic databases (AGRIS, AGORA), newspapers, library catalogues, broadcast media such as television and radio. Others are new age media such as social media platforms which include WhatsApp, Facebook, Twitter, and Instagram among others (Mugwisi, Ocholla & Mostert, 2016). Ajuwon and Odeku (2018) stressed that agricultural information sources contribute significantly to agricultural production as farmers can adopt new technologies or farming systems, identify when to plant and harvest, crop to produce and where to sell. It is also through agricultural information that farmers can acquire bank facilities, seedlings as well as pests and diseases control measure which consequently is capable of improving agricultural productivity and improve farmers' standard of living.

The advent of digital technology has revolutionized the dissemination of agricultural information to farmers. One of the major strengths of contemporary sources of agricultural information is their extensive reach and accessibility. Online platforms, such as e-Agriculture (FAO, 2019), provide a wealth of information on best practices, new technologies, and research updates. These platforms enable farmers to acquire knowledge and skills necessary to improve their productivity and sustainably manage their resources. Additionally, mobile applications like AgriApp (Patil *et al*., 2020) deliver timely, location-specific information on weather, pest and disease control, and market prices, helping farmers make informed decisions in real-time.

Broadcasting media, including television and radio, and extension services also play a crucial role in disseminating agricultural information to farmers, as demonstrated by Mekonnen *et al*. (2020). These sources can deliver information in a more accessible and understandable manner, were highly effective in reaching farmers, particularly in remote areas (Tegene, Wims, Gebeyehu & Melkato, 2022). Similarly, exhibitions and agricultural shows provide opportunities for farmers to learn about new farming technologies and practices, and to network with other farmers and agricultural professionals. Information and communication technology (ICT), such as mobile phones and the internet, has also emerged as a key source of agricultural information, enabling farmers to access real-time market information, weather forecasts, and expert advice. Despite its potential, however, the use of ICT may be hindered by factors such as poor network coverage and low digital literacy among farmers (Tegene *et al*., 2022).

The adoption of various information sources by farmers greatly varies depending on factors such as location, access to technology, and level of education. Studies have shown that the utilization of bibliographic sources among farmers was relatively low, particularly among small-scale farmers (Jara-Rojas *et al*., 2019). This is attributed to factors such as limited literacy levels and lack of access to these resources (Bansal, Das, Joshi & Meena, 2022). Similarly, broadcasting media, such as radio and television, also saw varying levels of use (Anyanwu & Udoh, 2022). While these sources can reach a wide audience and provide information in a more understandable format, their use may be limited in areas with poor signal coverage.

In North America, The United States, Canada, and Mexico there are thousands of land hectares for agricultural activities. USDA's National Agricultural statistics report (2019) showed 75% of rice farmers can access the internet, which is the most extensive media of accessing agricultural information, and 73% of farmers have access to computer, and yet it is increasingly important for rice farmers to access information on seed flow, moisture levels, temperature and weather patterns which are embedded on remote sensors that send information on the internet for farmers to access. Comparative to the rest of the world, the U.S has the highest level of farmer information literacy which contributes to high subsistence crop yields such as corn, sorghum, barley, and soybeans. Corn yields have been highest at 160.4 per acre since 2004, followed by wheat at 43.2 bushels per acre and soybeans at 42.5 bushels harvest per acre (Church, Haigh, Widhalm, de Jalon, Babin, Carlton & Prokopy, 2017).

In Kenya, Ethiopia, Malawi, Zambia, Tanzania, Uganda, and Nigeria studies showed a backdrop of access to information which exposed rice farmers more to climate change variability. Similarly, scholars contended that inadequate access to agro-meteorological information had affected food production and security among rice farmers (Ogalleh *et al*., 2012; Krell *et al*., 2020). In addition, lack of access to information is a major challenge to food production and food security among Ethiopian rice farmers (Krell *et al*., 2020). In Kenya, rice is a critical food crop, cultivated on approximately 34,000 hectares, involving around 80,000 smallholder farmers (Kipkoech *et al*., 2019).

In Nigeria, farmers preferred agricultural information obtained from agricultural extension workers from the ministry of agriculture over other sources of information owing to the mandate that has been accorded to them. Television has numerous programs that deliberate on farming techniques giving insights on the farming methods, techniques, prospects, opportunities and challenges pertaining agriculture and its related activities such as weather forecasting, farm inputs, market, crop diseases and control techniques (Adenkunle, 2004). In addition, Food and Agricultural Organization of the United Nations (UN), stated that electronic databases serve as reliable sources of agricultural information by way of providing free or low cost access to major scientific journals of agricultural research and training to public institutions in developing countries. Examples of these include AGRIS, AGORA and AGRICOM. Nigeria recorded a total population of 174.5 million in December 2013 with 70% farmers. In addition to the federal capital territory Abuja, Nigeria has 36 states covering a total area of 923,763km2; out of this vast land area, 91million hectares of land are found to be arable land, and only 42% of this has been utilized for agricultural purposes (Osokoya, Alabi, & Fagbola., 2014). Ibrahim, Jing, Abdu, Sanusi and Sanda (2018) observe that Kano is the most populous state in Nigeria with a population of 9,383,682 and an area of 20,131 km^2 of which 18,684 km^2 are cultivable, 75% of the total population engaged in agriculture.

1.1 Statement of the Problem

Agricultural information literacy of farmers is of paramount importance for the growth and development of the agricultural sector. However, despite the richness of Nigeria in variety of subsistence crops such as maize, corn, beans and sorghum, there have substantially been declined in productivity in recent years leading to frequent famine. This problem has been linked to unrealized agricultural information competencies, which lead to low productivity and a dire food insecurity particularly in Kano state. There is evidence of a decline in agricultural productivity among rice farmers in Kano State, Nigeria (Wudil *et al.*, 2020).

In Kano State, Nigeria, rice farmers face challenges in accessing timely, accurate, and relevant agricultural information, which negatively impacts their productivity (Yunusa *et al*., 2019). Despite the increasing availability of information sources, such as agricultural extension services, research institutions, input suppliers, and digital platforms, farmers may lack the necessary information literacy skills to effectively utilize these resources (Adebayo *et al*., 2020). Information literacy encompasses the ability to identify, evaluate, and apply information to solve problems or make decisions, which is crucial for the adoption of innovative agricultural practices and technologies. The limited information literacy among rice farmers in Kano State, Nigeria, hinders their ability to enhance productivity, manage resources efficiently, and adapt to changing market conditions and environmental challenges (Suleiman *et al*., 2019).

The efforts by the government of Kano State to raise the agricultural information literacy level of rice farmers by providing agricultural extension services have not yielded the desired literacy level of the rice farmers as most farmers rely on scarce information, they get from listening to agriculture related programs on radio although farmer characteristics playing significant role in underutilization of agricultural information is not known. The persistent reports of low agricultural production (yields) necessitated the need for this study to investigate farmer information awareness among rice farmers in in Bunkure, Kano State, Nigeria -West Africa with the aim of probing literacy issues contributing to underutilization of agricultural information.

1.2 Research Objective

To examine the level of rice farmers' awareness about the sources of agricultural information.

2.0 Literature Review

2.1 Theoretical Framework

This study was underpinned by Meyer's model of the building blocks of information behaviour which was proposed by Hester W. J. Meyer (2016). Meyer's model of the building blocks of information behaviour offers a comprehensive and structured framework for understanding how individuals engage with information in various contexts (Meyer, 2018). This model consists of four interrelated components: sources, resources, channels, and processes, which collectively shape the way people seek, process, and utilize information (Meyer, 2000).

The first building block, encompass a wide range of origins from which information emanates. These can be human experts, printed materials, online databases, or even personal experiences. The credibility and relevance of sources significantly influence individuals' decisions about which information to trust and use (Julien & Given, 2003). The second building block, represent the tools and assets individuals employ to access and manipulate information. These resources include both tangible items like books and digital devices, as well as cognitive capabilities such as memory and

analytical skills (Tamir & Hughes, 2018). The availability and quality of resources can impact the efficiency of information-seeking processes (Case, 2012).

The third building block, serve as conduits through which information flows from sources to individuals. These channels encompass a spectrum of mediums, from traditional forms like face-to-face communication to modern platforms such as social media and online databases. The choice of channel can influence the speed and accuracy of information dissemination (Rubin, 2010). The fourth building block, constitute the cognitive and behavioural activities involved in information-seeking and utilization. These processes encompass recognizing the need for information, actively searching for relevant sources, critically evaluating information for credibility and relevance, and ultimately integrating or rejecting it. These processes are influenced by factors like cognitive biases, cultural background, and previous knowledge (Kuhlthau, 1991).

Meyer's model of the building blocks of information behavior has found significant adoption and application among researchers in the field of information science. Scholars have embraced this model as a foundational framework for studying information-seeking behaviors, information retrieval, and user interactions with information resources. For instance, Julien and Given (2003) highlight the utility of Meyer's model in structuring information behavior research, enabling scholars to systematically investigate how individuals identify, seek, and evaluate information sources. By examining the interplay between sources, resources, channels, and processes, researchers gain insights into the complex nature of information interactions.

It is thus evident that Meyer’s model has been widely embraced by researchers as a valuable framework for comprehending information behavior. Its structured approach to analyzing the interactions between sources, resources, channels, and processes has enriched studies on user behaviors, information systems design, and the broader field of information science. Meyer's model provides a comprehensive lens through which scholars and practitioners can examine the intricate dynamics of information behaviour. By dissecting the process into these essential building blocks, researchers can delve into the nuances of how individuals interact with information, while professionals can enhance their understanding of user needs and preferences, thereby improving information services and systems in a variety of domains.

Meyer's model of the building blocks of information behavior is relevant to the current study because it provides a conceptual framework for understanding how rice farmers in Kano State engage with information sources, utilize resources, navigate channels, and undergo cognitive and behavioral processes to enhance their agricultural practices and productivity. The resources component resonates with the study's focus on the tools and cognitive abilities farmers employ to interpret and apply information for improved rice cultivation. The channels aspect is directly pertinent to investigating the communication channels and platforms through which farmers’ access and share agricultural knowledge. The processes component is crucial for comprehending how farmers process and apply the information they acquire to make informed decisions that impact their agricultural productivity. This model allowed the researcher to delve into the dynamic relationships between information sources, resources, channels, and processes, shedding light on the factors influencing farmers' information-seeking practices and how these practices ultimately impact their agricultural productivity in Kano State, Nigeria.

2.2 Empirical Review

Drawing on recent studies, the study examines the level of awareness among farmers regarding traditional sources such as fellow farmers, community meetings, and print materials, as well as modern channels like digital platforms, radio, television, and agricultural extension services (Kabir *et al*., 2020). By understanding the factors that influence farmers' awareness of these information sources, they study is able to identify potential gaps and develop strategies to improve access to and dissemination of vital agricultural knowledge, ultimately fostering informed decision-making and sustainable farming practices (Oladimeji *et al*., 2020). Nikam, Ashok and Pal (2022) evaluated farmers' information needs, access and its impact: Evidence from different cotton producing regions in the Maharashtra state of India. To achieve the objectives, the study conducted household level survey data of 644 cotton farmers where data was collected using multistage sampling from two districts representing distinct production contexts in the Maharashtra state of India. Factors determining the access to information from particular sources were obtained using the Probit model. The impact of access to information was estimated using Inverse Probability Weighted Regression Adjustment (IPWRA). The study found that the information needs of the farmers from the two regions were slightly different.

According to the findings of Kielbasa *et al*. (2018), farmers largely grasped the relevance of agricultural information and the need to identify sources of receiving needed information. Despite the importance of agricultural information knowledge and understanding, there are contradicting findings on farmer awareness in Africa. Deressa, Hassan, Ringler, Alemu, and Yesuf (2008) and Orindi and Murray (2005) found that rural farmers in Ethiopia and East Africa were typically unaware of agricultural information sources. In contrast to the conclusions of these research, other studies such as the BBC World Service Trust (2010), Jonge (2010), and Mertz, *et al*. (2008) found that farmers in different African countries were aware of agricultural information sources.

Kiconco, Stevens, Akankwasa and Kubiriba (2022) conducted a study to examine the relationship between agricultural information exchange and service delivery within social networks in Uganda's banana value chain actors. The study used an exploratory case study design methodology using Focus group discussions and Key informant interviews for data collection. Data were analysed using Social Network Analysis (SNA) to establish the actors who were influential in facilitating information exchange and service delivery in the banana value chain. The study's outcome revealed that farmer groups and regulatory bodies were the most influential actors in facilitating information exchange and service delivery. However, they were more recipients than determinants of information and services. Network density results (0.256–0.283) showed low cohesiveness among the actors, implying that less than 30% of the potential linkages are utilised for information exchange and service delivery.

According to Bisto (2012), an information source is a medium in which knowledge or information is kept. Bisto (2012), further explained that sources of information are tools that might potentially meet the information demands of different types of consumers and exist in various forms. Isaya, Agunga and Sanga (2018) identified the following sources of agricultural information available to farmers in developing countries, particularly in rural areas: bibliographic sources (books, journals, electronic databases (AGORA, AGRIS, and others), mass media (television and radio), extension services, use of information and communication technology ICT (Smartphones), and social media platforms (YouTube, WhatsApp, Facebook among others) This study focuses on reviewing exhibitions and agricultural shows, seminars, workshops, and trainings. Others include cooperative

societies, friends and colleagues, newspapers and periodicals, leaflets, libraries and institutions, speeches, documents, pictures, and artwork.

Abbas, Muhammad, Nabi, and Kashif (2003) evaluated farmers' information sources and their level of awareness about sugarcane production technologies adoption. The study included 180 sugarcane farmers from the Faisalabad district as participants. According to the data, the majority of large farmers (52.50-84.80 percent) were aware of recommended sugarcane production technologies, which the majority of them embraced. A significant proportion of small farmers (70 percent and above) obtained information about sugarcane production technologies from their fellow farmers and progressive farmers, a similar proportion (20 percent and above) obtained information from the Agriculture Department (Extension Wing) and Research Institutes, and 10 to 20% obtained information from the mass media (radio/television and printed information).

According to the findings of Kielbasa *et al*. (2018), farmers largely grasped the relevance of agricultural information and the need to identify sources of receiving needed information. Despite the importance of agricultural information knowledge and understanding, there are contradicting findings on farmer awareness in Africa. Deressa, Hassan, Ringler, Alemu, and Yesuf (2008) and Orindi and Murray (2005) found that rural farmers in Ethiopia and East Africa were typically unaware of agricultural information sources. In contrast to the conclusions of these research, other studies such as the BBC World Service Trust (2010), Jonge (2010), and Mertz, *et al*. (2008) found that farmers in different African countries were aware of agricultural information sources. Moon, Miah, and Berg (2016) conducted a study in Bangladesh on farmers' knowledge of successful agricultural information delivery using ICT-mediated extension service. Data were gathered from a random sample of 100 farmers chosen from a total of 700. Face-to-face interviewing and focus group discussions were conducted using a standardised interview schedule and check list (FGD) a three-point rating scale was used to assess awareness, and appropriate weights were assigned to each response. The awareness score was computed by adding the weights of the responses.

According to the survey, about two-thirds (68%) of farmers had moderate knowledge, nearly one-fourth (26%) had high awareness, and only 6% had low awareness concerning effective distribution of agricultural information via ICT centres. The study also indicates the following challenges farmers faced in improving their level of awareness of effective farm information delivery: inadequate field extension agent services, frequent power outages, a lack of skilled manpower (extension agents) at ICT centres, a lack of training facilities for farmers, and poor supervision and monitoring of field extension activities. The study focused on farmers' knowledge of agricultural information delivery via ICT-mediated extension services, with data collected using appropriate instruments. By focusing on ICT-mediated services, the data was constrained to a single source of agricultural information. This current study focuses on the level of awareness of all information sources available to rice farmers in rural areas, in order to build on the existing data and literature.

Farmers' awareness of available agricultural information sources is crucial for adopting modern farming techniques, optimizing yields, and managing risks Colussi, Morgan, Schnitkey & Padula, 2022). This is particularly important for rice farmers, given the crop's susceptibility to a variety of environmental factors like weather conditions, pests, and diseases (Labarthe & Laurent, 2019). Despite the wealth of information available through research publications, extension services, and digital platforms, the level of awareness among rice farmers can vary greatly depending on factors such as location, education, and access to resources. The role of extension services in this context

cannot be overstated, but here too, there are challenges. The effectiveness of these services depends not just on the quality of information provided, but also on the trust built between extension officers and farmers (Labarthe & Laurent, 2019). Rice farmers may be more likely to adopt new techniques or use new resources if they are introduced by individuals or organizations they trust. However, this trust takes time to build and requires consistent, reliable support something that is not always available. Moreover, although digital platforms offer enormous potential for raising awareness about agricultural information, not all rice farmers have equal access to these platforms. Even among those who do, digital literacy levels can vary significantly, affecting the extent to which these farmers can benefit from online resources (Sulaiman & Davis, 2020). This technological divide is another challenge to raising awareness among rice farmers about available agricultural information sources.

3.0 Research Methodology

The present study used a descriptive research approach in order to investigate the extent of rice farmers' understanding about the origins of agricultural information. The model involves providing a comprehensive depiction of a phenomenon and organising its attributes, quantities, and constructing a statistical framework to explain the observed phenomena (Creswell, 2013). The decision to use the descriptive research paradigm was motivated by its fundamental characteristics of describing, explaining, and interpreting current life events or specific activities within a certain timeframe. The study was conducted in Bunkure, a state located in Kano, Nigeria. Kano State is situated in the North-western region of Nigeria and has long been recognised as the primary source of food for the Nigerian population (Anugwa & Agwu, 2019). The Kano River Irrigation Scheme is a notable initiative implemented by the Federal Government of Nigeria in 1970, as documented by Ahmad (2018). The Kano River Irrigation Scheme is implemented within the Bunkure local government districts, as documented by Wudil, A.H., *et al* (2023). This region is known for its extensive cultivation of rice by irrigation, mostly owing to the significant presence of rice farmers, as highlighted by Yusuf, Abdu, and Ibrahim (2022). The research used a purposive sampling technique to choose participants who were rice farmers. This decision was based on the fact that rice cultivation covers over 70% of the total cropped area. According to Wudil *et al*. (2021), the crop is widely regarded as a significant staple in Nigeria, being eaten across all geopolitical zones and socioeconomic groups.

The target population for this study comprised 2,203 in Bunkure Local Government in Kano State Nigeria. A multi-stage sampling procedure was used; in the first stage, Bunkure Local Government in which study took place was purposively selected for the study representing the first stratum. The second stratum of the sampling technique took place at the ward level. Five farming wards were chosen for the study on the basis of their intensity in rice production and large number of registered rice farmers. The third phase of the study component was the sampling of respondents at various ward level in which the actual data collection took place. The sample size determination was based on Krejcie and Morgan (1970) Sample Size Determination Table for ±5% precision and 95% confidence levels. It stated that when the population is 6,340 at ±5% precisions, 364 should be the sample at a 95% confidence level. Due to the uneven number of Rice Farmers across the wards in Bunkure, sample size was calculated proportionately using Krejcie and Morgan's recommended formula to obtain a sample size of 284 respondents. Structured questionnaire was designed essentially to collect information that relate to participant’s demographic profile such as age, gender, duration and scope of practice, marital status, and educational background Descriptive

Statistics was used to identify and analyse the information needs of rice farmers, the information awareness, and sources of information of the rice farmers.

4.0 Study Findings

A total of 220 samples of questionnaire were administered to the respondents who were selected from 220 households in Kura Local Government. The study realized a response rate of 93.6%. It was clear that 93.6% of questionnaire distributed to the heads of households were successful retrieved by the researcher. Demographic results revealed that majority of the respondents who voluntarily participated in the research were between the ages of 30 and 39 years with 34% respondents, followed by 30% respondents who were between the ages 20 – 29 years, then, 17% respondents were between the ages of 40 to 49 years and farmers of 50 years and above constituted 10% respondents, 3% respondents were less than 20 years of ages. Regarding level of education, majority of the respondents were from non-formal education with 40%, it is followed by Qur'anic education with 30% of the respondents, then, graduates of tertiary institutions realized by 18% respondents, Secondary education 6.3% respondents and primary education 5.7% respondents respectively. In rems of experience, 30% of the respondents have 6 to 10 years' experience in rice farming, and rice farmers with less than 5- year experience constitute 25% respondents. The rest include rice farmers with between 11- and 20-years' experience in rice farming constitute 24% of the respondents and rice farmers with above 20 years' experience were 21% of the respondents.

4.1 Descriptive Analysis

Data were elicited through structured questionnaire and the data were cleaned, corded and analysed based on tables of frequency and percentage. The awareness of each source of agricultural information was assessed based in descriptive statistics and presented based on the research area, which was Bunkure Local Government. 220 questionnaires were distributed in Bunkure Local Government Area. 206 were returned yielding a response rate of 93.6%. The researcher analysed and presented the levels of awareness about the sources of agricultural information.

Table 1: Awareness about the Sources of Agricultural Information in Bunkure Local Government

Awareness Category	Number of Respondents Confirming Awareness	Percentage
Library	5	2.4%
Radio	40	19%
Agricultural extension Agents	63	31%
Farmer Associations	32	16%
Agricultural show	25	12%
Television	12	6%
Newspapers and magazines	6	3%
The Internet	3	1%
Farmer Groups	9	4%
Facebook	6	3%
Agricultural related Databases	5	2.6%

The results on awareness about the sources of agricultural information of rice farmers in Bunkure has produced various levels of awareness. Agricultural agents 31%, radio 19%, farmer association

16%, agricultural show 12%, and TV 6%, farmers groups 4%, newspaper 3%, Facebook 3%, agricultural database 2.6%, library 2.4% and internet 2.4%.

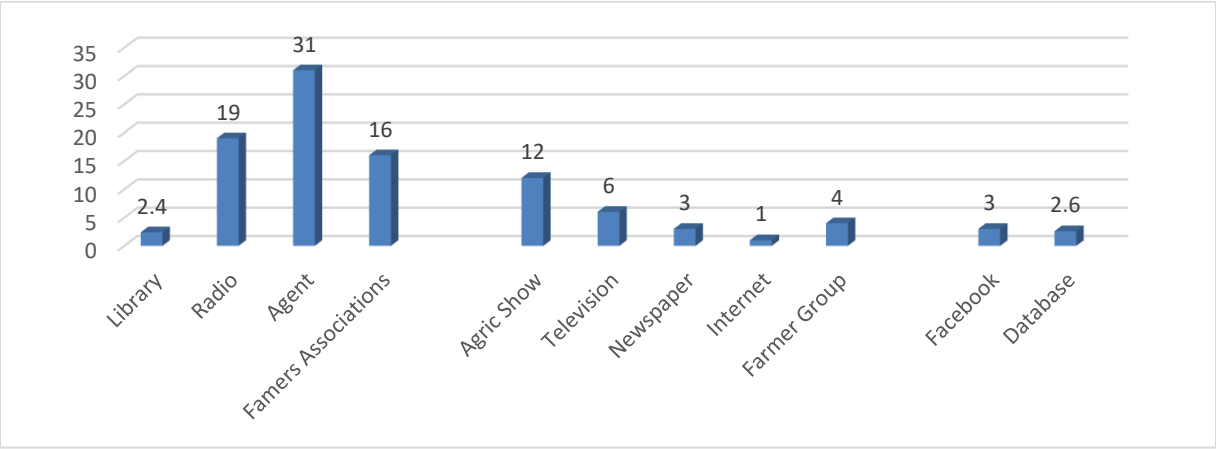

Figure 1: Awareness about the Sources of Agricultural Information in Bunkure Local Government

The results revealed that in Bunkure Local Government, agricultural agents was the highest at 31%, radio 19%, farmer association 16%, agricultural show 12%, TV 6%, farmers groups 4%, newspaper 3%, Facebook 3%, agricultural database 2.6%, library 2.4% and internet 2.4%. This implies that most of the rice farmers in Kano State are aware of limited sources of agricultural information. Libraries can be a valuable source of information on modern and effective farming techniques, new seed varieties, and other agricultural information. Without access to information on modern farming techniques and new seed varieties, farmers may continue to rely on traditional farming practices that may be less effective. This can result in lower crop yields, reduced profitability, and ultimately lower productivity. When farmers are not aware of these resources, they may miss out on valuable information that could help them improve their farming practices.

Awareness about radio as a source of agricultural information can have important implications for farmers and agricultural development. Radio can be a powerful tool for disseminating information about new technologies, practices, and market opportunities to farmers, particularly in rural areas where access to other sources of information may be limited. If farmers are aware of radio as a source of agricultural information, it could mean that they are more likely to tune in to agricultural programs and access the information provided. Awareness about agricultural extension agents as a source of agricultural information is crucial for farmers and agricultural development. Agricultural extension agents play a key role in disseminating information about new technologies, practices, and market opportunities to farmers, as well as providing training and support. This also means that when most of the farmers are not aware of agricultural extension agents or do not trust them as a source of information, they may be less likely to seek out their services which could lead to missed opportunities for learning about new technologies and practices, and ultimately lower productivity and incomes.

The results also imply that a lots of rice farmers in Bunkure Local Government are not aware of farmers' associations as a source of agricultural information and so are likely to miss out on important information about new technologies, practices, and market opportunities that could improve their productivity and income. Farmers' associations can provide a platform for farmers to come together, share knowledge and experiences, and collectively advocate for their interests.

However, if most rice farmers are not aware of these associations, it could limit opportunities for collective action and potentially weaken the voice of farmers in decision-making processes. It is important to increase awareness among rice farmers in Bunkure Local Government about the potential benefits of farmers' associations as a source of agricultural information, support, and collaboration. This can be done through targeted outreach and communication campaigns, as well as by strengthening the capacity and visibility of farmers' associations in the region. Moreover, most of the rice farmers in Bunkure Local Government have a platform to exchange knowledge. Agricultural shows provide a platform for farmers, researchers, and other stakeholders in the agricultural sector to come together, exchange knowledge and experiences, and showcase new technologies and practices. If farmers are aware of these shows, they can attend and learn about new agricultural innovations and practices. Also, awareness about agricultural shows as a source of information could lead to increased adoption of new technologies and practices among rice farmers in Kano State. Farmers who attend agricultural shows are exposed to new technologies and practices that can improve their productivity and income, and they may be more likely to adopt these innovations in their own farms.

Television is a powerful medium for disseminating information to large audiences, and if more rice farmers are aware of it as a source of agricultural information, they have greater access to information about new technologies, practices, and market opportunities. Television programs on agriculture provides farmers with access to expert knowledge and experiences from other farmers. This helps farmers to learn about new techniques and best practices, and to share their own experiences and knowledge with others. Descriptive statistics on awareness about newspapers and magazines source of agricultural information. Besides, rice farmers in Bunkure Local Government are exposed to some useful agricultural information thus can learn about new farming techniques, better crop management practices, and other useful tips that can improve their yields and profits. With better knowledge and skills, farmers can improve their productivity, reduce waste, and increase their income. Newspapers and magazines provide information on market prices, demand, and trends, which can help rice farmers make informed decisions about what crops to grow and where to sell them. Overall, the awareness of newspapers and magazines as a source of agricultural information can have positive effects on the livelihoods of rice farmers in Kano State, and contribute to the sustainable development of the agricultural sector.

It should however be noted that the rice farmers in Bunkure Local Government do not have access to internet and thus are not exposed to the important agricultural information that exists on the internet. With the internet becoming increasingly important in agriculture, farmers who lack awareness about it may not have access to the latest agricultural technologies and innovations that can help them improve their productivity and efficiency. The internet has become a vital source of information in many industries, including agriculture. Farmers who lack awareness about internet sources of agricultural information may not have access to the latest research, best practices, or market trends.

Thus, most of the rice farmers in the area have registered in farmers' groups. When most of the rice farmers are having awareness about farmer groups as a source of agricultural information, it implies that they are likely to have access to valuable resources and knowledge that can help them improve their farming practices and increase their yields. Farmer groups are a great resource for farmers to learn from each other and share their experiences. Farmers who are aware of farmer groups as a source of agricultural information are more likely to have access to a wider range of knowledge and expertise. Moreover, farmer groups can help farmers negotiate better prices for

their crops and access to credit and other resources. This can improve their profitability and reduce their financial risks. The lack of awareness of agricultural databases among the rice farmers in Kano State is likely to have negative effects on their productivity, competitiveness, and access to markets. It is important for agricultural organizations, governments, and development agencies to invest in programs that raise awareness of agricultural databases, provide training on how to use them effectively, and ensure that farmers have access to the necessary technology. By doing so, farmers can benefit from the wealth of information that is available in these databases and improve their farming practices, yields, and overall livelihoods.

The findings of the research agreed with Abbas, Muhammad, Nabi and Kashif (2003) which evaluated farmers' information sources and their level of awareness about sugarcane production technologies adoption. The study included 180 sugarcane farmers from the Faisalabad district as participants. According to the data, the majority of large farmers (52.50-84.80 percent) were aware of recommended sugarcane production technologies, which the majority of them embraced. A significant proportion of small farmers (70 % and above) obtained information about sugarcane production technologies from their fellow farmers and progressive farmers, a similar proportion (20% and above) obtained information from the Agriculture Department (Extension Wing) and Research Institutes, and 10 to 20% obtained information from the mass media (radio/television and printed information). Similarly, Moon, Miah, and Berg (2016) identified level of awareness of farmers in Bangladesh da ta were obtained through interview and focus group discussion. The participants exhibited high level of awareness about sources of agricultural information.

5.0 Conclusion and Recommendations

5.1 Conclusions

Based on the study findings, it is concluded that most of the rice farmers in Kano State Nigeria are aware of multiple sources of agricultural information. Awareness of sources of agricultural information is essential for these rice farmers to improve their production and profitability. It is the responsibility of governments and other stakeholders to ensure that farmers have access to reliable and relevant agricultural information through various channels, including traditional and modern means of communication. This can help to improve the livelihoods of rice farmers, as well as contribute to the overall development of the agricultural sector.

Additionally, access to reliable and timely information on agricultural practices and techniques can help rice farmers to improve their productivity and profitability. This can include information on seed varieties, soil fertility, pest management, irrigation, and other critical factors that can impact crop yield and quality. Moreover, awareness of market information can help farmers make better decisions on when and where to sell their produce, and at what price. The sources of agricultural information available to rice farmers may include agricultural extension services, agricultural research institutions, farmer organizations, agribusinesses, and social media and other online platforms. Therefore, farmers need to be aware of these various sources of information and how to access them.

The study further concludes that rice farmers who are aware of the sources of agricultural information have access to extension services, agricultural research institutes, and agricultural input suppliers. Extension services provide rice farmers in Kano State with technical advice and training on modern rice farming techniques. Agricultural research institutes carry out research to develop new varieties of rice that are more resistant to pests and diseases, have higher yields, and

are better suited to the local environment. Moreover, agricultural input suppliers provide farmers with high-quality inputs such as fertilizers, seeds, and pesticides that are necessary for optimal crop growth.

Furthermore, Agriculture being the backbone of Nigeria's economy, and rice farming is a significant agricultural activity in Kano State, rice farmers in Kano State need to be aware of various sources of agricultural information to increase their productivity and profitability. Awareness of sources of agricultural information allows farmers to stay up-to-date on market prices for their rice produce. Farmers can take advantage of higher prices by timing their harvests to match peak demand, ensuring they get the best returns on their investment. Additionally, farmers can take advantage of government policies such as subsidies on inputs and loans for farming activities.

6.0 Recommendations

The government and other stakeholders should use a participatory approach in involving rice farmers in Kano State. A participatory approach involves working with rice farmers to identify their information needs, as well as developing and implementing solutions that are tailored to their needs. This approach can help ensure that the information provided is relevant, appropriate, and useful for the farmers. There is a need for the government and extension officers to consider the local context when assessing the information needs of rice farmers in Kano State. This involves understanding the local agricultural practices, the socio-economic conditions of the farmers, and the available communication channels for delivering information.

Rice farmers in Kano State should adopt a variety of information sources. A variety of information sources should be considered when assessing the information needs of rice farmers; these sources should include agricultural extension services, research institutions, agro-input suppliers, local radio, and other media outlets. This approach ensures that farmers have access to a range of information sources and can select the most appropriate for their specific needs. It is essential to monitor and evaluate the process of assessing the information needs of rice farmers. This helps to identify any gaps in the process and to make improvements for future assessments. Evaluation can also help to measure the impact of the information provided on the farmers' productivity and livelihoods. Rice farmers in Kano State should be trained and educated on the various sources of agricultural information available to them. This should include information on the internet, agricultural extension services, mobile applications, and other sources. Farmers should be trained on how to access and effectively use these sources to improve their farming practices.

Agricultural information needs to be developed in the local language and tailored to the local context. This will help farmers understand and use the information effectively since it is essential to consider the literacy levels of the farmers and ensure that the information is presented in a simple and easy-to-understand manner. Innovative communication channels should be used to reach out to farmers and increase their awareness of sources of information. This includes the use of mobile phones, social media, community radio, and other channels, these channels can help to reach a broader audience and improve the accessibility of information. There is need to strengthen extension services; extension services play a vital role in providing information to farmers. It is thus essential to strengthen extension services among rice farmers in Kano State by increasing the number of extension workers, providing training and resources, and developing effective communication channels. This will help to ensure that farmers have access to accurate and up-to-date information to improve their farming practices.

The government of Nigeria should develop and implement a comprehensive farmer information literacy program in Kano State. This program should be designed to increase the information literacy skills of rice farmers in the area including training on how to identify, locate, evaluate, and effectively use agricultural information to improve farming practices. There is need to for the relevant bodies in the agriculture sector in Nigeria to increase access to agricultural extension services which should also be strengthened to increase their reach and effectiveness. This can be achieved through the recruitment and training of more extension workers and the provision of resources such as vehicles, equipment, and communication tools. The government should develop and disseminate localized agricultural information to rice farmers in Kano State. The agricultural information needs to be developed in the local language and tailored to the local context to help in ensuring that the information is relevant and useful for rice farmers in Kano State.

There is need for the government of Nigeria to increase access to technology and digital platforms among rice farmers in Kano State. Farmers in the region should be provided with access to technology and digital platforms such as mobile phones, computers, and the internet as this will help to improve their access to information and increase their information literacy skills geared towards enhancing agricultural productivity performance. Policies should be enacted to strengthen farmer organizations. Farmer organizations should be strengthened to help farmers' access information, agricultural inputs, and markets. This can be achieved through training, capacity building, and the provision of resources. One of the challenges faced by rice farmers in Kano State is lack of access to credit. Therefore, the government should develop and implement policies to increase access to credit and input among these farmers as this will help to improve their productivity and income.

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