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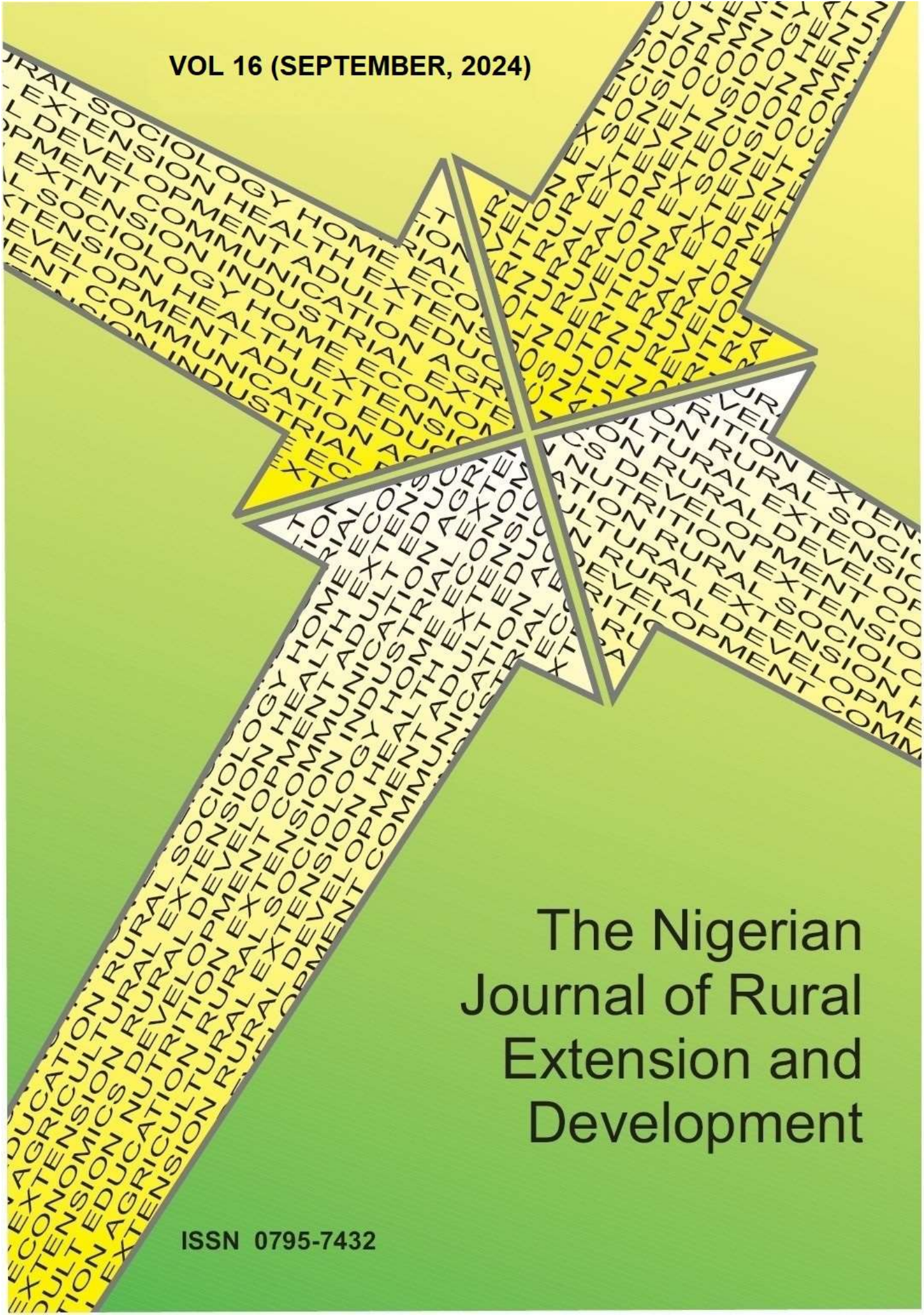

The Nigerian Journal of Rural Extension and Development

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THE NIGERIAN JOURNAL OF RURAL EXTENSION AND DEVELOPMENT (NJRED)

Aims and Scope

The Nigerian Journal of Rural Extension and Development (NJRED), a referred journal, is an annual publication of the Department of Agricultural Extension and Rural Development, University of Ibadan, Nigeria. The journal is intended to encourage systematic and continuous publication of practical ideas and empirical research work in the area of Rural Extension and Development as it relates to Rural Development, Women in Development. Agriculture and Extension Education, Rural Sociology, Livelihood, Mass and Extension Communication, Health and Nutrition Extension, Home Economics, Adult Education and Multi-disciplinary Rural Extension issues.

In addition, the Journal publishes book reviews and research and research –in-brief articles.

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NJRED employs a two-tier review system.

First, the editor reviews each submission to determine its suitability for further peer review by the NJRED Manuscript Review Committee. If the submission is judged as unsuitable, the editor either rejects the submission or highlights weaknesses and proffers revision suggestions to the author(s).

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List of references for each work cited should be given at the end of the text, in alphabetical order using the APA style of referencing, that is, surname of author (s), initials, year of publication in parenthesis, title of paper, name of journal (underlined or italicized) or book, volume, and first and last pages of the reference.

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Higher education and COVID-19 pandemic: Case study of the Sustainable Integrated Rural Development in Africa (SIRDA) Programme

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ABSTRACT

The need to document how the Sustainable Integrated Rural Development in Africa (SIRDA) programme has been differently or similarly affected by the COVID-19 pandemic when it is compared with most conventional higher educational programmes informed this study on higher education and COVID-19 pandemic: case study of the SIRDA programme. The study was carried out in two West Africa Universities namely, the University of Ibadan and Kwame Nkrumah University of Science and Technology. Data was collected from 56 SIRDA students using structured questionnaires which were administered online using google forms. The 56 SIRDA students were selected using a census sampling technique. Data was analysed using percentages. Respondents (83.3%) were mostly male and 50.0% of them heard of the programme from friends/relatives. Goal 17 of the SDGs reflected the most in SIRDA-taught courses and learning involving mainly course work, research projects, and seminars/conferences. Knowledge delivery for the SIRDA programme was modified to accommodate virtual methods (83.3%) during the COVID-19 crisis, while some essential components such as field practicum could not be implemented. Students were generally poorly involved in the Education for Sustainable Development (ESDA) governance issues and were mostly uncertain (66.7%) of what would be the long-run effect of COVID-19 on the SIRDA programme. The study concluded that COVID-19 caused major disruptions to SIRDA programme, especially in implementing some components such as fieldwork. It is recommended that SIRDA curriculum review process should focus attention amongst others, on developing a flexible curriculum that can be taught in person or online and that can switch between face-to-face and remote learning.

Keywords: COVID-19 pandemic, West African universities, Integrated rural development, Higher education

INTRODUCTION

The emerging coronavirus disease which was first reported in Wuhan, China in December 2019, has swept across the world with impacts felt in more than 200 countries and regions (Alanagreh, *et al*. 2020). COVID-19 is recognised as the third coronavirus to result in a large-scale epidemic in the current century after the Severe Acute Respiratory Syndrome Coronavirus (SARS-COV) in 2003. Unlike the SARS-COV, the COVID-19 virus is said to have originated in bats and was transmitted to humans through unconfirmed intermediate hosts in the Wuhan seafood market. Hadi *et al*. (2020) argued that COVID-19 was generated from seafood in the Wuhan seafood market as samples from objects and animals in the market tested positive during earlier efforts to confirm its origin. The COVID-19 symptoms present different signs in different people, including fever, fatigue, dry cough, aches and pains, sore throat, nasal congestion, cold, diarrhea, and loss of smell and taste (Hadi *et al*. 2020).

The impact of COVID-19 is believed to affect countries of the world disproportionately with a more severe impact felt in the African region (Ozili, 2020). Nicola (2020) noted that social distancing, self-isolation, and travel restrictions have led to a reduced workforce across all economic sectors and caused many jobs to be lost. In Nigeria and Ghana, the several containment measures imposed by local authorities have resulted in a hike in food prices as a result of panic buying, forceful relocation, and decongestion exercises to enforce physical distancing (Asante and Mills, 2020; Obi, *et al*. 2020). Similarly, the nationwide lockdown has resulted in financial losses in India and affected all segments of society including citizen's health, healthcare and nutrition (Gopalan and Misra, 2020).

The education sector is not left out of the negative impacts of the COVID-19 pandemic. Arguably, the various lockdown measures implemented by most governments in Africa due to COVID-19 brought important disruptions to teaching and learning, especially in the formal educational systems. While efforts to overcome the pandemic are well appreciated, it is imperative that experiences from the crisis be documented and analysed in order to become better prepared for future crises. Most studies (Daniel, 2020;

Oladipo *et al*. 2020; Pokhrel and Chhetri, 2021) have documented the impacts of COVID-19 on the higher educational systems. However, the peculiarity of the SIRDA programme in terms of structure, focus, and implementation which makes it different from most conventional higher educational programmes is anticipated to result in dissimilar responses in terms of effects. While research has been conducted on the performance of the SIRDA programme across the partnering institutions (Nyerere *et al*. 2021), a gap, however, exists in terms of how the programme has been differently or similarly affected by the COVID-19 pandemic when it is compared with most conventional higher educational programmes. This necessitates the need for this case study.

Also, comparing the effects of COVID-19 across different countries and educational systems can highlight effective strategies and lessons that can be adapted to various contexts. While most studies have looked at COVID-19's impact on higher education from different country perspectives, this study has taken a deeper dive by examining two countries (Nigeria and Ghana) implementing a joint master's programme.

To this end, this study was carried out to understand how COVID-19 has influenced changes in the implementation of Sustainable Integrated Rural Development in Africa (SIRDA) programmes in Nigeria and Ghana. Apart from the benefits of building resilience capacity, it is thought that insights from this study can be useful in deciding on what degree of flexibility is required for the SIRDA curriculum (for the possibility of both virtual and physical delivery) in the Education for Sustainable Development in Africa (ESDA) Phase II implementation. Therefore, this study was guided by the following objectives which include to:

1. examine the linkage between the SIRDA programme implementation and the SDGs in the West African sub-region,
2. determine how COVID-19 has shaped changes in the strategies or approaches for the SIRDA curriculum delivery in the West African sub-region; and
3. identify measures for improving the ESDA programme in the face of the COVID-19 pandemic.

About SIRDA and ESDA

Since 2008, the Education for Sustainable Development in Africa (ESDA) initiative has managed to build a foundation and structure for capacity training of African professionals through an inter-university collaborative programme of graduate training and research by eight African partner universities running three Master`s level programmes. The master's programme in Sustainable Integrated Rural Development in Africa (SIRDA) is one of the three Masters' programmes. The unacceptable paradox of Africa's rich natural resource endowments and the obvious incidences of widespread poverty and poor human living conditions, especially in rural Africa necessitated the SIRDA programme. The SIRDA programme is now part of a consortium of four West African universities namely, University of Ibadan (Nigeria), the University of Ghana, the University for Development Studies (Ghana), and Kwame Nkrumah University of Science and Technology (Ghana) [Nyerere *et al*. 2021].

The approach and implementation of the SIRDA programme in the participating four West African universities in Ghana and Nigeria were largely uniform. Similarities exist in terms of course structure, field and classroom orientation, collaboration with young researchers, and internship exposure as follows:

1. The programme runs on the tripods of coursework, workshop series, and field practicum/internship within a minimum of three semesters.
2. All the activities are graded and used for the final computation of students' performance.
3. Core and affiliate faculty members are practitioners with a long history of working with rural communities in the region.
4. Faculty members are pulled from different disciplines which are comprised mainly of the social sciences, health sciences, and agricultural/environmental sciences.
5. Core faculty members are sourced mainly from the universities while affiliate faculty members comprise ESDA consortium members, especially from the West African partner universities.
6. Courses and capacity-building workshops are usually taken in the first session while the second session is devoted to an intensive internship plus field practicum in rural communities.

METHODOLOGY

The University of Ibadan (UI), Nigeria, and Kwame Nkrumah University of Science and Technology (KNUST), Ghana were purposively selected for the study due to their frontal roles in the SIRDA master's programme implementation in the West Africa sub-region. The population of the study comprised all graduate students who commenced the SIRDA programme before the COVID-19 pandemic and completed same during the pandemic. This enabled

the researcher to compare the programme implementation before and during the pandemic from the perspectives of the students to give insights into the overall perception of changes in the programme structure and delivery. Thus, a census sampling technique was used to select all the students that were within this category giving a total of 56 respondents (42 from UI and 14 from KNUST). A descriptive research design involving the use of a semi-structured questionnaire was used to collect data for the study. The semi-structured questionnaire was administered to the respondents through an online form (google form). The contacts of the target respondents (e-mail, cell, and WhatsApp) were obtained from the SIRDA coordinators at the sampled institutions. Changes in the strategies/approaches for the SIRDA curriculum delivery elicited information on teaching and learning processes, students' fieldwork, internship, and community engagement components of the programme. Linkage of the programme implementation with SDGs was measured by asking the respondents to indicate on a yes or no basis which of the 17 SDGs are reflected in taught courses and learning at their universities. Quantitative data collected were analysed and summarised using descriptive statistics such as frequencies, percentages, and mean.

RESULTS AND DISCUSSION

Respondents' background information

Table 1 shows that most of the respondents were male (83.3%) while 16.7% were female. This suggests a gender imbalance in the student's enrolment for the SIRDA programme during the COVID-19 pandemic. This may be a result of the additional responsibilities of tending to the family thereby causing a strain on the academic activities of females as asserted by Aristovnik, Kerzic, Ravselji, Tomazevic, and Umek (2020). The respondents were aged 33.3±8.2 years. This finding is in tandem with the finding of the OECD (2020) which asserted that COVID-19 disproportionately affects the youth from attaining education thereby exacerbating intergenerational inequalities in education. On the respondents' source of information about the SIRDA programme, 50% asserted that they got to know about ESDA Master's Programme from friends/family, while 33.3% got to know about the programme from online sources. This suggests a relatively low online presence and calls for the exploration of different online sources for publicising the ESDA Master's Programme. Additionally, the current COVID-19 pandemic obliges the world particularly the educational system to adopt other substitutes beyond face-to-face information dissemination as sometimes presented by the dissemination of information from family/friends.

Table 1: Respondents' background information

Variables	Responses	Percent
Sex	Male	83.3
	Female	16.7
Age (years)	30-39	33.3
	40-49	33.3
	≥ 50	33.4
Source of information about SIRDA	Family & friends	50.0
	Online	33.3
	Others	16.7

Implementation of the SIRDA Programme and Links with SDGs

Components of ESDA programme in UI and KNUST

Figure 1 shows that all the respondents indicated that coursework (100%), research project (100%), and seminar/conferences (100%) components were reflected in the teaching and learning process in the participating universities. This is because these components are mandatory requirements in the fulfilment of the award of the SIRDA degree. Other components such as international field trips and local field trips (33.3%), field-based practicum (33.3%), and workshops (33.3%) are likely to decline with an upsurge of COVID-19 cases. This is anticipated because these components allow for close social interaction which is in contrast to the COVID-19 containment protocols. The relatively low implementation of the field practicum component of the programme is however contrary to the original design of the programme which was to prioritise field exposure through practicum and other related activities above classroom orientation since the programme was focused on community development professionals and practitioners.

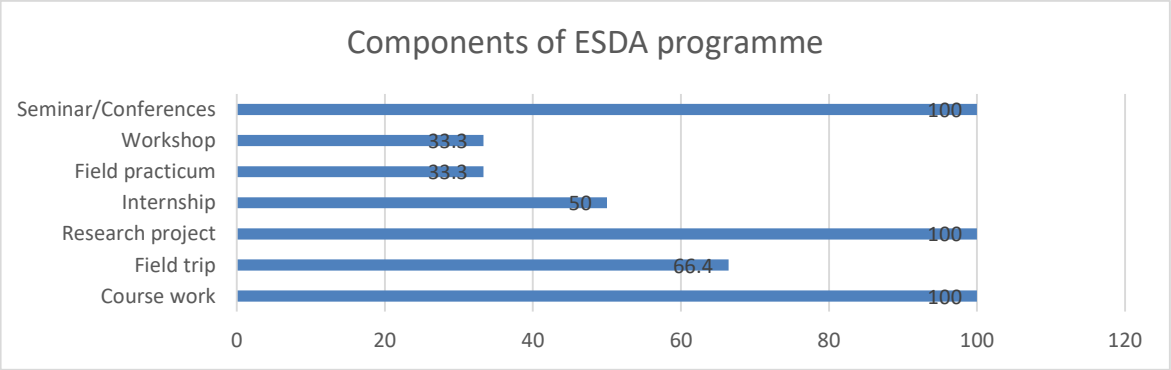

Figure 1: Components of the SIRDA programme

Course contents and links with the SDGs

Respondent asserted that all the Sustainable Development Goals (SDGs) reflect in their taught courses and learning (Figure 2). Additionally, all the respondents indicated that out of the 17 SDGs, Goal 17 which is about partnership to achieve the SGDs reflected the most in their taught courses and learning. The reason for this is not far-fetched as the SIRDA master programme was birthed by a partnership of 8 African universities (Olaniyan and Fadairo, 2019) and has continually relied on the same partnership in its implementation. This is a pointer to the fact that the realisation of the SDGs is hinged on Goal 17 which is based on the global implementation of the development agenda, strengthening global solidarity, enhancing intercultural understanding, tolerance, mutual respect, and shared responsibilities (United Nations, Undated). Apart from Goal 17 which topped on the assessment of the SIRDA links with the SDGs, goals 3, 4, and 5 which focused on good health/wellbeing, quality education, and gender equality, respectively which were indicated by 83.3% of the respondents also gained traction in the SIRDA taught courses and learning in Nigeria and Ghana. Olaniyan and Fadairo (2019) argued that these goals (with the inclusion of SDGs 1 and 2) directly speak to the development challenges of rural areas. Therefore, the relatively higher attention paid by the SIRDA programme to these goals can be justified since the programme's overarching aim is to build the professionals needed to promote an enduring and sustainable rural development process in the African continent.

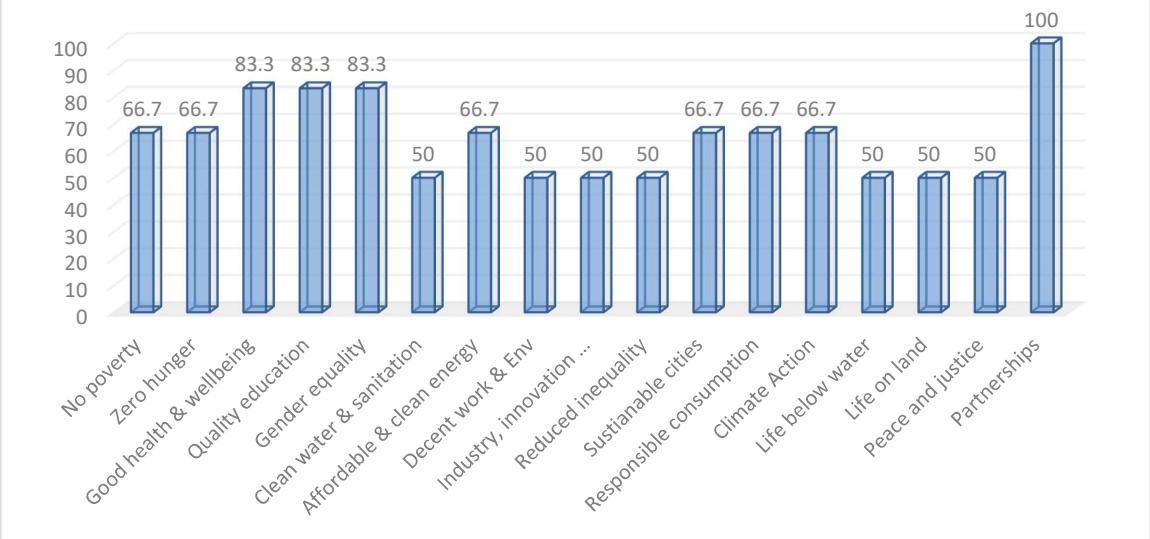

Figure 2: SIRDA course contents

COVID-19 Pandemic and the SIRDA Programme

How the COVID-19 pandemic affected SIRDA universities

Figure 3 shows that 67% of the respondents noted that their universities were partially open or completely closed during the COVID-19 pandemic. This implies that normal school activities were not at their peak as

a result of the COVID-19 pandemic containment measures which necessitated the activation of remote learning (Zitoun, 2020; Alshehri, Mordhah, Alsibians, Alsobhi, Alnazzawi, 2020). However, virtual teaching activities are being carried out in addition to the traditional classroom method of teaching in the universities because of the challenges of adapting swiftly to the demands of remote learning as affirmed by Ebohon, Obienu, Irabor, Amadin, and Omoregie (2021).

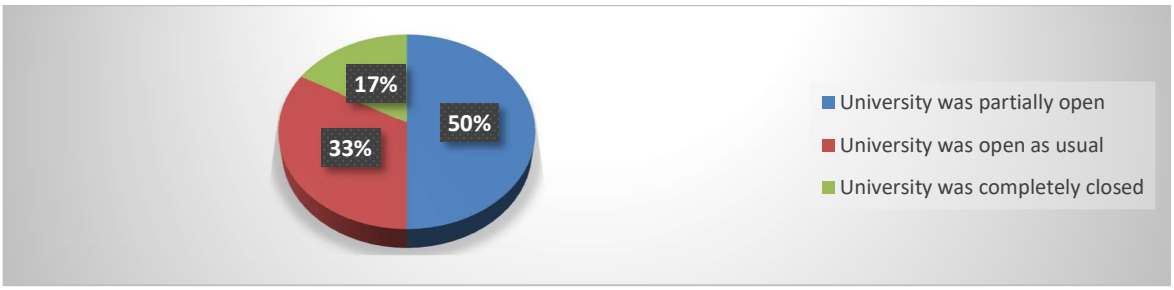

Figure 3: Effects of covid-19 pandemic on SIRDA universities

How the COVID-19 pandemic changed university strategies/approaches for the ESDA programme

Majority of the respondents asserted that the delivery mode of the ESDA graduate study programme has been revised to accommodate virtual methods (83.3%) in response to the effects of COVID-19 pandemic [Figure 4]. This finding is similar to the finding of Iseolorunkanmi, Adebola, Adebola, Rotimi, Nweke-Love, Adebisi, and Lawal (2021) who established that as a result of the COVID-19 pandemic, alternative teaching methods are being utilised to prevent the collapse of the educational sector. Furthermore, due to the COVID-19 protocols that strongly encourage physical distancing to curb the spread of the disease, activities such as fieldwork that necessitate close interaction were dropped.

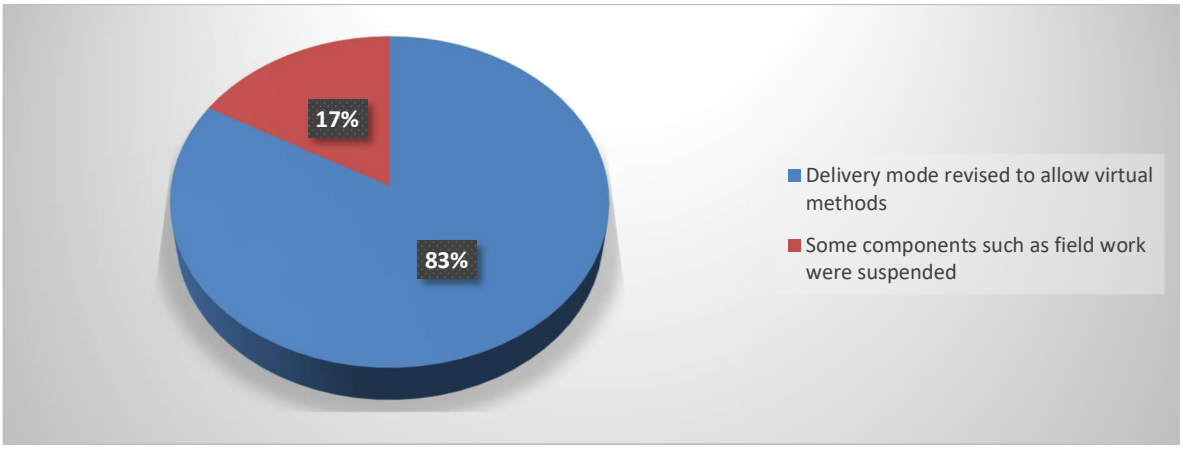

Figure 4: Effects of covid-19 on SIRDA approaches

COVID-19 and ESDA-related community engagement activities

Figure 5 reveals that more than half of the respondents (66.7%) noted that they did not know how COVID-19 affected ESDA-related community engagement activities in their universities. This suggests poor awareness of the ESDA governance issues among the students or lack/poor communication from the local ESDA desk offices to the students on the issues that affect them. Students are essential stakeholders in any educational system and they should be involved in processes that affect them for a transparent and smooth governance process (Rodgers *et al*, 2011; Pabian & Minksová, 2011).

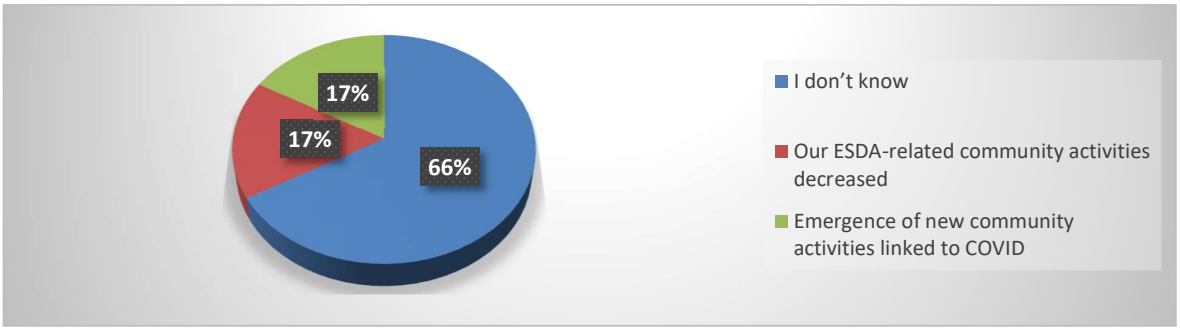

Figure 5: Effects of Covid-19 on SIRDA community engagements

Perceived overall effects of COVID-19 pandemic on ESDA programme

More than half of the students (66.7%) were uncertain of the impact of the COVID-19 pandemic on the attainment of the ESDA graduate study programme objectives. They opined that the crisis will both accelerate and slow down the achievement of the programme objectives. However, 16.7% of the respondents expressed optimism that the impact will be positive for the SIRDA programme in the long run. Others (16.7%) indicated that it was too early to predict what the impact will be.

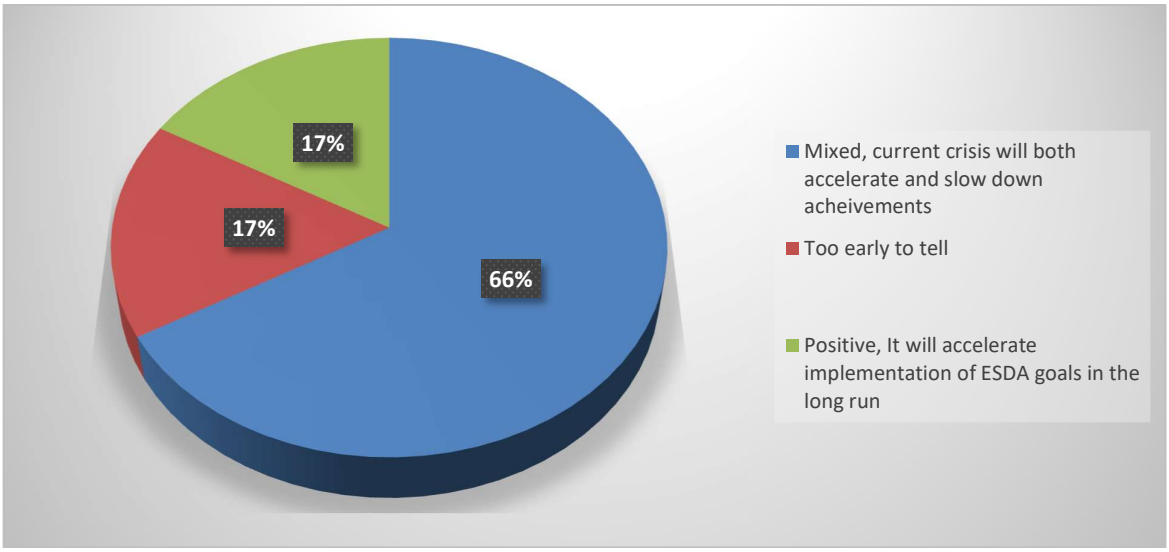

Figure 6: The perceived overall effect of covid-19 on the SIRDA programme

3.4 Suggestions for improving the ESDA program in the face of the COVID-19 pandemic

The following were the major opinions expressed by the respondents on how the SIRDA programme can be improved in the wake of the COVID-19 era:

1. Teaching and learning process to be sensitive to adult learners. The SIRDA programme targets professionals who are mainly adults. Adult learners differ from youth learners in terms of self-concept, physical ability, life experiences and motivation and these characteristics are noted to be given more priority attention in the second phase of the project implementation. Adult learners' independence and self-direction can vary based on their familiarity with the topic being taught. With a new or unfamiliar topic, adult learners may be more dependent on the facilitator and need more direction from him/her. Generally, adult learning psychology plays a significant role in designing effective educational programmes and training. Understanding the differences between adult and children's learning styles, psychological factors that affect adult learning, strategies for effective adult learning and their implications for education and training can enhance the effectiveness of the SIRDA programme.
2. More emphasis on field orientation. Incorporating field orientation into SIRDA programmes would ensure that rural

development practitioners who are mainly targeted are well-prepared, empathetic, and effective in their roles, ultimately leading to more sustainable and impactful development outcomes. This is because (i) field orientation provides practitioners with hands-on experience, allowing them to apply theoretical knowledge to real-world situations, (ii) it helps practitioners build trust and establish deeper relationships, (iii) working in the field hones essential skills such as problem-solving, adaptability, and communication, (iv) exposure to rural environments during training can influence practitioners' decisions to work in these areas long-term.

3. Involvement of more instructors who are vast in sustainability studies in the programme teaching.
4. Provision of small grants or scholarships for students. The programme started with a promise to include a funding support component for students. However, the funding support was only provided for the earlier cohort of students through the Africa Development Bank/Japanese Trust Fund (AfDB/JTF) for promoting knowledge exchange between Early Career Researchers in Africa and Asia. The latter cohort was unable to access any funding support which affected the quality of the field orientation component of the programme. The sustainability of the programme and the preservation of its quality would depend a lot on charting a pathway for a sustainable funding model for its implementation in the partnering institutions.

CONCLUSION AND RECOMMENDATIONS

COVID-19 caused major disruptions to the SIRDA programme, especially in implementing some components such as fieldwork. However, the various universities have managed to sustain learning by the introduction of virtual learning mode especially during the period of partial close-down. The SIRDA curriculum review process should focus attention amongst others, on developing a flexible curriculum that can be taught in person or online and that can switch between face-to-face and remote learning. Also, an effective SIRDA programme implementation requires improved funding. Given the importance of field orientation to the effectiveness of the programme, the phase II implementation should make provisions for virtual field orientation for the trainees especially where physical orientation is challenging due to funding or any future pandemic. The virtual field orientation can be achieved through a combination of digital tools and interactive methodologies such as virtual tours and simulations, case study analyses, interactive webinars with community leaders, and online collaborative projects.

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Analysis of factors influencing the adoption of tomato post-harvest technologies among smallholder farmers in Katsina state, Nigeria

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ABSTRACT

The study analysed the factors influencing the adoption of tomato postharvest technologies among smallholder farmers in Katsina State, Nigeria. A multistage sampling procedure was used to select 162 smallholder tomato farmers for the study. The data was analysed using frequencies, percentages, means and logit regression. Tomato farmers were predominantly male (85.0%), had a mean age of 39 years, a mean household size of 10 persons and a mean farm size of 0.7 hectares. Limited availability (44%), low capacity (94%), high initial capital (75%) and labour intensive (50.6%) were identified as the major constraints militating against the adoption of the technologies in the study area. The results of the logit regression show that regression coefficients of household size and distance to the nearest market were positive and significant at 1% in influencing the adoption of harvesting at turning stage and Zero Energy Cooling Chamber (ZECC), while age, farming experience, farm size, year of formal education, membership of association, participation in training and extension contacts were positive and significant at 5% for Solar dryer, Harvesting at turning stage, Reusable Plastic Crate (RPC) and ZECC, respectively, where farm size was positive and significant at 10% in the adoption of RPC. Farmers' socio-economic characteristics had positive and significant influence on the adoption of tomato postharvest technologies in the study area. The study therefore recommended that tomato postharvest technologies such as RPCs and Solar dryer should be made available and accessible to smallholder farmers.

Keywords: Harvesting, Postharvest, Solar drier

INTRODUCTION

Postharvest losses (PHL) encompass the detrimental reduction in quantity or quality of food that transpires along the entire food supply chain, commencing at the point of harvest until the ultimate consumption by the end consumer. Losses are incurred along the entire chain of activities involved in the handling, storage, shipping, and processing of agricultural commodities, leading to a decrease in both quantity and quality, as well as a decline in their market value. Fresh fruits and vegetables (FFVs) particularly have high levels of postharvest losses mainly due to its perishability and high moisture content making it susceptible to rot and spoilage (Jaspreet & Anita, 2013). One of the effects of postharvest losses is that it reduces the food that is available for human consumption, which is worsened by rising demand for food (Natsa, 2015). According to Arah *et al*. (2015), one of the constraints that makes tomato production costly is post-harvest loss, with incorrect handling being one of the key culprits. High levels of tomato postharvest losses reduce farmer welfare, undermining the desired worldwide trend of reducing poverty and hunger (Natsa, 2015). Adepeju (2014) similarly concludes that the overall value of post-harvest losses has been found to have a detrimental impact on per capita income and thus the welfare of tomato growers.

The World Packaging Organisation (WPO), which advocates enhanced tomato postharvest processing, has stated that growing global demand for food in the near future does not necessarily necessitate higher output, but rather better postharvest handling to ensure less food is wasted (WPO, 2010). Many donor countries have committed significant money in agricultural innovations through international development agencies, but have not fully achieved their anticipated aims, such as a high rate of adoption (Feltermeier & Abdulai, 2009). Adoption of recommended technologies implies that technologies are relevant to the farmers' circumstances. If farmer become aware of technologies that are relevant to their circumstances and can improve their farm production and thus their welfare, they will most likely adopt these changes (World Bank, 2011).

In recognizing the challenges of tomato postharvest loss in Nigeria, efforts were made by governmental and non-governmental organisations in promoting good postharvest technologies. Among the promoters was TechnoServe that implemented Yieldwise Project which piloted and promoted the use of Reusable Plastic Crates (RPC), Zero Energy Cooling Chamber (ZECC), Solar Dryer and Harvesting at turning stage as tomato post-harvest technologies in Katsina State. Despite the advantages offered by these technologies in tomato post-harvest loss reduction and promotion of its use in the study area, tomato farmers are still making use of the old and loss provoking methods thereby incurring greater losses.

However, based on the review of related literature, it was revealed that there is plethora of studies conducted on tomato post-harvest loss and adoption of post-harvest technologies, but there has been no study

taking into consideration to determine the factors that influence the adoption of the tomato postharvest technologies in the study area. There is, therefore, the need to have such research information and hence the necessitates this study.

Considering the above, this study was therefore carried out to:

i. describe the socio-economic characteristics of smallholder tomato farmers in the study area.
ii. determine the factors that influence the adoption of tomato post-harvest technologies,
iii. describe the constraints militating against the adoption of tomato post-harvest technologies.

METHODOLOGY

The study was carried out in Katsina State, North-western Nigeria located between latitudes 11°081N and 13°221N and longitudes 6°521E and 9°201E (GPS, 2018). The State has 34 Local Government Areas, which are further divided into three ADP Zones: Ajiwa zone (Zone I), Funtua zone (Zone II), and Dutsinma zone (Zone III). It has a total land mass of 24,971 square kilometres with an estimated projected population of 7,831,300 people (NPC, 2018). The State shares common boundaries with Niger Republic to the North, Sokoto and Zamfara States to the West, Kaduna State to the South and Kano and Jigawa States to the East (Ibrahim, 2017). The duration of the rainfall is between May and October with the mean annual rainfall of 257mm, the minimum and maximum temperatures of 15^{0}c and 39^{0}c respectively (NIMET, 2018).

A multistage sampling procedure was used for this study. In the first stage, a purposive selection of three (3) Local Government Areas (LGAs) that participated in the Yieldwise Project implemented by TechnoServe between March 2018 and March 2021, one (1) LGA from each zone of Katsina State Agricultural and Rural Development Authority (KTARDA) based on the high concentration of the project beneficiaries. The selected LGAs were Batagarawa (Zone I), Danja (Zone II) and Ingawa (Zone III). The next stage involved a purposive selection of 50% of the project communities in each of the 3 selected LGAs based on the high concentration of the project beneficiaries. Finally, the third stage considered a random selection of 162 respondents using sample size determination. The mathematical formula is given below:

$$n = \frac{Z^2\,P\,q\,N}{e^2\,(N-1) + Z^2\,P\,q} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$n = \frac{1.96^2\,(0.5 * 0.5 * 950)}{0.072^2(950-1) + 1.96^2 * 0.5 * 0.5} = \frac{912.38}{5.6105} = 162$$

Where:

n = Sample size
N = Population size
P = Population reliability (Frequency estimated for a sample size of n)
q = 0,5 considered for all developing countries population and P + q = (Where q = 1 – P = 0.5)
e = 0.07 error margin
$\frac{Z\alpha}{2}$ = normal reduced variable at 0.05 level of significance/confidence level and Z is 1.96

Table 1: Summary of the Sample Frame and Size

KTARDA Zones	Selected Yield wise Project LGAs	Yield wise Project Communities	Selected Communities (50%)	Sampling Frame	Sample Size
Zone I	Batagarawa	Ajiwa 'A', Ajiwa 'B', Gajerar Giwa, Tigrimis, Yargamji and Kurtufa	Ajiwa 'A'	100	17
			Kurtufa	100	17
			Yargamji	100	17
Zone II	Danja	Dabai 'A', Dabai 'A', Danja 'A', Danja 'A', Kokami, Kahutu, Tsangamawa 'A' and TsanSgamawa	Dabai 'A'	100	17
			Dabai 'B's	100	17
			Danja 'A'	100	17
			Kahutu	100	17
Zone III	Ingawa	Darmasho, Masibil, Kwanar Maje, Maje, Jobe, and Zucci	Jobe	75	13
			Masibil	100	17
			Zucci	75	13
Total:		**20**	**10**	**950**	**162**

Source: Field survey, 2023

Method of Data Collection

Primary data was employed in this study; it was sourced from project beneficiaries in the study area through a face-to-face interview using a structured interview schedule administered with the assistance of trained enumerators.

The data collected were analysed using descriptive statistics (mean, percentage, frequency, standard deviation) and logit regression. The logit model is implicitly stated as:

$$\text{Prob } (y^*=1) = 1\text{-}F^* (\square x_i\beta_i) = \frac{e\square xi\beta i}{1+e\square xi\beta i} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

$$\text{Prob } (y^*=0) = F^* (\square x_i\beta_i) = \frac{e\square xi\beta i}{1+e\square xi\beta i} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where:

Y = adoption of tomato post-harvest technologies
F = the cumulative distribution function for μi
e = exponential function

The probability of the farmers adopting tomato postharvest technologies was determined by the binary decision estimated in 0 and 1, which dichotomous dependent variable. Since the underlying adoption response variable is Y.

The explicit logistic model is expressed as:

$$Y = a + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \mu i$$

Where:

Y = Adoption of tomato post-harvest technologies (1= Adoption, 0= No Adoption)

a = the intercept

$\beta_1 - \beta_n$ = the parameters

X= Factors that influence the adoption of tomato post-harvest technologies

X_1= Age (years)
X_2 = Household size (number of persons)
X_3 = Farming Experience (years)
X_4 = Farm size (Ha)
X_5 = Year of formal education
X_6 = Membership of association (member = 1, otherwise, 0)
X_7 = Participation in training (participated = 1, 0 otherwise)
X_8 = Extension contacts (contact = 1, otherwise, 0)
X_9 = Access to credit (Access = 1, 0 otherwise)
X_{10} = Distance to market (km)
μ = error term

RESULTS AND DISCUSSION

Socioeconomic characteristics

Results in Table 2 reveal that the tomato farmers had a mean age of 39 years. This indicated that most tomato farmers were young, within their active age group and believed to be flexible in decision making towards adopting tomato post-harvest technologies in the study area. This is in agreement with the findings of Bukar *et al.,* (2022) in their study on the effect of tomato post-harvest losses on households' food security where a similar average age of farmers was reported. The tomato farmers had a mean household size of 10 members, implying a large family size. Large family size is an indicator of the availability of labour since the main source of labour in most African communities is from immediate family. This is in line with the findings of Korie *et al.* (2022) in the study of the effects of selected drivers of information and communication on awareness and perception of tomato post-harvest loss-reduction technologies in Kaduna, Nigeria, who reported a similar household size. The mean farm size of tomato farmers was 0.71 hectares. This is in agreement with the findings of Murtala *et al.,* (2021) in their study on "assessment of post-harvest losses of tomato in Zobe irrigation project in Dutsinma local government area of Katsina state" which revealed that the majority of the tomato farmers had less than 1 hectare of farm size. This implies that the majority of the tomato farmers in the study area are small-scale farmers. This might be due to the land tenure system and as a result of inheritance and an increase in population which led to subdivision and fragmentation of farmlands. The tomato farmers had a mean of 15 years of experience in tomato production. This shows that tomato farmers in the study area have considerable years of experience in tomato production. Thus, farmers with such experience in tomato farming can perform better and make appropriate decisions in the adoption of post-harvest technologies and in improving their living conditions. This corroborates Elemasho *et al.* (2017), who stated that high experience could make farmers make comparisons on old and new technology practices and such judgement could facilitate the adoption of new post-harvest practices thereby enhancing their farm practices and by their earnings.

Table 2: Socio-Economic Characteristics of the Respondents

Variables	Minimum	Maximum	Mean	Std. Deviation
Age	21	69	39	10
Household Size	1	31	10	6
Farm Size (Ha)	0.1	2.5	0.71	0.53
Farming experience	3	47	15.46	8.33

Source: Field survey, 2023

Postharvest technologies in use among smallholder Farmers

The study described the different types of tomato post-harvest technologies adopted among small holder farmers in the study area as presented in Table 3. Findings of the study established that most (83.3%) of the respondents were found using harvesting at turning stage technology, 42.6% were found using RPCs, 8.0% and 14.8% were found using Solar Dryer and Zero Energy Cooling Chamber, respectively. Low adoption of RPC technology could be attributed to the high initial cost and unavailability of RPCs in the study area. The low adoption rate of Solar dryer is attributed to its high initial cost and low capacity, which is why most of the farmers prefer to use their conventional sun drying method despite the differences in quality of outputs between the two methods.

Table 3: Adoption of Tomato Postharvest Technologies

Technologies	Frequency	Percentage
Reusable Plastic Crate (RPC)	69	42.6
Solar Dryer	13	8.0
Harvesting at turning stage	135	83.3
Zero Energy Cooling Chamber (ZECC)	24	14.8

Source: Field survey, 2023 *Multiple responses

Constraints to adoption of tomato postharvest technologies

Constraints are factors that can influence the innovation process negatively. Adoption of tomato post-harvest technologies is associated with certain constraints as reported by the tomato smallholder farmers in the study area. Table 4 presents the constraints faced by the farmers which affected the adoption of the technologies. Results in Table 4 reveal that buyers' preference was identified as the major constraint militating against the adoption of harvesting at the turning stage technology. This is attributed to the fact that some buyers that are not transporting the tomato to distant market prefer to buy the red ripe because most of their customers who are mostly the final consumers preferred the red ripe tomato, while low capacity was identified as the major constraint faced by the tomato farmers in the adoption of RPC and ZECC. This result agrees with the findings of Aghadi (2019) in Lagos State, Nigeria who reported inability of RPCs to contain as many tomatoes as woven basket as the major constraint hindering the adoption of the technology. High initial capital was identified as the 1st and 3rd constraints in the adoption of tomato solar dryer and RPC, respectively. This is in line with the findings of Izukanne and Chinweota (2018) in Taraba State, Nigeria where expensive nature and lack of funds have been identified as major barriers hindering the use of tomato post-harvest technologies. Limited availability was identified as the 2nd and 3rd constraints militating against the adoption of RPC and Solar dryer, respectively. This is in agreement with the findings of Akangbe *et al.* (2014) in Oyo State, Nigeria who described unavailability and insufficient knowledge as factors hindering the adoption of tomato post-harvest technologies.

Table 4: Constraints to Adoption of Tomato Postharvest Technologies

Constraints	Harvesting at Turning Stage		RPC		Solar Dryer		ZECC	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Inadequate training	2	1.2	2	1.2	3	1.9	9	5.5
Limited availability	-	-	44	27.2	38	23.5	-	-
High initial capital	-	-	75	46.3	74	45.7	6	3.7
Insecurity problem	11	6.8	17	10.5	27	16.7	7	4.3
Labour intensive	-	-	-	-	-	-	82	50.6
Buyer's preference	64	39.5	-	-	-	-	-	-
Low access o credits	-	-	15	9.3	36	22.2	5	3.1

Constraints	Harvesting at Turning Stage		RPC		Solar Dryer		ZECC	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Low capacity	-	-	94	58.0	54	33.3	51	31.5
Low extension contacts	13	8.0	8	4.9	14	8.6	17	10.5
Lack of market information	22	13.6	3	1.8	-	-	-	-

Source: Field survey, 2023

Factors that influenced tomato farmers' adoption of postharvest technologies

The results of logit regression in Table 5 indicate the influence of the socioeconomic factors in the adoption of tomato post-harvest technologies. The results indicated the relevance of the model for estimating the relationship between the dependent and independent variables. A positive coefficient indicates that a higher value of the independent variables tends to increase the likelihood of adoption of the technologies. Similarly, a negative value of coefficients implies that a higher value of the variables would decrease the adoption. The result presented in Table 3 shows that the regression coefficient of age of the respondents was positive and significant ($p<0.05$) in influencing the adoption of Solar drier. Indicating that an increase in farmer's age increases the likelihood of adoption of the solar dryer technology. Some studies reveal a positive relationship between age and technology adoption (Chuang, Wang & Liou, 2020). For example, Melesse (2018) refers to age as one main factor that determines the technology adoption behaviour of a farmer.

The regression coefficient of household size was also positive and significant ($p<0.01$) in influencing the adoption of ZECC. This indicates that the larger the household size the higher the adoption of the technology. Danso-Abbeam *et al.* (2017) opined that large households tend to have a free labour supply toward the adoption of the innovation than the smaller households. The result also indicates that farming experience was positive and significant ($p<0.05$) in influencing the adoption of solar driers. This means that when farmers experience increases the probability of using solar drier increases. The implication is that experience in farming can encourage a farmer to adopt new technologies and understand the benefits of the technology. The coefficient of farm size was positive and significant ($P<0.05$) and ($P<0.1$) in influencing the adoption of harvesting at the turning stage and RPC technologies, respectively. This shows that the adoption of the technologies increases with the increase in size of tomato farm cultivated. This finding is consistent with the finding of a research carried out in the Central Highlands of Ethiopia to determine the factors affecting the adoption of an improved maize variety, which revealed a positive relationship of farm size with the adoption behaviour (Dissanayake *et al.,* 2022).

Level of education was positive and significant ($P<0.05$) for tomato solar dryer technology. This indicated that the higher the farmers level of education, the higher the adoption of the technology. According to a study conducted by Mamudu, Emelia, and Samuel (2012), there exists a positive correlation between the highest level of education attained within a household and the likelihood of adopting modern agricultural technologies. This suggests that farming households with individuals who possess higher levels of education are more inclined to adopt these technologies compared to households lacking such educational attainment. The coefficient of membership of association was positive and significant ($P<0.05$) in influencing the adoption of harvesting at turning stage. This is in agreement with the findings of Tafida and Muntari (2017) in Katsina State, that suggested that the regression coefficient of membership of association was positive and significant for adoption of recommended planting date for cowpeas. The regression coefficient of participation in Yieldwise training was also positive and significant ($P<0.05$) in influencing the adoption of tomato solar dryer technology. This confirms the findings of Yuying *et al.* (2022) who reported that attending the technical training has a positive and statistically significant effect on farmers' adoption of biopesticides in China. The regression coefficient of extension contact was positive and significant ($p=0.05$) in influencing RPC technology adoption, which is consistent with the findings of Tafida and Muntari (2017) in Katsina State, Nigeria, who found that extension contact was positive and significant in the adoption of recommended cowpea planting distance (25cm x 75cm). Mwangi and Kariuki (2015) cited availability and access to extension services as important factors in technology adoption. Credit availability was discovered to have a positive link with RPC technology adoption. This was determined to be statistically significant at $p<0.01$. This suggests that credit is an essential component in the adoption of agricultural technology. This is consistent with the concept that farmer poverty and a lack of finance make it nearly impossible for them to acquire technologies (Ministry of Food and Agriculture, Ghana 2010). According to Udimal *et al*. (2017), when farmers have access to finance facilities, they are more likely to adopt new technologies. The regression coefficient of distance to the nearest market was significant ($p<0.01$) in influencing the adoption of harvesting at the turning stage and Zero energy cooling chamber, indicating

that a unit increase in distance to the output market would lead to an increase in technology adoption. The positive association also suggests that the greater a household's distance from the market, the more forced they are to transport or store their products. This suggests that households located further away from the output markets are more likely to embrace the technologies than those located closer to the markets.

Table 5: Logistic Regression Results

Technologies	**Harvesting at turning stage**		**RPC**		**Solar Dryer**		**ZECC**	
Variables	**Coeff.**	**Signif.**	**Coeff.**	**Signif.**	**Coeff.**	**Signif.**	**Coeff.**	**Signif.**
Age	-0.038	0.957	0.801	0.161	2.093	0.036**	-0.155	0.881
Household size	-1.199	0.296	-1.176	0.158	1.542	0.182	3.623	0.007***
Farming experience	-1.158	0.398	0.527	0.473	1,950	0.028**	-0.765	0.590
Farm size	2.284	0.028**	1.298	0.052*	0.673	0.466	1.144	0.147
Year of formal educ.	0.672	0.610	-0.037	0.952	2.702	0.014**	-0.547	0.628
Membership of association	1.394	0.022**	0.261	0.538	-0.128	0.890	-0.507	0.516
Participation in training	0.204	0.913	1.028	0.284	0.357	0.781	2.431	0.0411**
Extension contacts	-0.567	0.461	1.201	0.022**	-0.898	0.326	-0.359	0.568
Access to credit	-0.705	0.585	1.884	0.009**	1.951	0.331	-1.771	0.259
Distance to market	2.992	0.000***	-0.337	0.469	0.246	0.794	2.003	0.009***
2Log likelihood ratio test	88.028		182.061		70.753		111.427	
Cox and Snell R^2	0.301		0.214		0.115		0.140	
Nagelkerke R^2	0.506		0.287		0.268		0.247	
Percentage prediction	86.4		74.1		92.6		87.0	

Source: Field survey, 2023 *** P<0.01, **P<0.05, *P<0.1

CONCLUSION AND RECOMMENDATIONS

Based on the findings of the study, it is concluded that, farmers' socio-economic characteristics such as age, household size, years of experience in tomato farming, year of formal education, farm size, participation in training, membership of association, extension contacts, access to credits and distance to market have positive and significant influence on the adoption of tomato postharvest technologies in the study area and the following recommendations were made:

1. Tomato postharvest technologies such as RPCs and Solar dryer should be made available and accessible to smallholder farmers.
2. Agricultural technology manufacturers should conduct needs assessment before producing any technology to avoid gap between technology production specifications and farmer's needs most especially in terms of capacity.
3. Tomato farmers using RPCs, Solar dryer and ZECC should be encouraged on saving of replacement cost to ensure sustainability.

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Gender differentials of participation in political activities among farming households in Oke-Ogun region of Oyo state, Nigeria

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ABSTRACT

The study investigated gender differentials of participating in political activities among farming households in Oke - Ogun region of Oyo state. In all, a total of 135 farming households were sampled, with 54 female-headed households and 81 male-headed households sampled using multi-stage sampling procedure. Data was analysed using percentages, mean, correlational analysis and t-test at 5% level of significance. There was marginal difference in the prominent political activities participated in by both male and female respondents, these activities were voting during elections ($\bar{x}$= 1.37, $\bar{x}$= 0.90), registering under a political party ($\bar{x}$= 0.73, $\bar{x}$= 0.55), sponsoring and supporting candidates ($\bar{x}$= 0.58, $\bar{x}$= 0.55). The male respondents identified engagement of community members in politics ($\bar{x}$= 1.89) and the ability to serve as pressure groups ($\bar{x}$= 1.43), while the female respondents identified that the present system accommodates female engagement in governance at local, state and/or national level ($\bar{x}$= 2.36) as factors motivating participation in political activities. There was favourable perception of politics by male (74.1%) and female (59.3%) gender. Inverse relationship (r= -0.216, p=0.014) was established between limitations to participation in political activities for the female respondents. Significant difference (t= 21.784, p= 0.000) was established in participation in political activities across gender. In view of the foregoing, the study recommends gender peculiarity in the design of political activities in a bid to accommodate and enhance gender participation.

Keywords: Farming households; Gender differentials; Participation in political activities and Oke-Ogun region.

INTRODUCTION

Political participation is significant in rural communities as it provides rural dwellers with the opportunity to express their views and concerns. Rural communities face unique challenges such as access to healthcare, education, and infrastructure, and political participation provides them with the opportunity to voice their concerns and influence policy decisions (Ezeibe & Anoliefo, 2018). Political participation also promotes civic engagement, social capital, and community development, which are essential for the development of rural communities (Barreto *et al*., 2014). One significant impact of political participation on rural development is the ability to influence local policies and decision-making processes. Through political participation, rural residents can advocate for their interests and push for policies that support local economic growth, environmental sustainability, and social justice. For example, in India, rural communities have used their collective political power to influence government policies and secure better access to resources such as water, electricity, and education (Roy & Bose, 2018).

According to the United Nations, more than half of the world's population lives in rural areas, with the majority residing in developing countries (UNDP, 2019). Rural dwellers, particularly in developing countries, face several challenges that can hinder their participation in political activities. The rural people are either predominantly illiterate or have low educational levels and are ignorant of new ways of improving their lives. Factors such as poverty, ignorance, disease, high rate of illiteracy and lack of basic infrastructure keep rural people stagnant (Naveed and Anwar, 2014). However, despite these challenges, rural dwellers have demonstrated a keen interest in political activities, considering that they have significant impact on rural development.

Collaboration and partnership among different stakeholders, including government officials, non-profit organizations, and community members, can promote political participation in rural areas. Collaboration can help to build trust, share resources and expertise, and leverage collective power for positive change. For example, in India, the Rural Communities Program brings together government, non-profit organizations, and community members to develop and implement community-driven development initiatives (Swain & Wallentin 2016). Furthermore, the engagement of communities in civic activities is identified as a potent tool for promoting political participation in rural areas. These activities can help to build social capital, increase community cohesion, and mobilize rural residents around shared interests and goals. Community engagement in civic activities can also help to identify and address local

issues that may be overlooked by mainstream political processes (McMahon & Wilson, 2019).

Female inhabitants in rural areas may have limited access to political information, such as candidate platforms, policy proposals, and voting procedures, due to limited access to technology, media, and civic education programs (Hogg & Gilmour, 2017). In contrast, their male counterparts are more inclined to have more access to political information, as they have more resources and opportunities to engage in political activities. Furthermore, social networks and community norms have been found to differ in their influence on political participation. In rural areas, social networks may be more homogeneous and exclusive, which may limit political participation for marginalised groups (Swain & Wallentin, 2016). The findings above portends that there will be significant variations in political participation in rural areas across gender lines.

Moreover, community norms may be more conservative and traditional in rural areas, but their effect across gender lines varies in principle and practice. The roles played by women are often underrepresented in political processes in rural areas, yet they represent a significant portion of the population. The active engagement of women in political activities, such as voter registration drives, leadership development programs, and community organising, can increase their participation and representation in decision-making processes (Batliwala & Pittman, 2017). Moreover, it is essential to engage marginalized groups and create more opportunities for political participation to promote equity and inclusivity in the political process. Acknowledging that political participation is an important aspect of democracy and understanding the similarities and differences between male and female respondents in its activities can help to promote more equitable and inclusive political processes.

Recently, policy initiatives, advocacy campaigns, and academic research have increased interest and prompted participation in political activities in rural areas. However, research has not shed light on the dichotomy that exists in political participation across genders. In reference to the foregoing and in a bid to examine the issues identified, the study conceived the following objectives:
(i) assess participation in political activities across gender;
(ii) identify factors motivating participation in political activities across gender;
(iii) determine the limitations to participation in political activities across gender;
(iv) assess the perception of politics and its activities across gender.

Hypotheses of the study
$H_0$1: There is no significant relationship between factors motivating participation in political activities and participation in political activities across genders.
$H_0$2: There is no significant relationship between limitations to participation in political activities and participation in political activities across genders.
$H_0$3: There is no significant relationship between perception of political activities and participation in political activities across genders.
$H_0$4: There is no significant difference in participation in political activities across genders.

METHODOLOGY

Oke-ogun region of Oyo State is the study area. It is one of the five geo-political regions in Oyo State; others are, Ibarapa, Ogbomoso, Oyo, and Ibadan. It covers an area of about sixty-three percent of the total landmass (15, 193,320 km2) of the state. It is located within latitude 7070' and 90' N and longitude 2060' E to 4020' E. The vegetation prominent is derived savanna with a rainfall range between 25^{o}C – 37^{o}C. The area is endowed with a wide expanse of fertile land suitable for the cultivation of yam, millet, guinea corn, cassava, cowpea, maize, sorghum, etc. The population of the area comprises ten (10) local government areas, they are: Itesiwaju, Atisbo, Saki East, Saki West, Iseyin, kajola, Iwajowa Oorelope, Irepo and Olorunsogo.

The target population of the study was all farming households in the Oke-Ogun region of Oyo State. Multi-stage sampling procedure was used in the selection of sample subjects for this study. In the first stage, there was a purposive sampling of 50% of the Local Government Areas in the region owing to the presence of more farm clusters. The second stage involved the sampling of fifty percent of the communities in the farm clusters under the local government areas earlier sampled. In the third stage, the listing of female and male-headed households in the communities sampled was carried out. The final stage involved the use of a proportionate sampling technique to sample thirty percent of the households generated in the previous stage of the sampling procedure. In all, a total of 135 farming households were sampled, with fifty-four (54 of the farming households representing the female respondents.

Variables assessed were participation in political activities, factors motivating participation in political activities across genders, limitations to participation in political activities across genders, and respondents' perception of politics and its activities across genders. Participation in political activities was measured by presenting a set of activities that reflect participation in politics. The extent of participation was operationalized as do not participate, passively

participate, and actively participate. Scores assigned were 0, 1, and 2, respectively. The average weighted mean was used to isolate the political activities they participated in from the pool of the political activities provided. Factors motivating participation in political activities were determined by presenting respondents with plausible factors that could motivate their participation in political activities. Respondents had response options of not being considered, moderately considered, and fully considered as a motivating factor. Scores of 0, 1, and 2 were assigned, respectively.

The average weighted mean value was used to isolate the political activities they participated in from the pool of the political activities provided. The limitation to participation in political activities was elicited by presenting some identified factors that act as limitations to participation in political activities. Respondents adjudged these limitations from the set of response options of not a limitation, moderate limitation, severe limitation, and very severe limitation with scores of 0, 1, 2, and 3 assigned, respectively. The average weighted mean value was used to identify the limitations to participation in political activities. The perception of the respondents of political activities was elicited by presenting a set of questions (positive and negative) that reflect their perception of politics and its activities. A Likert-type scale strongly agree, agree, undecided, disagree, and strongly disagree were response options presented. The perception index was generated from the pooled score. Using the mean value, perception was categorized as favourable or unfavourable. Data was analysed using descriptive and inferential statistics of the Statistical Package for the Social Sciences (SPSS) 25 analytical software at a 5% level of significance.

RESULTS AND DISCUSSIONS

Participation in political activities

Data presented in Table 1 reveals that voting during elections ($\bar{x}$= 1.37), registering under a political party ($\bar{x}$= 0.73), sponsoring and supporting candidates ($\bar{x}$= 0.58), and canvassing for people to register with a political party ($\bar{x}$= 0.57) were political activities that were participated in by the male respondents,while the female respondents identified voting during elections ($\bar{x}$= 0.90), registering with a political party ($\bar{x}$= 0.55), and sponsoring, and supporting candidates ($\bar{x}$= 0.55) were the political activities they participated in. The statistics above show that there is a marginal difference in the activities participated in by both male and female. It further reflects that there is a shift from the norm to a noticeable involvement and participation in political activities irrespective of gender. It is established that involvement in political activities includes voting during elections. Voting during elections is considered a crux in political participation as most political activities intend to achieve this, it is regarded as a common form of political participation. This view is consistent with the assertion of Holt and Stokes (2016) that voting behavior is one of the common forms of political participation in rural areas.

It is also expressed that participating in political activities transcends voting during elections to include having a stake as members of registered political parties. This guarantees identity and shows an affinity for the process and procedure. This notion is supported by Ryan and Niedzwiecki (2013), having a sense of identity and belongingness are core objectives that are provided by party membership of political parties. Sponsoring and supporting candidates is also a noticeable index of participation in political activities by both genders. These activities reveal sufficient commitment of resources (time, money, material, etc.) to enhancing the emergence of their preferred candidates during elections. However, the distinguishing index was canvassing that people get registered with a political party by the male respondents. Their ability to meet the demands associated with this activity is responsible for this. It suffices that the female may not have ample time to commit to this activity owing to family commitments compared to the male.

Table 1: Distribution of the respondents by their participation in political activities

Political activities	Male (Weighted mean)	Female (Weighted mean)
Registering under a political party	0.73*	0.55*
Contest for elective positions	0.24	0.17
Vote during elections	1.37*	0.90*
Sponsoring and supporting candidates seeking for elective positions	0.58*	0.55*
Draft petitions or protest letters against a competitor	0.21	0.18
Campaigning and political rallies	0.26	0.27
Canvassing for people to register with a political party.	0.57*	0.27
	***≥ 0.55 (Weighted mean average)**	***≥ 0.41 (Weighted mean average)**

Source: Field Survey, 2023.

Motivating factors for participating in political activities

Data, as shown in Table 2, reveals that religious organisations, mobilisation strategies adopted by political parties, an opportunity to effect change in the community, and transparency of the stakeholders were factors motivating participation in political activities that were common to both male ($\bar{x}$= 1.79, $\bar{x}$= 1.42, $\bar{x}$= 1.42 and $\bar{x}$= 1.52) and female ($\bar{x}$= 2.18, $\bar{x}$= 2.64, $\bar{x}$= 2.09 and $\bar{x}$= 2.09) genders, respectively. However, the male respondents identified the engagement of community members in politics ($\bar{x}$= 1.89) and ability to serve as pressure groups ($\bar{x}$= 1.43) as factors motivating participation in political activities, while the female respondents identified that the present system accommodates female engagement in governance at local, state and/or national levels ($\bar{x}$= 2.36). It is acknowledged that religious organisations serve as agents of social engineering and are instrumental in the actualisation of social change. These organisations serve as legitimisers of change-induced activities. Political activities are one of the avenues of government through which increased consciousness and acceptance is being reflected through religious platforms. This serves as a source of motivation irrespective of their gender. The penetration of internet connectivity has further widened the span of reach for the persistent presentation of information on political activities. With this, prospective participants of political activities are kept abreast of political activities. This includes but not limited to the form of activities to take place, time, venue, and agenda among others. All these foster participation in political activities irrespective of gender.

The viewing of participation in political activities as an opportunity to effect change further strengthens the resolve of both genders to engage in these activities. Through participation, their interest in these activities and the influence they exert will be increased. By this, they are further guided on the procedures to adopt and the processes to follow to make their interest known and have it addressed. The challenges faced by rural communities are enormous, ranging from healthcare, education, and infrastructure, however, through active political engagements they have ample opportunity to voice their concerns and influence policy decisions (Ezeibe & Anoliefo 2018). Transparency in political activities and its attendant processes will shape the thoughts of the participants as trust in the former will be strengthened. Through transparent activities and processes, resources (material, human financial, etc.) will be committed to the course of these political activities. With this, inclusion and ownership which are instrumental to sustaining these activities will be put to productive use in attaining development. Political participation also promotes civic engagement, social capital, and community development, which are essential for the development of rural communities (Barreto *et al*., 2014).

The community members' engagement in political activities spurs others to take up the process. Acknowledging that community members' engagement in political activities serves as legitimiser of these activities, hence fostering acceptance and giving credence to them. With this in place, other members of the community who were hitherto indifferent, will have a change of thought, lend their voice, resources and be positive about their sustained engagement in political activities. Through this, other members of the community will have detailed information on the direction and dynamics of these activities, thereby giving room for others to subscribe to them. With the frequent flow of information among the citizenry, the acquisition of knowledge is guaranteed, and this is likely to enhance participation in political activities (Ezeibe & Anoliefo). Ascribing the ability to serve as a pressure group as a motivation for participation by the male attests that it is only through participation that there can be active engagement. By this, they can have a voice that will reflect their interest and convey the same to policymakers. Through active participation, stakeholders' interest is aroused, ability to influence and effect change is further increased.

On the other hand, the female gave credence to the present system increasingly accommodating female engagement in governance at the local, state, and/or national level. The increased consciousness to engage women in governance at all levels and the practical reflection of such engagement across various strata and levels of governance is having a multiplier effect on participation in political activities by the female. It further establishes that the promises of increased inclusion of women in governance have been matched with actions. Because of this, the female is motivated to sustain their participation in political activities.

Table 2: Distribution of respondents by the factors motivating factors for participation in political activities

Motivating factors for participation in political activities	Male (Weighted mean)	Female (Weighted mean)
Political activities are becoming more is transparent	1.10	1.90
Less cumbersome nature of political activities	1.05	1.54
Attainment of career goals	1.21	1.63
Engagement of community members in politics	1.89*	2.00
Religious organizations	1.79*	2.18*
Mobilization strategies adopted by political parties	1.42*	2.64*
Opportunity to effect change in our community	1.42*	2.09*
Transparency of the stakeholders	1.58*	2.09*
The present system accommodates female engagement in governance at local, state and/or national level	1.26	2.36*
Ability to serve pressure group	1.43*	1.74
	***≥ 1.42 (Weighted mean average)**	***≥ 2.10 (Weighted mean average)**

Source: Field Survey: 2023

Perception of politics and political activities

Data in Table 3 reveals that a significant proportion (74.1%) of the males had a favourable perception of politics and political activities. Similarly, a notable proportion (59.3%) of the females also had a favourable perception of politics and political activities. The favourable perception across genders can be ascribed to the increasing awareness and acknowledgment of the role and influence of participation in politics and governance. This includes the following but is not limited to government policies, reforms, and societal transformation. The pattern and dynamics with which these activities are run are also plausible reasons for the favourable disposition of perception recorded. Recently, the clamour to shun violence which has characterized politics and political activities in the past is a major objection that most political parties and their stakeholders are upholding. Furthermore, the increased inclusion and the reflection of the thoughts and demands of the populace can also be ascribed as a reason for the favourable perception of rural households to politics and political activities across genders. Political instability along with failed promises on the part of the political class have made political participation in rural areas a more dramatic issue of concern for both scholars and technocrats, until recently where social inclusion is reshaping the narrative (Ojo, 2014).

Table 3: Distribution of respondents by their perception of politics and political activities

	Favourable f (%)	Unfavourable f (%)	Minimum	Maximum	Mean	Standard deviation
Male	60 (74.1)	21 (25.9)	26	68	54	5.8
Female	32 (59.3)	22 (40.7)				

Source: Field Survey: 2023. F= Frequency, % = percentage

Limitation to participation in political activities

Data presented in Table 4 reveals that there are distinctions across genders concerning the limitations to participation in political activities. Inadequate financial resources ($\bar{x}$= 1.63), poor governance ($\bar{x}$= 1.74), and disapproval by spouses were identified as limitations peculiar to the male respondents. The female respondents identified alienation from some of the activities by stakeholders ($\bar{x}$= 2.55), poor access to information ($\bar{x}$= 1.99), lack of ideology by the political parties ($\bar{x}$= 2.27), inability to keep to terms of agreement at local, state and/or national level and cultural convictions ($\bar{x}$= 2.09). However, comparatively both male and female identified long hours of political activities ($\bar{x}$= 2.11, $\bar{x}$= 2.00) and long distance to venue of meetings ($\bar{x}$= 1.97, $\bar{x}$= 2.04) as limitations to participation in political activities. Engagement in political activities comes with some commitments and demands, among them is financial resource. This resource is utilised for the execution of the schedule of activities outlined by the political parties and their allied institutions, hence the inability to make these resources available is a potential drawback to participation by the male gender. According to a study by Smale and Amanor-Boadu (2015), rural communities often lack the resources and funding needed to support political campaigns and

participate in political activities. This can limit their ability to advocate for their interests and influence local policies.

The inability of the government to match words with actions by keeping to the promises made to the populace is considered a huge impediment to participation as ascribed by the male. This is observed in poor governance across the three tiers of government which include but are not limited to weak economic indices, infrastructural deficit, and poor service delivery by government agencies, parastatals, and institutions. Considering that there are impediments in the nature and dynamics of political activities, engaging in them comes with some risks. Because of this, disapproval by spouse was also considered as an impediment to participation in political activities by the male. Without appropriate support from spouses, the active engagement of the male in political activities will be hindered as full attention to these activities and the commensurate commitment to them is not guaranteed.

On the other hand, their alienation from some of the activities by stakeholders will give room for exclusion, and the attention of the females will waver. This will further lead to passive participation in political activities as mobilization and utilisation of resources (human, material financial, etc.) that will portray and reflect a commitment to the course of these activities will be withdrawn. Furthermore, this will breed rancor among the members, which will further weaken and threaten the cohesion of political groups. Poor access to information concerning these political activities leads to distortion of thoughts by the members of the populace. With this in place, the female will generally perceive that they are excluded in the scheme of things. Denying them access to vital information will further shrink their sense of belonging. A transparent and democratic political system encourages political participation among rural dwellers (Martin and Zachary, 2023).

The lack of ideologies and inability to keep to the terms of the parties in government are huge setbacks as the tendency to renew commitment is further weakened by such practice. With this, they will not place a premium on these political activities nor will they take part in them. Respect for culture plays a huge role in the participation in political activities by the female. Premium is placed on cultural values, hence the female holds these convictions dear to their hearts and as such will not engage in practices that negate their convictions. This view is consistent with the finding of Martin and Zachary (2023) that women are less likely to participate in political activities than men due to cultural and social barriers. The attention required of its members by political parties is huge, hence it serves as a setback to effective participation in political activities. It is acknowledged that most rural households are engaged in on-farm and off-farm activities as their primary income-generating source, hence they cannot afford the luxury of time demanded by these political activities, hence further acting as a limitation to their participation in these activities.

Notably, political activities are conducted across locations that may not fall within the catchment area of the participant, with this in place, extra cost is incurred by the prospective participant. This further hinders commitment and threatens participation in these political activities. According to a study by Pilon and Kestila-Kekkonen (2018), distance can also increase the cost of political participation for rural residents, making it harder for them to attend events and engage with political parties and organizations.

Table 4: Limitation to participation in political activities

Limitations	Male (WM)	Female (WM)
Alienation from some of the activities by stakeholders	1.05	2.55*
Lack of trust for principals of political parties	1.32	1.36
Inadequate financial resources	1.63*	1.73
Poor access to information	1.22	1.99*
Poor governance experienced	1.74*	1.45
Lack of ideology by the political parties	1.32	2.27*
Long hours of political activities	2.11*	2.00*
Most political party activities are gender insensitive	1.33	1.73
Alienation from some of the activities by stakeholders	1.22	2.55*
Disapproval by spousal	1.78*	1.55
Inability to keep to terms of agreement at local, state and/or national level	1.39	2.09*
Cultural convictions	1.28	2.09*
Long distance to venue of meetings	1.97*	2.04*
	*≥ 1.49 (Weighted mean average)	*≥ 1.95 (Weighted mean average)

Source: Field Survey: 2023

Hypothesis

Table 5a reveals that factors motivating participation in political activities had a positive and significant relationship with participation in political activities for males (r=0.460, p=0.041) and females (r= 2.113, p=0.003). The table also reflect that perception of politics, and its activities was significantly related to participation in political activities for both male (r=0.614, p=0.000) and female (r=0.614, p=0.000) respondents. However, an inverse relationship (r= -0.216, p=0.014) was established between limitations to participation in political activities for the female respondents. It is appreciated that certain indices drive both the males and females to partake in political activities. This spans from personal benefits and group benefits to community benefits. This depicts that these motivating factors have prominence and are ingredients to effective and efficient participation in political activities. Agreeably, the disposition of the genders towards a course will reflect the attention and commitment given. The favourable perception ascribed to politics and political activities must have shaped the thoughts of the farming household toward participating in political activities. The favourable perception further drives the commitment of time, material, and other resources to enhance effective and efficient participation in political activities. An increase in limitations to participation in political activities will inhibit the female from participating in political activities. Conversely, these limitations are of no effect on the participation in political activities by the male respondents Suffice that they are likely to overcome these limitations to participate in these political activities.

Furthermore, Table 5b reveal that a significant difference (t= 21.784, p= 0.000) existed between the male and female respondents in their participation in political activities. This infers that there are variations in the extent to which both genders get engaged in political activities. The limitations ascribed to participation in political activities among other facts can be ascribed to the variation experienced.

Table 5a: Relationship between isolated variables and participation in political activities

Variable	Male		Female	
	r	p	r	p
Factors motivating participation in political activities	0.460	0.041	2.113	0.003
Limitations to participation in political activities	0.321	0.584	-0.216	0.014
Perception of politics and its activities	0.614	0.000	0.423	0.000

r: correlation coefficient, p: probability
Source: Field Survey, 2023.

Table 5b: Test of difference in participation in political activities across genders

	Mean	df	p-value
Participation in political activities	21.784	134	0.000

df: Degree of freedom
Source: Field Survey, 2023.

CONCLUSIONS AND RECOMMENDATIONS

The study concludes that there was a difference in political activities participated in by both male and female respondents. The engagement of community members in politics and their ability to serve as pressure groups are factors that motivate the male respondents to participate in political activities, while the female respondents identified that the present system accommodates female engagement in governance at the local, state, and/or national level as a prominent factor that motivates their participation in political activities. Both male and female respondents had favorable perceptions of politics and political activities. Inadequate financial resources, poor governance, and disapproval by spouses were identified as limitations to participating in political activities peculiar to the male respondents, while the female respondents identified alienation from some of the activities by stakeholders, poor access to information, a lack of ideology by political parties, the inability to keep to terms of agreement at the local, state, and/or national level, and cultural convictions. Participation in political activities was significantly different by gender. In view of the foregoing, the study recommends considering gender peculiarities when designing political activities to engage in and accommodate gender mainstreaming across its activities.

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Proclivity to use interactive voice response as information and communication technology tool for extension service delivery in Lagos state, Nigeria

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ABSTRACT

The Interactive Voice Response (IVR) system is an automated telephone technology that employs a computer-generated voice to engage callers' input. It holds significant global recognition as a potent Information and Communication Technology (ICT) tool, particularly in facilitating communication between farmers and extension service providers worldwide. In Nigeria, despite the notable deficit in extension agent-farmer interaction, IVR as an alternative for extension service delivery remains largely unused. Thus, extension agents' proclivity to use interactive voice response as an ICT tool for extension service delivery was investigated. Using multistage sampling procedure, a total of 97 Extension Agents (EAs) were used as samples for the study. Data were analysed using percentages, means and Pearson's product moment correlation at $\alpha_{0.05}$. Respondents' age was 46±0.91 years, the majority were married (80.4%), had Bachelor's degrees (53.6%) with professional experience of 13.7±8.2 years, and were mainly in the senior cadre (46.4%). Airtel was the primary service provider for internet connection of IVR ($\bar{x}$ =1.60). A larger (51.5%) proportion of the respondents had a favourable perception towards IVR use in Extension Service Delivery (ESD) and the IVR perceived benefits were high for 60.8% of the EAs. More than half of the EAs expressed high proclivity to use IVR. Respondents' age (r= -0.156) and years of experience (r= 0.262). were significantly related to proclivity to IVR. A significant relationship existed between respondents' perception and proclivity to use IVR (r = 0.424). Extension agents in Lagos State showed a positive inclination toward using IVR for extension delivery systems. To harness its benefits, stakeholders should prioritise IVR integration to improve the effectiveness and efficiency of agricultural extension services, fostering better outcomes for farmers.

Keywords: Interactive Voice Response, Extension Service Delivery, Information and Communication Technology, Proclivity to use

INTRODUCTION

Prior to Nigeria's oil boom, agriculture was the cornerstone of the economy, supporting most Nigerians and contributing significantly to foreign exchange earnings (Food and Agriculture Organization, 2020). Approximately 35% of the Nigerian population was employed in the agricultural sector in 2020, and it contributed around 29.25% to the Gross Domestic Product in the third quarter of 2019 (World Bank, 2020; National Bureau of Statistics, 2019). Agriculture also supplied raw materials for local industries and served as the primary source of both export and domestic food (Food and Agriculture Organization, 2020).

The effectiveness of the agricultural sector is heavily reliant on its information system, ensuring the seamless flow of information from researchers to producers and consumers, and from facilitators to users of agricultural knowledge, information, and technologies (Rahman *et al*., 2020). Advancements in Information and Communication Technologies (ICTs) have further revolutionised how agricultural information is acquired, processed, stored, transmitted, and retrieved, adapting to contextual realities (Ayim *et al*., 2022). With the utilisation of ICTs in extension services, barriers to agricultural information transfer to farmers are being dismantled, thereby enhancing the efficiency of extension services (Ayim *et al*., 2022). A notable example of this is the use of Interactive Voice Response (IVR) technology, which delivers location-specific messages to farmers regarding various aspects of agriculture such as crop varieties, livestock breeds, soil management, weather conditions, market prices, and more, thereby revolutionising agricultural information delivery through ICT (Ayim *et al*., 2022).

Interactive Voice Response (IVR) technology enables the delivery of information via audio recordings through any type of phone, allowing users to provide feedback by selecting options using the keypad (Sahel Consulting, 2020). The IVR serves as an automated telephone system that interacts with callers, provides information, collects data, and directs calls to the appropriate recipient (Sahel Consulting, 2020). This ICT solution enables callers to access pre-recorded messages and navigate menu options without speaking to an agent, using touch-tone keypad selection or speech recognition (Sahel Consulting, 2020). The IVR operates on basic feature phones, making it accessible to a wide range of users (USAID, 2016) and has been widely deployed, reaching millions during the

COVID-19 pandemic, and 6.8 million globally for vital information dissemination (Viamo, 2020). In Nigeria, IVR was employed by USAID and Airtel Networks Limited for COVID-19 containment efforts, while Union Bank utilised it for customer service (USAID, 2020; Union Bank, 2020). Moreover, IVR is increasingly utilised in public health programmes and agriculture, exemplified by Airtel Networks Limited and HNI's "3-2-1" Service, which provides agricultural information in multiple languages (Viamo, 2020).

The agricultural extension system in Nigeria, primarily facilitated by Agricultural Development Programmes (ADP) alongside various public, private, and civil society entities, plays a pivotal role in rural development (Adedotun, 2022). However, the traditional top-down approach lacks context-specific solutions, resulting in a weak linkage between extension, research, and farmers (Davis *et al*., 2018). This deficiency hinders farmers' access to critical information, impeding agricultural productivity and rural development efforts in Nigeria (Yusuf *et al*., 2021). Communicating vital agricultural information to farmers is crucial for innovation uptake and rural development (Sennuga, 2019). Integrating IVR with digital tools offers a solution to enhance extension services and boost agricultural productivity (Feed the Future, 2017). Interactive Voice Response is increasingly being used in agricultural extension services across countries like India, Ethiopia, Malawi, and Madagascar and has demonstrated effectiveness in overcoming language and literacy barriers (Feed the Future, 2017). Despite its potential, evidence of IVR's use in Nigeria remains limited, highlighting a gap in research and implementation. Investigating extension agents' inclination towards IVR adoption in Lagos State is therefore crucial to understanding its potential impact on extension service delivery.

The main objective was to ascertain extension agents' proclivity to use interactive voice response as an ICT tool for extension service delivery, while the specific objectives were to:

1. describe the socio-economic characteristics of extension agents in the study area.
2. identify the available IVR service providers in the study area.
3. determine the respondents' perception of IVR in extension service delivery in the study area.
4. Identify the perceived benefits of IVR among respondents in the study area.
5. Identify the perceived constraints to the use of IVR in extension service delivery in the study area.

METHODOLOGY

The study was carried out in Lagos state, Nigeria which covers 3,577 km^2 with a population of approximately 12.5 million (National Bureau of Statistics, 2017). The state features tropical swamp forests and mangrove swamps, influenced by its double rainfall pattern, making it a wetland region. The economy relies on industries like fishery, farming, and livestock, with three main agricultural zones: Badagry, Imota, and Epe.

Primary data were collected through structured questionnaire administered to extension workers. A two-stage sampling method was employed in picking sample for the study. In the first stage, a list of 120 extension workers was generated across three agricultural zones in Lagos state: Imota (43), Epe (38), and Badagry (39). Subsequently, 80% proportionate sampling was conducted in each zone, resulting in a total sample size of 97 extension agents for the study.

The independent variables in this study included respondents' socioeconomic and professional characteristics, service providers of IVR, extension agent's perceptions towards IVR, perceived benefits and constraints to the use of IVR. The dependents variable was extension agent's proclivity to use IVR for extension service delivery.

The perception of Interactive Voice Response (IVR) was assessed by presenting respondents with a list of 20 statements regarding IVR. They were asked to indicate their level of agreement with each statement using a five-point Likert-type scale of Strongly Agree, Agree, Undecided, Disagree, And Strongly Disagree, with corresponding scores of 5, 4, 3, 2, and 1 for positively worded statements, while and negatively worded statements were scored in the reverse order. Scores ranged from 20 to 100, with a mean score of 73.2±11.5. This mean score was used to categorise perceptions into favorable and unfavorable dispositions towards the use of IVR in the study area for extension service delivery.

Proclivity to use IVR was measured at the interval level. Respondents rated their willingness to use IVR for extension service delivery on a two-point scale: "willing" (scored as 1) and "not willing" (scored as 0). Scores ranged from 0 to 13, with a mean score of 12±2.4. Respondents were then categorised based on their proclivity scores. All respondents with scores below the mean score were classified as having low proclivity, while those equal to or above the mean were classified as having high proclivity to use IVR for extension service delivery.

RESULTS AND DISCUSSION

Table 1 reveals that most extension workers in Lagos State were middle-aged, with 57.8% being above 40 years old, indicating their potential receptiveness to innovations like IVR (Olaoye *et al.,* 2023). Gender distribution shows a marginal mix, with 51.5% female and 48.5% male extension agents, facilitating broader outreach to farmers (Washington, 2008; Manir, 2013; Idiake-Ochei *et al*., 2016). Most respondents held Bachelor's degrees (53.6%), indicating their literacy and capacity for effective knowledge transfer (Onwubuya *et al*., 2015). This educated demographic suggests a higher potential for IVR adoption, consistent with previous findings linking education levels to innovation adoption intentions (Diaz *et al*., 2021 and Kabbiri *et al*., 2018).

The majority (80.4%) of respondents were married, suggesting a responsible and committed workforce in the extension service system (Ferrari *et al*., 2022). Additionally, 46.4% of respondents were in the senior cadre, indicating a wealth of experience among extension personnel (Ferrari *et al*., 2022). This demographic composition implies that extension agents in the study area possess the qualities of reliability, trustworthiness, and expertise crucial for effective extension service provision.

The study further reveals that 60.8% of extension agents in Lagos State had over ten years of work experience, with a mean of 13.7±8.2 years, indicating a highly experienced workforce (Vasa and Trendov 2020). This extensive experience may impact extension workers' inclination to utilise IVR technology.

Table 1: Socio-economic characteristics of respondents

Variable	Freq.	%	Mean /SD
Age			
21-30	13	13.4	46±0.91 years
31-40	28	28.9	
41-50	41	42.3	
51-60	15	15.5	
Sex			
Male	47	48.5	
Female	50	51.5	
Educational qualification			
OND	5	5.2	
HND	21	21.6	
BSC	52	53.6	
MSC	19	19.6	
Marital status			
Single	14	14.4	
Married	78	80.4	
Separated	1	1.0	
Widowed	4	4.1	
Grade of level			
Entry-level	15	15.5	
Mid- level	37	38.1	
Senior level	45	46.4	
Number of years worked as an extension officer			
1-10 years	39	39.2	13.7±8.2
11-20 years	34	35.1	
21-30 years	23	23.7	
Above 30 years	1	1.0	

Source: Field survey, 2021

Perception towards the use of IVR for agricultural extension delivery

The analysis from Table 2 shows that extension agents had a favorable perception of IVR in extension service delivery, with a grand mean of 3.70. Among the 20 items, respondents expressed positive attitudes toward 11 aspects of IVR. They believed that IVR could efficiently forward farmers' calls to specialists ($\bar{x}$ = 4.41), overcome language barriers ($\bar{x}$ = 4.34), and target diverse farmer groups based on location and crops grown ($\bar{x}$ = 4.33). This indicates that IVR has the potential to facilitate prompt responses to farmer challenges, enhance communication between agents and farmers, and overcome distance barriers ((Ayim *et al*., 2022).

In addition, extension agents perceived IVR as user-friendly ($\bar{x}$ = 4.32) and conducive for feedback ($\bar{x}$ = 4.30), indicating its potential to disseminate technology to farmers effectively (Abishek 2014, Okoroma *et al*. 2015). However, they expressed concerns about IVR's challenges, such as its novelty in sharing agricultural information ($\bar{x}$ = 2.43), potential time-consuming nature due to waiting queues ($\bar{x}$ = 2.47), and the perceived high cost of implementation ($\bar{x}$ = 3.06), suggesting these factors could hinder its adoption (Amoussohoui *et al*., 2024). This indicates unfavourable perception among extension agents regarding the practicality and limitations of IVR in agricultural extension services.

Table 2: Extension agents' perception of IVR in extension service delivery

Statements	SA	A	U	D	SD	Mean
IVR being voice-based means, only relies on the most basic phone feature to function.	23.0	28.9	15.5	7.2	15.5	2.43
Integrating IVR into other ICT channels for disseminating agricultural information might likely create unhealthy competition.	6.2	16.5	16.5	29.9	3.9	3.63
IVR essentially allows for extension to move from its top-down approach to a more interactive or targeted knowledge exchange system.	27.1	35.1	8.2	3.1	16.5	3.73
IVR requires more advanced technical input when creating it since it is a more dynamic type of calling system.	16.5	22.7	14.4	18.6	27.8	3.19
The process involved in creating an IVR system for disseminating agricultural information can be quite costly.	15.5	24.7	20.6	16.5	22.7	3.06
IVR makes it possible to broadcast messages to a large population of farmers simultaneously.	51.5	25.8	13.4	7.2	2.1	4.18
Different types of farmers can be targeted with messages based on their location and crops grown.	51.5	35.1	9.3	3.1	1.0	4.33
IVR is a pretty new idea in terms of sharing agricultural information; hence it is bound to have several challenges	14.4	41.2	33.0	9.3	2.1	2.43
IVR allows those that you send out messages to be able to give back feedback.	48.5	39.2	6.2	6.2	0	4.30
IVR helps to overcome language barriers as messages can be broadcast in different languages.	55.7	29.9	9.3	3.1	2.1	4.34
Even illiterate farmers can benefit from IVR through listening to voice prompts and messages and then choosing a key message then to listen to	53.6	3.9	7.2	5.2	3.1	4.27
Farmers cannot choose their own time, place, and subject to get information on their phone when under IVR.	11.3	23.7	14.4	30.9	19.6	3.23
IVR would enable farmers to access timely services such as labor and transportation	40.2	36.1	14.4	7.2	2.1	4.05
Mobile network providers/operators may not be willing to sign up to IVR, given that the system allows individual farmers a handful of free calls	6.2	18.6	23.7	21.6	29.9	3.51
IVR would give room for sufficient opportunity for interaction necessary to internalized information disseminated	40.2	44.3	8.2	6.2	1.0	4.16
IVR is not appropriate and adequate as other communication platforms for facilitating behavioural changes	12.4	26.8	14.4	17.5	28.9	3.24
IVR can be described as user friendly	50.5	37.1	8.2	2.1	2.1	4.32
IVR as a means of disseminating information is not genuine	5.2	15.5	5.2	32.0	42.3	3.91
IVR system could be time-consuming as farmers have to wait in the queue when all extension agents are busy online	33.0	21.6	18.6	18.6	5.2	2.47
Farmers calls can easily be forwarded to a subject matter specialist to meet his or her needs via the IVR system	51.5	43.3	1.0	3.1	1.0	4.41

Grand mean: 3.70. Source: Field Survey, 2021

IVR service providers

Table 3 highlights that Airtel Networks Limited (1.60) and MTN (1.54) emerged as the leading internet service providers for IVR services, likely due to their

extensive coverage compared to other providers. In contrast, Orange Telecom and Vodacom ranked among the least utilised internet service providers for IVR services in Lagos State.

Table 3: Service providers of IVR

Service providers	Always	Sometime	Never	Mean
Airtel	61(62.9%)	31 (32.0%)	5 (5.2%)	1.60
Vodacom	9 (9.3%)	9 (9.3%)	79 (82.4%)	0.28
MTN	62 (63.9%)	22 (22.7%)	23 (13.4%)	1.54
9 Mobile	23 (23.7%)	25 (25.8%)	49 (80.05%)	0.73
Orange Telecom	1 (10%)	4 (4:1%)	92 (94.8%)	0.06

Source: Field survey, 2021

Perceived benefits of IVR among extension personnel

Table 4 illustrates the perceived benefits of IVR among respondents, with timely access to extension services ($\bar{x}$ = 1.79) ranking highest, followed closely by quick feedback on advisory services ($\bar{x}$ = 1.74). This suggests that IVR facilitates informed decision-making for farmers and enables efficient communication between extension agents and farmers (Anteneha and Melak, 2024). Additionally, perceived benefits included improved extension worker/farmer relationships ($\bar{x}$ = 1.73), effective time management ($\bar{x}$ = 1.72), and enhanced marketability of farmers' produce ($\bar{x}$ = 1.71), highlighting the multifaceted advantages of IVR in agricultural extension services. Generally, the totality of the results of perceived benefits suggests a substantial willingness among extension agents to utilise IVR for improved service delivery, given its potential benefits in overcoming resource limitations and enhancing communication with farmers (Dione *et al*., 2021).

Table 4: Distribution by perceived benefits of IVR among extension personnel

Benefits	Large extent	Little extent	Not a benefit	Mean	
IVR can facilitate access to timely extension services	81.4	16.5	2.1	1.79	1st
Quick feedback from farmers on advisory services rendered	73.2	19.6	3.1	1.74	2nd
Improves extension worker/farmer relationship	77.2	18.6	4.2	1.73	3rd
Effective in time management	72.2	27.8	0	1.72	4th
IVR can enhance the marketability of farmers' produce	74.2	22.7	3.1	1.71	5th
IVR help buyers access available farm product	73.2	20.6	6.2	1.67	6th
Increases efficiency among extension personnel	73.2	18.6	8.2	1.65	7th
Reduces operational cost of extension service delivery	68.0	27.8	4.2	1.64	8th
Increases customer satisfaction	68.0	37.8	4.2	1.64	8th
Increases professionalism	68.0	22.7	9.3	1.59	10th

Source: Field survey, 2021

Perceived constraints to use of IVR for extension service delivery

Table 5 highlights the likely constraints to IVR use in extension service delivery by extension agents. High abandonment rates ($\bar{x}$ = 1.15) and cumbersome IVR menu navigation ($\bar{x}$ = 1.03) ranked highest. Other prominent constraints included the absence of IVR provision at the office ($\bar{x}$ = 0.98) and technical difficulties in setup ($\bar{x}$ = 0.91). Conversely, factors like lack of trust ($\bar{x}$ = 0.62), scheduling adaptability ($\bar{x}$ = 0.62), external distractions ($\bar{x}$ = 0.80), and inconsistency ($\bar{x}$ = 0.82) were ranked least impactful. Addressing issues related to IVR navigation and technical complexities is crucial for enhancing IVR's effectiveness in extension service delivery, considering the recognized gap between ICT challenges and effective extension services (FAO and ITU, 2022).

Table 5: Distribution of respondents by perceived constraints to use of IVR among extension agent

Constraints	Severe	Mild	Not a constraint	Mean	Rank
High abandonment rates (farmers dropping out of customer service rather than self-servicing or waiting to be put through to a human agent)	41.2	33.0	25.8	1.15	1st
Navigating an IVR menu is sometimes cumbersome when you have many data	35.1	33.0	32.0	1.03	2nd
No provision is made for IVR at the office	29.9	38.1	32.0	0.98	3rd
Technical difficulty/complexity in setting up IVR	25.8	39.2	35.1	0.91	4th
No facial expressions	24.7	40.2	35.1	0.90	5th
Illiterate or semiliterate characteristic of most farmers	25.8	37.1	37.1	0.89	6th
Telephony nature of IVR can be costly	27.8	26.8	45.4	0.82	7th
Lack of consistency	21.6	37.1	41.2	0.80	8th
External distractions	22.7	35.1	42.3	0.80	8th
Schedules of work are not adaptable to IVR use	15.5	30.9	53.6	0.62	10th
Lack of trust in message	15.5	30.9	53.6	0.62	10th

Source: Field survey, 2021

Proclivity to Use of IVR for Extension service delivery among extension personnel

The findings presented in Table 6 indicate a strong inclination among respondents towards utilising IVR for various agricultural extension purposes. The majority (91.8%) expressed readiness to employ IVR for disseminating information on best agricultural practices, including fertilizer application and pest management, to a large audience simultaneously. Similarly, 91.8% expressed willingness to utilise IVR for delivering information on credit sources and agricultural inputs. Moreover, a notable proportion (86.6%) expressed their intent to use IVR for offering farm and business advisory services to farmers and rural communities, while 81.4% indicated their readiness to utilise IVR for human resource development through training services for farmers. These results underscore the potential of IVR technology in enhancing agricultural extension services and empowering rural communities with valuable information and resources (Dione *et al*., 2021).

The survey findings revealed that majority of respondents expressed their willingness to utilise IVR for various agricultural extension services. Specifically, 79.4% were inclined to use IVR for disseminating information on seed varieties and treatments, while 76.3% showed readiness to employ IVR for providing production and market support services to farmers. Additionally, 75.3% expressed their willingness to utilise IVR for offering information and communication support services on weather and climate change, as well as enhancing linkages between farmers and researchers. These results underscore the potential of IVR technology to address key challenges in agricultural extension and advisory services, as noted by Dione *et al*. (2021) in their study on extension agents in Uganda.

Table 6: Distribution of respondents by proclivity to use IVR for extension service delivery among extension personnel

Extension Services	Willing	Not willing	Rank
Information on best agricultural practices such as fertilizer application, weed, pest and disease management, can be passed across many farmers at the same time using IVR; Are you willing to use IVR for this?	89 (91.8)	8 (8.2)	1st
How willing are you to deliver information on sources of credits and inputs via IVR?	89 (91.8)	8 (8.2)	1st
Farmer to farmer link can be established by extension agent using IVR. Are you willing to create this using IVR?	61 (62.9)	36 (37.1)	2nd
Farm and business advisory services can be provided to farmers and the rural populace using IVR; how willing are you to use the IVR for this?	84 (86.6)	13 (13.4)	3rd
Are you willing to use IVR for human resource development by providing training services to farmers using it?	79 (81.4)	18 (18.6)	4th

Extension Services	Willing	Not willing	Rank
Are you willing to provide information on seed varieties and seed treatments to farmers using IVR?	77 (79.4)	20 (20.6)	5th
Production and market support services can be provided to farmers using IVR; how willing are you to use IVR for this?	74 (76.3)	23(23.7)	6th
Will you be willing to provide information and communication support services on weather and climate change to farmers using IVR?	73 (75.3)	24(24.7)	7th
With IVR, farmers can be linked with research or subject matter specialist; Are you willing to use IVR for this?	73 (75.3)	24(24.7)	7th
Are you willing to deliver information on government-related announcements via IVR?	73 (75.3)	24 (24.7)	7th
IVR can be used to disseminate information to farmers on better livestock control; will you be willing to do this using it?	69 (71.1)	28(28.9)	11th
Information about farmers' health can be provided using IVR; how willing are you to deliver this information using IVR?	67 (69.1)	30 (30.9)	12th
IVR can be integrated with other digital tools for optimum performance of extension service; will you be willing to integrate this tool for extension service delivery?	61 (62.9)	36 (37.1)	13th

Source: Field Survey, 2021

Relationship between respondents' perception of IVR and proclivity to use IVR for extension delivery

Table 7 reveals that there was a significant correlation ($r = 0.424$, $p \leq 0.05$) between respondents' perception of IVR and their proclivity to use it for extension service delivery. This implies that as extension personnel hold a more positive view of IVR, their likelihood of utilising it for extension services increases. This is in tandem with Ajayi, Alabi, and Akinsola (2013), who found a similar relationship between perception of ICT tools and their utilisation for extension services among agents in Ondo state. However, there was a significant negative correlation ($r = -0.278$, $p \leq 0.05$) between respondents' perceived constraints to IVR usage and their proclivity to utilise it for extension service delivery. This indicates that as extension agents encounter more constraints, their proclivity to use IVR diminishes. This aligns with Ojo *et al.*, (2024) in the study that investigated the constraints limiting the effectiveness of extension agents in disseminating climate-smart agricultural practices among rice farmers in north-Central Nigeria.

Table 7: Relationship between respondents' perception of IVR, perceived constraints and proclivity to use IVR for extension service delivery

	r	p	Decision
Perception vs. proclivity to use IVR delivery	0.424	0.000	Significant
Constraints and Proclivity to use IVR	0.006-	0.278	Significant

Source: Field survey, 2021

CONCLUSIONS AND RECOMMENDATIONS

The research revealed a positive and high proclivity among extension personnel in Lagos state to utilise IVR for delivering extension services. However, challenges such as high abandonment rates, data processing complexity, lack of office provisions for IVR, and technical difficulties were identified as impediments to its effective implementation. The study recommends training and retraining exercise for extension agents in Lagos state on the use of IVR to address technical complexity and ensure practical implementation. Additionally, the government should facilitate internet access for extension workers and supply necessary IVR tools like phones.

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The determinants of employability among final-year students at the federal university of agriculture, Abeokuta

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ABSTRACT

The study examined the determinants of employability among final year students of Federal University of Agriculture, Abeokuta (FUNAAB). The study population comprised of the all the final year students of FUNAAB. A multistage sampling procedure was used to collect information from 150 respondents in agricultural colleges of the University. Study data were analysed using percentages, mean, Chi square and regression analyses . The study reveals that the mean age of the respondents was 24.51(±2.26) years. Female students were more (59.4%) in the sample of respondents drawn for this study. Respondents perceived communication skills as the most important ($\bar{x}$=4.5) for a good job placement after graduation. Majority (90.40%) of the respondents perceived that the employability indices of the job market were favourable to them. Self-motivation and commitment ($\bar{x}$=4.57), self-confidence ($\bar{x}$=4.45) and mature attitude ($\bar{x}$=4.36) were some of the indices of employability possessed by the respondents. There was a significant relationship between employability and career path (χ2 =70.089, df=36, p<0.01) as well as students' CGPA (r = 0.196, p<0.05). Also, technical skills (β=0.249, p< 0.01), communication skills (β=0.285, p< 0.01), and other skills (β=0.244, p< 0.05) were factors associated with the employability indices possessed by the respondents. The study concluded that employability of final year students in the university is largely dependent on their possession of employability skills. This study recommended among others that; institutions should endeavour to integrate employability skills training into their curriculum.

Keywords: Employability, Determinants, Final year students, Agriculture.

INTRODUCTION

Unemployment has grown to be a national issue in Nigeria. According to the National Bureau of Statistics (NBS), the unemployment rate in urban areas was 5.9% in Q2 2023, which was an increase from 5.4% in Q1 2023. Time-related underemployment in Q2 2023 was 11.8%. Out of this, 8% (constituting 67.80%) of the working-age population were in subsistence agriculture, while the percentage of youth unemployment was 13.8% of the population (NBS, 2024). This implies 31.65 youth who are currently unemployed going by the current population of Nigeria which 229,332,533 million people (Worldometer, 2024). Ongbali *et al*. (2019) stressed that one of the reasons for youth unemployment in Nigeria is non-possession of employable skills. Employability, therefore, has to do with dedication of potential candidates to excellence in professional and technical skills especially in incipient technologies. In addition to this, such potential workers must be self-motivated, confident, and competent to accomplish future employment tasks in an efficient and effective way. Employability is, therefore, a personal quality that makes it easier for people to find work and supports an individual's professional life more easily (Tushar and Sooraksa, 2023). These skills are needed to perform higher-order thinking, personal and social skills needed to excel in the current civilisation (Lim, 2023). Lack of adequate employability skills can lead to unemployment and hinder people's career development. Since skills are becoming more important in a globalised world, even though professional and technical skills are essential, employers are looking for candidates who can continue to learn and adapt, competent in reading, writing and arithmetic and who can listen and communicate effectively with team members. According to Mariano and Tantoco (2023), the world of work today is rapidly transforming from the industrial age to the knowledge-based economy which requires various skills that were not used in the past, for which students who have foresight must personally develop themselves in. It has become so important for candidates to develop employability skills so that they can be equipped to secure and retain a job and move with the ever-changing world of employment (Ismail & Hilal, 2023). According to the World Bank (2017; 2020) "only about 2 - 4% of secondary and tertiary level graduates are employable (i.e. have the knowledge, skill and ability to get a job and succeed on the job), while 18 - 20% of tertiary graduates will require training interventions for about 1 - 4 years to be employable". This indicates that students do not possess the necessary skills or do not know the appropriate skills required to compete in the labour market as employers look out for candidates who have skills and not certificates alone. Aluko (2014)

researched on employability skills from the perception of employers, while Agboola (2022) examined employability issues from the perspective of how these skills improves organisational growth and sustainable development. Furthermore, of all unemployability categories in Nigeria, agricultural graduates are worst hit by unemployment and employability issues (Olubusoye *et al*., (2022). This is why this study focussed on potential agricultural graduates of agricultural science at the Federal University of Agriculture.

The broad objective of the study was to examine the determinants of the employability of final-year students at the Federal University of Agriculture, Abeokuta (FUNAAB). The specific objectives are to:

1. describe employability indices used in the labour market,
2. determine the indices of employability possessed by the respondents,
3. examine the perception of respondents on constraints to employability.

Arising from the above, the hypotheses examined by this study are:

$H_0$1: There is no significant relationship between the socio-economic characteristics and employability of the respondents.

$H_0$2: There is no relationship between the employability indices and the employability of final year students of FUNAAB.

METHODOLOGY

The study area is the Federal University of Agriculture, Abeokuta (FUNAAB), and it is in Ogun State, Nigeria. The Federal University of Agriculture, Abeokuta was established on 1 January 1988 by the Federal Government of Nigeria. The University has 179 academic programmes made up of 44 undergraduate programmes, 135 graduate programmes which include 22 postgraduate diploma programmes, 57 master's degree programmes and 56 doctorate degree programmes. The population of the study were the final year students of the three agricultural colleges of the university.

Primary data were used for this study. They were sourced from structured questionnaire administered to the sampled respondents. The questionnaire was in five sections which included the socio-economic characteristics of the respondents, employability indices used in the labour market, indices of employability possessed by the respondents, and factors mitigating against employability of respondents. The questionnaire measured perceived employability indices used in the labour market by adapting Nikunen (2021) and Tran *et al*., (2022) containing 7 predictors of perceived employability which are academic performance, technical skills, communication skills, personality, leadership and motivation skills, teamwork and problem-solving skills and other factors which were rated on a five-point Likert scale (Strongly Agree to Strongly Disagree). The indices of employability possessed by the respondents were adapted from Desai and Ramisetty-Mikler, 2017, with five domains (Communication, Personal and professional advancement, Personal qualities, Personal qualities, Understanding organization vision and objectives), which were rated on a five-point Likert scale (To a Very Great Extent to Not at All). Finally, factors militating against employability of respondents was measured using a scale developed by the author, with six factors considered (Lack of Motivation, Disorganisation, Communication Error, Individualism, Inflexibility, others) and and these were rated on a five-point Likert scale (Strongly Agree to Strongly Disagree).

Sampling procedure and sample size: Multistage sampling technique was used to collect information from 150 respondents. The first stage featured purposive selection of three agricultural colleges in the university, because agricultural graduates are worst hit by unemployment and employability issues (Olubusoye *et al*., (2022). At the second stage, stratified sampling technique was used to select two departments from each college making 6 departments The third stage adopted a simple random sampling technique to select 25 final year students each from the six departments giving a sample size of 150 respondents.

Data obtained from 106 respondents (representing a return rate of 70.67%) was used for meaningful analysis and to achieve objectives of the study. Descriptive statistics (means, standard deviation, frequency counts, and percentages and inferential statistics (Chi square, Pearson Product Moment Correlations, and Regression) were used in the analysis of the data obtained from the study.

RESULT AND DISCUSSION

Socioeconomic characteristics

Majority (53.8%) of FUNAAB final year students are within the ages of 23 and 25 years with the mean age of 24.51±SD years (Table 1). This which implies that they are youths who were employable, if they can develop their employability skills needed for a successful career. There were more (59.4%) females interviewed among the respondents. Also, (37.7% of the respondents were from COLAMRUD (College of Agricultural Management and Rural Development),

while 33.0% were from COLANIM (College of Animal Science and Livestock Production), and 29.2% from COLPLANT (College of Plant Science and Crop Production). The mean CGPA of the respondents were approximately 3.67. This shows that the respondents were in the second-class upper division which indicates that they are academically sound, and have the capability to compete favourably for employment in the country. Majority (62.3%) of the respondents' parents had tertiary education with 37.7% having BSc qualification, while 3.8% of the respondents' parents had Ph.D. qualification. This denotes that majority of the respondents' parent were educated and are therefore expected to be abreast of emerging employability skills that their children can learn to enhance their quick job placement post-university education (Kaul, 2020).

Table 1: Socioeconomic characteristics of respondents

Variables	Frequency	Percentage	Mean (S.D)
Age			
<=22	19	17.9	24.51± 2.260
23-25	57	53.8	
26-28	25	23.6	
>= 29	5	4.7	
Sex			
Male	43	40.6	
Female	63	59.4	
College			
COLPLANT	31	29.2	
COLANIM	35	33.0	
COLAMRUD	40	37.7	
Marital status			
Single	100	94.3	
Married	5	4.7	
Separated	1	0.9	
Religion			
Christianity	84	79.2	
Islam	22	20.8	
CGPA			
2.50-3.49	39	36.8	3.669 (0.545)
3.50-4.49	58	54.7	
>= 4.50	9	8.5	
Level of education of students' parents			
O level	40	37.7	
HND	15	14.2	
BSc	40	37.7	
MSc	7	6.6	
PhD	4	3.8	

Source: Field survey, 2023

Perception of respondents on employability indices used in the labour market

Employability indices obtained from Nikunen (2021) and Tran *et al.*, (2022) were adapted for this study. The findings shown in Table 2 describe how the respondents perceived the indices of employability in the labour market. The grand means (average scores) for seven perceived indices of employability in the labour market are displayed in the table. According to the table, of all (Communication Skills, Teamwork and Problem-Solving Skills, Leadership and Motivation Skills, Personality, Technical Skills and others) the indices, communication skills ($\bar{x}$=4.51) was perceived most while academic performance ($\bar{x}$=4.09) was the least perceived indices that can determine the employability of candidates in the labour market. In relation to the communication skills, respondents thought that better communication skills make the candidate confident ($\bar{x}$=4.53), as they must have sound communication skills along with other requirements ($\bar{x}$=4.52), because candidates with better networking capabilities are highly valued ($\bar{x}$=4.48). In terms of teamwork and problem-solving skills, respondents feel that organisations strongly seek candidates with better teamwork and problem-solving capabilities ($\bar{x}$=4.42). Also, both teamwork and problem-solving skills are two very essential skills when hiring ($\bar{x}$=4.39), and they are tested through brainstorming and real problem-solving tests

($\bar{x}$=4.36). Furthermore, regarding leadership and motivation skills, respondents believe that organisations firmly seek the candidate with leadership and motivational skills ($\bar{x}$=4.37), because only a good leader can motivate his/her followers ($\bar{x}$=4.35), and organisations prefer employees who have developed their leadership and motivational skills ($\bar{x}$=4.30). Additionally, respondents perceived other ($\bar{x}$=4.11) indices that could predict the employability of candidates in the labour market. Respondents pointed out that having a professional certificate increases employability ($\bar{x}$=4.41), while critical thinking is an important skill employers hunt for ($\bar{x}$=4.41), with the resilience of the candidate ($\bar{x}$=4.39), having 21st century skills as a prospective employee ($\bar{x}$=4.38) and acquiring a growth mind set which is needed to succeed in the workplace ($\bar{x}$=4.37). Moreso, concerning personality, respondents thought personality can be developed ($\bar{x}$=4.45), but a candidate with strong personality usually has leadership capability ($\bar{x}$=4.25), and has better commitment to his/her job ($\bar{x}$=4.23). About technical skills, respondents indicated that candidates with sound technical skills are better sought after ($\bar{x}$=4.35), as it is one of the mandatory competencies for employability ($\bar{x}$=4.25), because they are well sought after ($\bar{x}$=3.97). Finally, on academic performance, respondents perceived that organisations consider academic performance as an important indicator of employability although it is not the only thing ($\bar{x}$=4.35), because good academic performance can be jettisoned for exceptionally skillful candidates ($\bar{x}$=4.35) even though academic performance is an indicator of candidate's employability ($\bar{x}$=4.35). These results suggest that communication proficiency is directly linked to self-assurance in professional settings because employers may prioritize communication abilities as a fundamental criterion, potentially influencing hiring decisions and professional development programs within organizations. This confidence can enhance candidates' ability to perform effectively during interviews and in their roles, contributing to overall job performance and satisfaction. This result also reflects the growing recognition of the importance of networking in career advancement, collaboration, and organizational success. Employers may therefore invest in training programs that enhance networking skills to cultivate a more interconnected and resourceful workforce. These findings are corroborated by Mariano and Tantoco (2023) that possession of additional employability skills outside normal academic performance, helps young graduates to secure jobs quite easily. Furthermore, result presented in Fig. 1 revealed the further categorisation of the perceived employability indices used in the labour market. The result showed that 90.4% of the respondents perceived that employability indices in the job market were favourable to them, while 9.6% perceived an unfavourable employability indices in the labour market.

1. **Table 2: Perception of respondents on employability indices used in the labour market)**

Statements	SA	A	U	D	SD	Mean	SD
Communication skills						**4.51**	
Better communication skills make the candidate confident	64(60.4)	35(33.0)	6(5.7)	1(0.9)	0(0)	4.53	0.65
Candidates must have sound communication skills along with other requirements	60(56.6)	42(39.6)	3(2.8)	1(0.9)	0(0)	4.52	0.61
Candidates with better networking capabilities are highly valued	60(56.6)	38(35.8)	7(6.6)	1(0.9)	0(0)	4.48	0.67
Teamwork and problem -solving skills						**4.39**	
Organisations strongly seek the candidate with better teamwork and problem-solving capabilities	54(50.9)	45(42.5)	5(4.7)	1(0.9)	1(0.9)	4.42	0.72
Teamwork and problem-solving are two very essential skills when hiring	62(58.5)	33(31.1)	5(4.7)	2(1.9)	4(3.8)	4.39	0.95
Candidates' problem-solving skills are tested through brainstorming and real problem-solving tests	52(49.1)	44(41.5)	7(6.6)	2(1.9)	1(0.9)	4.36	0.77
Leadership and motivation skills						**4.34**	
Organisations strongly seek the candidate with leadership and motivational skills	51(48.1)	47(44.3)	5(4.7)	1(1.9)	1(0.9)	4.37	0.75
Only a good leader can motivate his followers	58(54.7)	35(33.0)	7(6.6)	4(3.8)	2(1.9)	4.35	0.91
Organisations prefer employees who have developed their leadership and motivational skills	56(52.8)	33(31.1)	12(11.3)	3(2.8)	2(1.9)	4.30	0.92

Statements	SA	A	U	D	SD	Mean	SD
Others						**4.33**	
Having a professional certificate increases employability	49(46.2)	45(42.5)	8(7.5)	4(3.8)	0(0)	4.41	0.69
Critical thinking is an important skilled employer hunt for	54(50.9)	42(39.6)	5(4.7)	5(4.7)	0(0)	4.41	0.71
Resilience is a vital trait that employers look out for among candidates	48(45.3)	45(42.5)	4(3.8)	3(2.8)	6(5.7)	4.39	0.95
Having 21st century skills is highly essential for prospective employee	47(44.3)	49(46.2)	7(6.6)	2(1.9)	1(0.9)	4.38	0.76
Growth mindset is needed to succeed in the workplace	51(48.1)	50(47.2)	3(2.8)	1(0.9)	1(0.9)	4.37	0.79
A robust curriculum vitae can increase chances of getting a job	47(44.3)	41(38.7)	13(12.3)	4(3.8)	1(0.9)	4.31	0.77
Having work experience is an important requirement	54(50.9)	44(41.5)	5(4.7)	3(2.8)	0(0)	4.31	0.76
Volunteer roles are a prerequisite for getting jobs	38(35.8)	44(41.5)	17(16.0)	7(6.6)	0(0)	4.22	0.87
The ability to adapt to changing technologies is very important for job seekers	52(49.1)	47(44.3)	3(2.8)	3(2.8)	1(0.9)	4.19	1.04
Personality						**4.31**	
Personality can be developed	57(53.8)	41(38.7)	7(6.6)	1(0.9)	0(0)	4.45	0.66
A candidate with a strong personality usually has leadership capability	51(48.1)	39(36.8)	9(8.5)	6(5.7)	1(0.9)	4.25	0.91
A candidate with strong personality has better commitment to his/her job	48(45.3)	44(41.5)	5(4.7)	8(7.5)	1(0.9)	4.23	0.92
Technical skills						**4.19**	
Candidates with sound technical skills are better sought after	46(43.4)	48(45.3)	6(5.7)	5(4.7)	1(0.9)	4.35	0.78
Technical skills are one of the mandatory competencies for employability	43(40.6)	49(46.2)	5(4.7)	7(6.6)	2(1.9)	4.25	0.84
Candidates with technical skills are well sought after	53(50.0)	41(38.7)	8(7.5)	4(3.8)	0(0)	3.97	1.01
Academic performance						**4.09**	
Organisations consider academic performance as an important indicator of employability although it is not the only thing	43(40.6)	52(49.1)	8(7.5)	2(1.9)	1(0.9)	4.26	0.76
Good academic performance can be jettisoned for exceptionally skilful candidates	34(32.1)	52(49.1)	10(9.4)	10(9.4)	0(0)	4.04	0.89
Academic performance is an indicator of candidate's employability	35(33.0)	47(44.3)	13(12.3)	8(7.5)	3(2.8)	3.97	1.01

Source: Source: Computer from data collected from field survey, 2023

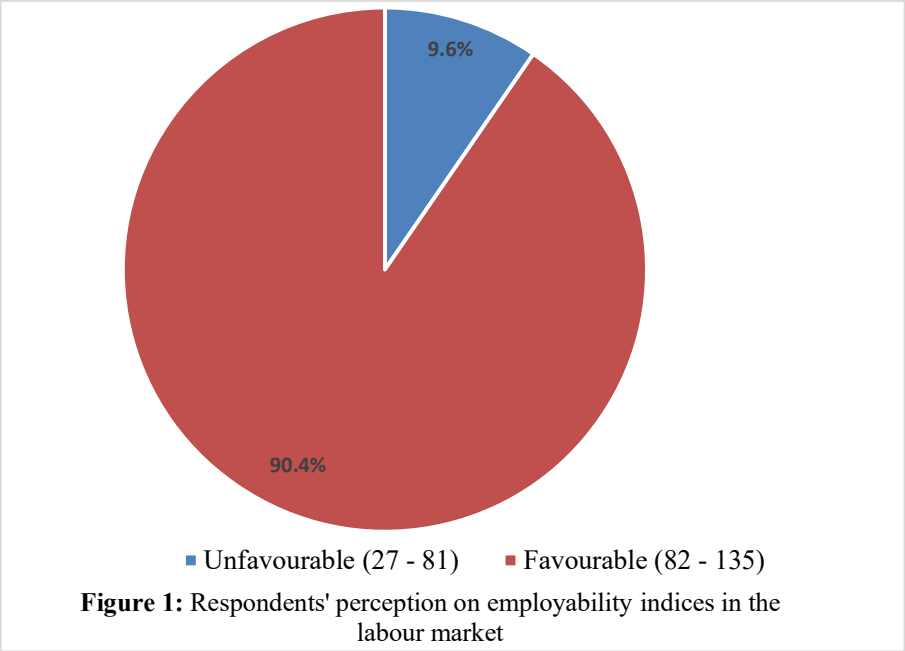

Figure 1: Respondents' perception on employability indices in the labour market

Indices of employability possessed by the respondents

Table 3 represents the results and discussion on the indices of employability possessed by the respondents. Respondents identified with the personal and professional advancement skill by agreeing that they are self-motivated and committed ($\bar{x}$=4.57), have self-confidence ($\bar{x}$=4.45), have a mature attitude ($\bar{x}$=4.36), and can monitor progress of goals ($\bar{x}$=4.35). Furthermore, they possess communication skills such as, attentive listening ($\bar{x}$=4.44), have good command of written, spoken and reading in English Language ($\bar{x}$=4.30), they respond effectively to others' comments during a conversation ($\bar{x}$=4.28), can convey information orally one-on-one ($\bar{x}$=4.29) and they also have excellent written communication skills including writing external and internal reports ($\bar{x}$=4.08). Personal qualities (adaptation and flexibility) are also possessed by the respondents, a good number of the respondents maintain a positive attitude, ($\bar{x}$=4.47), can function effectively in a team ($\bar{x}$=4.43), they believe that self-motivation plays a vital role in the success of an organisation ($\bar{x}$=4.41), respond positively to constructive criticism ($\bar{x}$=4.22), and can effectively adapt to changing situations in the workplace ($\bar{x}$=4.26). The world today, including the world of employment, is in the process of changing from the industrial age to the information and communication age, often referred to as the knowledge-based economy (Pitan, 2015). An implication of this change is that it is no longer enough for new graduates to have a good degree, but it also becomes crucial for them to acquire a range of general, and employability and flexibility skills so that they can adjust to new modes of production organisation inherent to the globalisation of the economy (Fallows and Steven, 2000; Guichard, 2001).

Table 3: Indices of employability possessed by the respondents

Statements	TVGE	TGE	TSE	TME	NA	MEAN	SD
Communication skills							
I have excellent oral communication skills including making effective business presentations to a group	42(39.6)	51(48.1)	7(6.6)	5(4.7)	1(0.9)	4.21	0.836
I can convey information orally one-on-one	44(41.5)	52(49.1)	7(6.6)	3(2.8)	0(0)	4.29	0.717
I can communicate ideas verbally to groups	37(34.9)	55(51.9)	10(9.4)	4(3.8)	0(0)	4.18	0.753
I am an attentive listener	57(53.8)	41(38.7)	7(6.6)	1(0.9)	0(0)	4.44	0.705
I respond effectively to others' comments during a conversation	44(41.5)	50(47.2)	10(9.4)	2(1.9)	0(0)	4.28	0.714

Statements	TVGE	TGE	TSE	TME	NA	MEAN	SD
I have excellent written communication skills including writing external and internal reports	34(32.1)	53(50.0)	13(12.3)	6(5.7)	0(0)	4.08	0.818
I have good command of written, spoken and reading in English Language	45(42.5)	52(49.1)	5(4.7)	4(3.8)	0(0)	4.30	0.733
Personal and professional advancement skill							
I am self-motivated and committed	67(63.2)	33(31.1)	5(4.7)	1(0.9)	0(0)	4.57	0.633
I have a matured attitude	46(43.4)	54(50.9)	4(3.8)	2(1.9)	0(0)	4.36	0.650
I have self confidence	58(54.7)	41(38.7)	5(4.7)	1(0.9)	1(0.9)	4.45	0.719
I can monitor progress of goals	48(45.3)	49(46.2)	7(6.6)	2(1.9)	0(0)	4.35	0.691
I can revise plans to include new information	42(39.6)	55(51.9)	7(6.6)	2(1.9)	0(0)	4.29	0.676
I can set organisational priorities with ease	45(42.5)	43(40.6)	16(15.1)	2(1.9)	0(0)	4.24	0.775
I can work independently	48(45.3)	43(40.6)	9(8.5)	5(4.7)	1(0.9)	4.25	0.871
My presentation skill using the PowerPoint is second to none	33(31.1)	46(43.4)	19(17.9)	6(5.7)	2(1.9)	3.96	0.945
Personal qualities (adaptation and flexibility)							
I maintain a positive attitude	61(57.5)	37(34.9)	6(5.7)	1(0.9)	1(0.9)	4.47	0.733
I can effectively adapt to changing situations in the workplace	45(42.5)	50(47.2)	7(6.6)	2(1.9)	2(1.9)	4.26	0.820
I believe that self-motivation plays a vital role in the success of an organization	57(53.8)	38(35.8)	8(7.5)	3(2.8)	0(0)	4.41	0.753
I know how to develop and maintain effective relationship with colleagues and superiors	58(54.7)	40(37.7)	5(4.7)	1(0.9)	2(1.9)	4.42	0.792
I can function effectively in a team	58(54.7)	38(35.8)	8(7.5)	2(1.9)	0(0)	4.43	0.717
I have leadership skills that are expected in the workplace	52(49.1)	40(37.7)	9(8.5)	5(4.7)	0(0)	4.31	0.821
I have numeracy and computational skills	55(51.9)	39(36.8)	8(7.5)	4(3.8)	0(0)	4.37	0.785
I can recognize alternative routes in meeting objectives	49(46.2)	45(42.5)	12(11.3)	0(0)	0(0)	4.35	0.677
I meet set deadlines	47(44.3)	48(45.3)	7(6.6)	4(3.8)	0(0)	4.30	0.758
I can initiate change to enhance productivity	51(48.1)	47(44.3)	5(4.7)	2(1.9)	1(0.9)	4.37	0.747
I have empathy and understanding for the needs of others	52(49.1)	45(42.5)	8(7.5)	1(0.9)	0(0)	4.40	0.672
I respond positively to constructive criticism	39(36.8)	56(52.8)	6(5.7)	5(4.7)	0(0)	4.22	0.756
I know how to delegate work to peers	40(37.7)	55(51.9)	9(8.5)	2(1.9)	0(0)	4.25	0.691
I know how to delegate responsibilities to subordinates	39(36.8)	55(51.9)	7(6.6)	5(4.7)	0(0)	4.21	0.765
I am good in crisis management	33(31.1)	47(44.3)	21(19.8)	5(4.7)	0(0)	4.02	0.839
I understand cause-and-effect relationship	39(36.8)	51(48.1)	9(8.5)	6(5.7)	1(0.9)	4.14	0.867
Personal qualities (interpersonal and leadership skills)						4.18	0.913
I know how to identify and provide solution to problems related to my job	43(40.6)	48(45.3)	9(8.5)	3(2.8)	3(2.8)	4.19	0.770
I know how to solve problems related to job	38(35.8)	54(50.9)	11(10.4)	2(1.9)	1(0.9)	3.75	1.067
I use a computer to carry out daily tasks	31(29.2)	36(34.0)	22(20.8)	16(15.1)	1(0.9)	4.09	0.879
I make decisions based on thorough analysis of the situation	39(36.8)	45(42.5)	15(14.2)	7(6.6)	0(0)	4.18	0.913
Understanding organization vision and objectives							
I am up to date with information related to the success of the organization	34(32.1)	53(50.0)	11(10.4)	8(7.5)	0(0)	4.07	0.854
I understand international economics policies (e.g., de-monetisation, Brexit	26(24.5)	46(43.4)	22(20.8)	12(11.3)	0(0)	3.81	0.937

Statements	TVGE	TGE	TSE	TME	NA	MEAN	SD
etc.) and their effects on the organisation and its strategies							
I understand how an organisation functions in relation to its competitors	34(32.1)	48(45.3)	14(13.2)	9(8.5)	1(0.9)	3.99	0.941
I can visualise my role in response to the changing strategies	35(33.0)	46(43.4)	15(14.2)	9(8.5)	1(0.9)	3.99	0.95

Source: Field survey, 2023

Not at All (NA), To a Minor Extent (TME), To Some Extent (TSE), To a Great Extent (TGE), To a Very Great Extent (TVGE)

Respondent's perception of factors mitigating against employability of respondents

Table 4 explains the factors that mitigate against the employability of respondents. Most (42.5%) strongly disagreed (x=2.49 ±0.1.59) that they will get a job after their education. This implies that majority of the respondent were confident of getting a job after their education and that they were inspired to develop workplace skills because they already had a strong GPA will not affect their employability (SD: x=2.33 ±1.4). Also, respondents agreed that the ability to properly allocate and distribute the time required for tasks will affect their employability (SD: x=2.29 ±1.38), while they also agreed that inability to express themselves appropriately will affect employability (SD: x=2.05 ±1.25).

The respondents also disagreed that they do not know how to contribute to the task of others (x=2.23 ±1.22), they also disagreed that they do not allow others to collaborate with or them to perform a task (x=2.15 ±1.31). Respondents also disagreed that they are inflexible, that is, they do not find it hard to adapt to changing environment (x=2.18 ±1.27).

Furthermore, they agreed that ability to have the 21st century workplace skills (x=2.78 ±1.47) is a factor militating employability, and that impressive performance during past internships e.g., industrial training, National youth service corp, vacation job, temporary appointment, would boost employability (x=2.66 ±1.43). These findings agree with the views of Green, (2012) Hosain, (2021) and Kamaroellah *et al.*, (2021) who asserted that graduates are usually blamed for their inability to acquire the required skills (such as entrepreneurial, social, and soft skills) upon graduation, and these may affect their employability.

Table 4: Respondent's perception of mitigating factors of employability

Statements	SA	A	U	D	SD	MEAN	SD
Lack of motivation							
I am not sure I will get a job after my education	19(17.9)	17(16.0)	6(5.7)	19(17.9)	45(42.5)	2.49	1.59
I do not feel motivated to develop employability skills due to the economic situation of the country	12(11.3)	21(19.8)	3(2.8)	31(29.2)	39(36.8)	2.40	1.44
I am not inspired to develop workplace skills because I already have a strong grade point average (GPA)	15(14.2)	10(9.4)	6(5.7)	39(36.8)	36(34.0)	2.33	1.40
I am not motivated to learn employability skills because of my low academic performance	12(11.3)	14(13.2)	5(4.7)	36(34.0)	39(36.8)	2.28	1.38
Disorganisation							
I am unable to properly allocate and distribute the time required for my tasks	12(11.3)	18(17.0)	6(5.7)	41(38.7)	29(27.4)	2.29	1.26
I do not know how to delegate task	10(9.4)	11(10.4)	10(9.4)	44(41.5)	31(29.2)	2.35	1.32
I have difficulty prioritizing tasks	10(9.4)	16(15.1)	9(8.5)	37(34.9)	34(32.1)	2.49	1.59
Communication error							
I have difficulty in communicating with others	12(11.3)	12(11.3)	6(5.7)	39(36.8)	37(34.9)	2.27	1.35
I do not know how to express myself appropriately	8(7.5)	10(9.4)	7(6.6)	35(33.0)	46(43.4)	2.05	1.25
I lack good writing skills	13(12.3)	11(10.4)	4(3.8)	34(32.1)	44(41.5)	2.20	1.40
Individualism							

Statements	SA	A	U	D	SD	MEAN	SD
I do not know how to contribute to the task of others	7(6.6)	14(13.2)	9(8.5)	42(39.6)	34(32.1)	2.23	1.22
I do not allow others to collaborate with or help me to perform a task	12(11.3)	7(6.6)	6(5.7)	41(38.7)	40(37.7)	2.15	1.31
Only my work matters, no one else matters	13(12.3)	6(5.7)	6(5.7)	34(32.1)	47(44.3)	2.09	1.36
Inflexibility							
I find it hard to adapt to changing environment	9(8.5)	12(11.3)	6(5.7)	41(38.7)	38(35.8)	2.18	1.27
I do not respond quickly to changing situations	13(12.3)	10(9.4)	5(4.7)	40(37.7)	38(35.8)	2.25	1.36
I rarely initiate change on my own	10(9.4)	15(14.2)	12(11.3)	37(34.9)	32(30.2)	2.38	1.31
Others							
Vested interest of employers	21(19.8)	11(10.4)	18(17.0)	32(30.2)	24(22.6)	2.75	1.44
Lack of impressive performance during past internships e.g., Industrial training, National Youth Service, Vacation jobs, temporary appointment, etc.	20(18.9)	9(8.5)	18(17.0)	33(31.1)	26(24.5)	2.66	1.43
Not very robust curriculum vitae	13(12.3)	21(19.8)	15(14.2)	33(31.1)	24(22.6)	2.68	1.35
Lack of volunteer roles	10(9.4)	24(22.6)	20(18.9)	27(25.5)	25(23.6)	2.69	1.31
Family background	13(12.3)	16(15.1)	18(17.0)	26(24.5)	33(31.1)	2.53	1.39
Lack of professional certificate	16(15.1)	17(16.0)	17(16.0)	32(30.2)	24(22.6)	2.71	1.38
Lack of work experience	18(17.0)	20(18.9)	12(11.3)	30(28.3)	26(24.5)	2.75	1.45
Not having 21st century workplace skills	20(18.9)	18(17.0)	13(12.3)	29(27.4)	26(24.5)	2.78	1.47
Inability to adapt to changing technologies	13(12.3)	21(19.8)	14(13.2)	32(30.2)	26(24.5)	2.65	1.37

Source: Field survey, 2023

Scholars have surmised that poor communication skills in English (McKinsey Global Institute, 2012), wrong work attitude (Hosain *et al.*, 2021), and unrealistic expectations (Tran *et al.,* 2022) are frequently cited by employers in turning down graduates for employment and mainly mismatched major of study with the students' interests.

Test of hypothesis

Socioeconomic characteristics and employability of the respondents

Table 5 shows the relationship between socio-economic characteristics and employability of the respondents. Career path was significantly related with employability of final year students of FUNAAB. This implies that the kind of career path chosen by a final year student can influence their employability. This is possible given the fact that with the looming food crisis in the country, which predisposes many Nigerians to go back to the farm, as well as the renewed efforts of government at different levels to inspire youth into farming (Akpan, 2022), most of the agricultural graduates may be opportuned to become employable in agriculture.

Table 5: Socio-economic characteristics and employability of the respondents

Variables	Chi-square ($\chi 2$)	df	p-value	Decision
Sex	0.001	1	0.969	NS
College	5.011	2	0.082	NS
Marital status	0.663	2	0.718	NS
Religion	0.574	1	0.449	NS
Level of education of parent	1.518	4	0.823	NS
Career path	70.089	36	0.001	**S**

Source: Field survey, 2023

Socioeconomic characteristics and employability

Table 6 indicates the result for the test for relationship between socio-economic characteristics and employability of the respondents. There is a significant relationship between Cumulative Grade Point Average (CGPA) and employability of respondents. This implies, according to Soon *et al*., (2019) that the higher the CGPA of a student, the higher the chances of being employed.

Table 6: Test for relationship between socio-economic characteristics and employability of the respondents

Variables	Value	Sig. level	Decision
Age	-0.052	0.595	NS
CGPA	0.196*	0.044	**S**

Source: Field survey, 2023

Results on Table 7 shows the test for significant relationship between determinants of employability and employability of the respondents. The hypothesis was further tested using multiple regression analysis to determine the relative contribution of each of the indices of employability in the labour market on employability of respondents. From the analysis, the coefficient of determination (R square) equals 0.605 i.e., perceived employability indices determine majority (60.5%) of employability of a candidate leaving 39.5% unexplained. The results of the regression analysis show technical skills (β=0.249, $p \leq 0.01$), communication skills (β=0.285, $p \leq 0.01$), and other skills (β=0.244, $p \leq 0.05$) have significant relationship with the employability indices possessed by the respondents. This implies that technical skills, communication skills, and other skills strengthen employability of respondents in the labour market. In other words, the more they develop technical skills, communication skills, and other skills which includes having professional certifications, the higher the probability of getting employment in the labour market. This implies that candidates who invest in a diverse range of skills are more competitive in the job market. Emphasizing the development of both technical and soft skills along with professional certifications amongst university student, therefore, will give students the value of multifaceted competence. Agboola (2021) and Lim (2023) asserted that employers are seeking candidates who can not only perform technical tasks but also communicate effectively and demonstrate a commitment to continuous professional development.

Table 7: Result of regression analysis of employability indices used in the labour market and employability of the respondents

Predictor	B coefficients	S. E	t-value	Sig	Remarks
Constant	36.864	5.06	7.285	0.000	
Academic Performance	0.070	0.797	0.712	0.478	NS
Technical Skills	0.249	0.813	2.55	0.012	S
Communication Skills	0.285	0.135	2.073	0.004	S
Personality	-0.094	0.141	3.466	0.302	NS
Teamwork and Problem-Solving Skills	0.054	0.929	-0.163	0.871	NS
Leadership and Motivation Skills	-0.019	0.807	0.554	0.581	NS
Other skills	0.244	0.414	2.166	0.033	S
R^2	0. 605				

Source: Field Survey, 2023.
Dependent variable: Employability skills of respondents S= Significant

CONCLUSION AND RECOMMENDATIONS

The results of this study revealed that the future of work and employability of university graduates is largely dependent on the possession of employability skills such as communication, and technical and other skills including acquiring professional certificates. This study has shown that employability skills are highly essential for securing employment and succeeding in any workplace.

Universities should therefore endeavour to integrate teaching of employability skills such as communication, technical skills, and the pursuit of professional certifications into the curriculum. This can be achieved through mandatory courses, workshops, certification examinations and practical assignments that focus on these skills. They can also form partnership with industry professionals to design programmes and courses that are aligned with the current market demands. Others like guest lectures, internships, and co-op programmes can provide students with real-world experience and enhance their employability.

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Factors influencing migrations and settlement among pastoralists in Kaduna state, Nigeria

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ABSTRACT

This study was carried out to investigate the factors influencing migration and settlement of pastoralists in Kaduna State, Nigeria focusing on Ladduga Grazing Reserve and Kwanan Dutse a pastoralist village both located in Kachia Local Government Area (LGA) of Kaduna State Nigeria. Purposive and randomised sampling techniques were used to select participants inside the grazing reserve; while a purposive and exponential snowballing sampling technique used to gather data outside the grazing reserve (KwananDutse), resulting in a sample size of 116 and 57 respectively. This study is based on choice model which gives a data-driven nuanced understanding of factors that influence pastoralist's decision making and utility as they choose between settling in grazing reserves or traditional pastoralism. Thereafter, the study employed close-ended questionnaires to collect the data and analysed using binary logistic regression model. The findings show that pasture and water, livestock pests and diseases and conflict were the key drivers of migration (permanent and temporary) both inside and outside reserve. Specifically, herders with access to pasture and water had 26.7% and 13.2 % higher odds of permanent migration both inside and outside reserve compared to those without access, respectively. Likewise, herders who experienced livestock pests and diseases had 21.7% higher odds of migration inside the reserve and 1.1% higher odds outside the reserve compared to those without pest and diseases. In the same manner, herders who experience conflict had 44% and 14.2% higher odd of permanent migration both inside and outside reserve compared to those who do not experience, respectively. On the other hand, alternative market emerges as a non-significant factor both inside (odd ratio=0.196, p=0.131) and outside (odd ratio=0.316, p=0.524) reserve, possibly due to availability of local markets and informal value chains.

Keywords: Pastoralist migration, Settlement pattern, Grazing reserves.

INTRODUCTION

Pastoralism is a livestock production system that seeks to maximize productivity by exploiting landscapes, using the traditional knowledge, skills and experience acquired over many years (Nyariki & Amwata 2019, Wafula, et,al, 2022). Estimates indicate that there are about 120 million pastoralists/agro pastoralists worldwide, of which 50 million reside in sub-Saharan Africa (FAO, Rass,2016). Many African communities, including the Maasai in East Africa, the Fulani in West Africa, the Somali in the Horn of Africa, and many others, have strong cultural and historical ties to pastoralism. Pastoralism supports more than 200 million pastoralist households globally, contributes significantly to the Gross Domestic Product (GDP) of several countries, and employs over 1.3billion actors in livestock-related value chains worldwide (De Haans, 2015).

Pastoralism is classified into three categories: nomadic, sedentary, and transhumance. These categories are largely defined by the extent of pastoralists search for pasture and water for cattle, as well as their vulnerability to threats and shocks to their means of livelihood (Badejo, 2017). It doubles as an economic activity and as well as cultural identity, even though the latter does not necessarily imply the former as such, there is no clear divide on its definition as far as the pastoralist is concerned (Krätli, Huelsebusch, Brooks and Kaufmann, 2016). The major pre-requisites for pastoralist production are livestock, labour, access to grazing and water resources (Homewood, 2012, Tamou, 2017).

Though it is often dismissed and viewed as an unstable and unsustainable livestock production system (Kratli *et al* 2012), it is a major contributor to livestock production in Nigeria, which is predominantly in the hands of "the Fulbe ethnic group," also referred to as "Fulani" in Hausa language. This ethnic group makes up a sizable portion of the nation's socioeconomic strata. Approximately 90% of the nation's estimated herd, consisting of 76 million goats, 43.4 million sheep, and 18.4 million cattle are produced by them (Federal Ministry of Agriculture and Rural Development, 2017, Food and Agricultural Organization, 2022), along with significant holdings of several other livestock species.

Theoretical frameworks such as the Push-Pull Theory, proposed by Lee Everett in 1966, have been widely used to explain migration patterns. This theory suggests that people migrate due to a combination of push factors that drive them away from their original location and pull factors that attract them to new destinations. In the context of pastoralist migration and settlement in Kaduna State, Nigeria, push factors may include environmental degradation, conflict with farmers, and government policies limiting pastoralist rights. Conversely, pull factors may encompass environmental factors such as better grazing lands and water resources, economic factors like proximity to markets and competitive prices for livestock, and areas with improved security and stability.

Empirical studies have investigated various aspects of pastoralism, migration, and settlements. For instance, a study by Duijne *et al*. (2024) examined the well-being outcomes of ex-pastoralists in northern Kenya who migrated to towns. Similarly, a study by Wafula *et al*. (2022) in Nairobi, Kenya, identified search for pasture and water resources, and alternative markets, as the main reasons for pastoralists' migration to the city. Other studies have analysed the urban and peri-urban pastoral herd composition, land use changes, and drivers of pastoralism, highlighting the complexities of pastoralist migration and settlement patterns (Tamou 2017; Munishi 2013; Ducrotoy *et al*. 2018; Roessler *et al*. 2016).

Despite the enormous economic contribution of pastoralism both locally and globally, it has been experiencing a myriad of challenges that undermine productivity and survival of the system. Increased land use and associated competition for natural resources in the wake of high human and livestock population pressures have been major challenges confronting pastoralists of West Africa. This is especially true in Nigeria where Fulani make up 4% of the national population and prevailing national insecurity issues are impacting on pastoral livelihoods, including violent conflicts over land and ethnic, religious and political disparities (Ducrotoy, Majedunmi, Shaw and Bagulo 2018).

Population growth has triggered other challenges such as competition for land that has become a major source of conflict between pastoralists and crop farmers, this persistent conflict has also spilled over to lower productivity of crop outputs due to fear and suspicions of attacks and reprisal by both parties (Tamou,2017, Sayedi and Ndagi,2020). Second, is the problem of land use and land tenure systems of 1978 which completely left out pastoralist out the land tenure dynamics, thus diminishing land available for grazing (Ayantunde, 2011, Okello 2012).

Migration, settlement and resettlements of pastoralists have been a major feature of pastoralist production and lifestyle influenced by a complex interplay of environmental, socio-economic, political, and cultural factors. Pastoralists in Kaduna State, Nigeria are not any different. Pastoral migration is a complex phenomenon influenced by a multitude of factors which shape pastoralist mobility. Understanding the underlying causes of such migrations and settlement patterns among pastoralists is fundamental in addressing the challenges facing the pastoral systems as a whole. It is against this background that this study attempts to examine factors influencing migration and settlements of pastoralists in and outside the grazing reserve in Kaduna state, Nigeria through the lens of a choice model, using Ladduga grazing reserve and KwananDutse in Kaduna State as a microcosm. In addition, since the federal government of Nigeria is promoting intensive cattle production (Grazing Reserves or Ranching). Due to the challenges posed by traditional pastoralism over the years and its impacts.

METHODOLOGY

The study was conducted in Ladduga Grazing Reserve and Kwanar Dutse. Ladduga Grazing Reserve is located in Kachia local government, southern Kaduna senatorial district of Kaduna state, Nigeria, and is situated in the sub-humid zone. Established in 1965, the reserve was designed to settle nomads in one location to improve their standards of living and avoid conflict between nomads and farmers. The reserve has approximately 777 households, with over 10,000 Fulani pastoralists and more than 40,000 cattle.

Kwanar Dutse is a small Fulani pastoralist village located on the land of the Nigerian Army School of Artillery in Kachia local government area of Kaduna State, Nigeria. The village is inhabited by Fulani pastoralists who relocated from southern Kaduna and neighbouring states due to persistent farmers/herders conflicts and post-election crises of 2011. The settlement is home to approximately 60 households and 500 pastoralists, with over 4,000 cattle, sheep, and goats, and is characterised by an agro-pastoralist system.

Ladduga Grazing Reserve

Purposive and randomised sampling was used to select participants at different phases. The selection of participants was a two-phase process, commencing with a pre-survey phase, where key informants were purposively selected from local government areas, including agricultural extension workers, veterinarians, and stakeholders, who have worked closely with the pastoralists. Subsequently, in the main survey phase, participants were purposively selected from the resident pastoralists in the grazing reserve, based on specific criteria, which includes being male heads of households, given the patrilineal nature of the Fulani family structure, and having been cattle farmers in the reserve for at least one year, except for transhumance pastoralists who temporarily stay in the reserve. Ultimately, this selection process resulted in a sample size of 116 participants

Kwanan Dutse

An exponential snowball sampling technique was used for this study area, this enables participants to refer multiple individuals they knew who might be a good fit for the study, thereby facilitating a faster expansion of the sample size. This technique was particularly effective following an initial interview with the Ardo (the head of the community), who played a crucial role

in mobilising and introducing heads of households or their representatives in the settlement to participate in the research, ultimately resulting in the administration of questionnaires to a total of 58 heads of households, providing valuable quantitative data for the study.

The main method of data collection used in the research was a questionnaire. Structured questionnaires and focus group technique that is utilised within a homogenous group of participants mainly heads of households (Men) or a deputy in the absence of the head (6-12) to discuss selected topics assisted by a moderator.

Copies of the questionnaire were distributed to scholars and subject matter experts outside the study population, and they were validated. Thereafter, reliability test was conducted using Cronbach's Alpha test to ascertain whether the items in the questionnaire would consistently measure the variables being studied with findings suggesting a good level of internal consistency among the items in the scale.

Method of data analysis

The study employed both descriptive and inferential statistics to analyse the data. Descriptive statistics involved the use of tables and percentages to summarize and describe the characteristics of the respondents. Inferential statistics, specifically binary logistic regression analysis, was used to determine the factors that influence the migration and settlement of pastoralists to other locations. The binary logistic regression model was chosen due to the categorical nature of the dependent variable, migration pattern (permanent and temporary).

Model Specification

The model for the study is in line with the study of Wafula *et al*, 2022 which is presented in logit model form as follows:

Log In $(\frac{P1}{1-p})$ = logit $(P1)$=ð + β1x_1+Ɛ1 …… (1)

Ɣ = In $(\frac{P1}{1-p1})$ …… (2)

The regression model for pastoralist migration was specified as follows:

Log $(\frac{P1}{1-p1})$ =α + β_o +β_1HS -β_2APW + β_3ALTMK ±β_4LPD ±β_5AGE ±$\beta_6 HHS$ ±$\beta_7 CONFL$ ±U_i(3)

Where: P1 is the probability of migrating permanently, (1-P1) is the probability of migrating temporarily, $(\frac{P1}{1-p1})$ is the odds ratio, Y is the dependent-categorical variable, xi is the ith predictor variable, α and βi are the estimated coefficients for predictor variables and εt the error terms in the model. The predictor variables in Eq. 3 are specified as HS = Herd size, APW = access to pasture and water, ALTMK = alternative markets, LPD =, livestock pests and diseases, AGE = age of respondent, HSS = household size, CONFL= Farmer/herders Conflict

RESULTS AND DISCUSSION

Nature of migration inside and outside grazing reserve

According to the results, inside grazing reserves, 72.4% of migrations were permanent, while 27.6% were temporary, while outside grazing reserves, 93.0% of migrations were permanent, and only 7.0% were temporary. The findings indicate that migration both inside and outside reserves appears to be more permanent, signifying that an overwhelming majority of pastoralists are beginning to embrace a more sedentary lifestyle and stability. They are opting for permanent migration due to either conflict, resource scarcity, or other factors. This is in line with the findings of Ducrotoy *et al*. (2018) who found that pastoralists were increasingly adopting sedentary lifestyles due to factors such as conflict, climate change, and resource scarcity, leading to a shift away from traditional nomadic practices. Similarly, Sayedi *et al*. (2020) observed that permanent migration was becoming a more common phenomenon among pastoralists, driven by factors such as environmental degradation, conflict, and economic instability, which were forcing them to abandon their traditional ways of life and adopt more settled lifestyles Ducrotoy *et al* 2018 and Sayedi *et al* 2020

Table1: Nature of Migration

Inside Grazing Reserve					Outside Grazing Reserve			
S/N	Item	Response			Response			
1	Migration	Temporary Migration	Permanent Migration	Total	Migration	Temporary Migration	Permanent Migration	Total
		32(27.6%)	84(72.4%)	116(100%)		4(7.0%)	53(93.0%)	57(100%)

Source: Author's computation (2024)

Factors influencing migration settlement within and outside the grazing reserves

Access to pasture and water emerged as a critical factor in both contexts. Inside grazing reserves, 98.3% of respondents cited access to pasture and water as a reason for migration and settlement, while outside reserves, 96.5% of respondents similarly identified pasture and water access as a key factor. The significance of access to pasture and water can be attributed to the fact that these resources are essential for the survival and well-being of pastoralists' livestock, and their availability or scarcity can have a profound impact on pastoralist migration decisions. This result is consistent with previous studies, such as those conducted by Tugjamba *et al*. (2023) and Safari and Wambua (2024), which have also highlighted the significance of access to pasture and water in shaping migration patterns among pastoralists.

Similarly, livestock pests and diseases also significantly influenced migration settlement. Inside reserves, 71.6% of respondents cited livestock pest and diseases as a reason for migration, while outside reserves, 66.7% of respondents similarly identified disease concerns. One possible explanation for this finding may be due to the fragile ecosystem and limited resources available to pastoralists. The high concentration of livestock in these areas creates an ideal environment for the spread of diseases, while the lack of access to veterinary services, inadequate disease control measures, and poor livestock management practices exacerbate the problem, ultimately making pests and disease a persistent threat to pastoralist livelihoods, both inside and outside reserves. This finding is supported by previous research, such as the work of Chacha (2024) which have shown that disease outbreaks can have far-reaching consequences for pastoralist communities, including reduced livestock productivity, increased mortality rates, and decreased household income

More so, conflict is also a primary driver of migration settlement in both contexts. Inside the reserves, 96.6% of respondents cited conflict as a reason for migration, while outside reserves, 89.5% of respondents similarly identified conflict as a key factor. A plausible explanation for the significant impact of farmer-herder conflict on migration decisions is that these conflicts disrupt the livelihoods of herders, rendering it challenging for them to sustain their traditional practices. As a result, migration emerges as a coping mechanism for herders to escape the persistent conflicts and explore new opportunities in other regions or countries. This finding is consistent with the a priori expectation that farmer-herder conflicts can profoundly influence permanent migration decisions and is also corroborated by Wennström's (2024) study, which revealed that violent conflicts between pastoralists and farmers in Uganda resulted in increased migration and livelihood disruption.

Alternative markets, however, have limited influence on migration settlement. Inside reserves, 16.4% of respondents cited alternative markets as a reason for migration, while outside reserves, 28.1% of respondents similarly identified alternative markets. The insignificant role of alternative markets in predicting permanent migration among herders may be attributed to the inherent characteristics of the herding industry, where traditional markets and informal networks often take precedence over formal alternative markets, rendering them less influential in migration decisions. Furthermore, herders may have diversified income streams or support systems that reduce their reliance on alternative markets, making migration unnecessary, a finding that diverges from Barry's (2021) study, which highlighted the significant impact of alternative market access on migration patterns.

Table 2: Factors influencing Migration Settlement

SN	Item	Inside Reserve		Outside Reserve	
		Yes	No	Yes	No
1.	Access to pasture and water	114(98.3%)	2(1.7%)	55(96.5%)	2(3.5%)
2.	Livestock pest and diseases	83(71.6%)	33(28.4%)	38(66.7%)	19(33.3%)
3.	Conflict	112(96.6%)	4(3.4%)	51(89.5%)	6(10.5%)
4.	Alternative market	19(16.4%)	97(83.6%)	16(28.1%)	41(71.9%)
5.	Age of the respondents	18-35 Years	>35 Years	18-35 Years	>35 Years
		30(25.9%)	86(74.1%)	17(29.8%)	40(70.2%)

Source: Author's computation (2024)

Binary logistic regression estimates on factors influencing migration decisions within and outside the grazing reserves

One notable finding was the significant impact of herd size on migration decisions inside grazing reserves (odd ratio=1.223, p=.043), suggesting for every unit increase in herd size, the odds of migration increase by 22.3%. This finding is consistent with expectations as,

the larger the herds size, the faster the depletion of available pasture increases the chances of migrating permanently or temporarily to new locations. However, this relationship is not significant outside of reserves. A possible explanation for this difference is the availability of resources within grazing reserves compared to outside areas. Inside reserves, there may be a limited amount of grazing land and water sources, making it more challenging for large herds to be sustained. As a result, pastoralist with larger herds may be more likely to seek out better opportunities elsewhere, leading to higher rates of permanent migration which is in line with the findings from the study of Ducrotoy *et al*, (2016). In contrast, outside of reserves, there may be more abundant resources available for herds of all sizes because they are not confined to a limited space and this could reduce the need for migrants to move in search of better opportunities permanently, regardless of the size of their herd.

Furthermore, access to pasture and water was a significant factor in both models. Inside reserves, the results reveal that herders with access to pasture and water had 26.7% higher odds of permanent migration compared to those without access. Similarly, outside reserve, the results indicate that herders with access to pasture and water had 13.2% higher odds of permanent migration compared to those without access. This finding is in line with a priori expectations, as access to pasture and water resources is a crucial factor in the livelihood and mobility of herders. This is supported by a study of Wafula, *et al*. (2022) who found that search for pasture and water resources, and alternative markets especially during droughts, are the main reasons for pastoralists' migration to the city.

On the other hand, the alternative market was a non-significant factor in both models. Inside reserves, the odd ratio was 0.196 with value of 0.131, implying that herders with access to alternative markets had 19.6% lower odds of permanent migration than those without alternative markets. Likewise, outside reserve, the odd ratio was 0.316 with value of 0.524, implying that herders with access to alternative markets had 31.6% lower odds of permanent migration than those without alternative markets. This finding may seem surprising at first; especially considering that previous research has suggested that access to alternative markets can have a significant impact on migration patterns (Barry, 2021). One possible explanation for the lack of significance of alternative markets in predicting permanent migration could be the nature of the herding industry itself. In some regions, herders may rely on traditional markets or informal networks for their livelihoods, rather than formal alternative markets. Additionally, herders may have other sources of income or support that make migration unnecessary, regardless of their access to alternative markets.

The study also found that livestock pests and diseases had a significant impact on the likelihood of migration inside reserves (odd ratio=1.243, p=.042), suggesting that herders who experience issues with livestock pests and diseases were 21.7% more likely to migrate compared to those without such problems within reserve areas. The finding is in line with the a priori expectations and consistent by a study of Lelenguyah *et al*. (2021) who reported that the loss of livestock due to pests and diseases was a key factor in the decision to migrate. However, this impact is not significant outside of reserves (odd ratio=1.132, p=.931). One possible explanation for this finding is that inside reserves, herders may be more reliant on their livestock for their livelihood. If their livestock is affected by pests and diseases, it can have a detrimental effect on their ability to continue their way of life. This could lead to a decision to migrate permanently in search of better opportunities outside of the reserve. In contrast, outside of reserves, herders may have more options for dealing with livestock pests and diseases. They may have access to veterinary services, resources for pest control, or alternative sources of income.

Furthermore, the age of respondents also was non-significant factor in both models. Inside reserves, the odd ratio was 0.356 with an insignificant p value of 099). In the same manner, outside reserve, the odd ratio was 0.295 with an insignificant p value of 0.334. This finding was surprising, as one might expect younger individuals to be more mobile and open to migration opportunities. For example, a study by Simpson (2022) found that younger individuals were more likely to migrate in search of better economic opportunities than the older men. One possible explanation for this finding could be younger herders may still be learning and developing their skills, making them more reliant on migration to maintain their livelihoods.

Findings also show that farmers/herders' conflict significantly increased migration likelihood in both models. Inside reserves, the odd ratio was 1.44 with value of 024), suggesting that herders experiencing farmers/herders' conflict have 44% higher odds of permanent migration compared to those without conflict. Likewise, outside reserve, the odd ratio was 1.142 with value of 049, suggesting that herders experiencing farmers/herders' conflict had 14.2% higher odds of permanent migration compared to those without conflict. One possible explanation for this finding is that farmers/herders' conflicts disrupt the livelihoods of herders, making it difficult for them to continue their traditional practices. Migration becomes a way for herders to escape the ongoing

conflicts and find new opportunities in other locations. This result aligns with the a priori expectation that farmer-herder conflicts can significantly influence the decision to migrate permanently which is also consistent with a study by Wennström, (2024) who found that violent conflicts between pastoralists and farmers in Uganda led to increased migration and disruption of livelihoods.

Table 3: Estimated Binary Logistic Regression Model

Inside Grazing Reserve Model				**Outside Grazing Reserve Model**			
	B	Sig.	Exp(B)		B	Sig.	Exp(B)
HS	.202	.043**	1.223	HS	.113	.483	1.120
APW (1)	.237	.036**	1.267	APW (1)	.124	.041**	1.132
ALTMK (1)	-1.630	.131	.196	ALTMK (1)	-1.152	.524	.316
LPD (1)	.217	.042**	1.243	LPD (1)	.124	.931	1.132
AGE (1)	-1.033	.099	.356	AGE (1)	-1.220	.334	.295
HSS	.102	.958	1.107	HSS	-.112	.613	.894
CONFL (1)	.365	.021**	1.44	CONFL (1)	.133	.049**	1.142
Constant	3.510	.004	33.445	Constant	3.113	.003	22.488

Source: Author's computation. Where: APW= Access to pasture and water, HS= Herd Size, ALTMK=Alternative Markets, LPD=Livestock Pest and Diseases, AGE= Age of the Respondents HSS= Household Size, CONFL=Farmers/Herders Conflict, *, ** indicate significance at 1% and 5% respectively

CONCLUSION AND RECOMMENDATIONS

This study examined the major factors that influence pastoralists' migration and settlement pattern in Kaduna State, Nigeria. As pastoralists are confronted with the choice of being confined within the government approved grazing reserve or not, given the utility they aim to derive from this decision. The findings revealed that pastoralists mainly migrate and resettle temporarily or permanently (within the reserve and outside) due to search for pasture and water to sustain their herd size, as such pastoralist with larger herds size are likely to migrate temporally in the grazing reserve as competition for grazing field becomes stiff during the dry season in most parts of northern Nigeria, than those outside the reserve due to absence of restrictions of grazing land. Furthermore, there is a significant impact of livestock pests and diseases on migration likelihood inside reserves, and the destabilizing effect of farmers/herders conflict on herder communities outside the grazing reserve. However, Pastoralists in the grazing reserve still face problems of insecurity, cattle rustling, kidnappings and conflicts due to seasonal transhumance practices in the dry season, which goes against the major reason for the grazing reserve initiative in Nigeria. In Addition, the non-significant impact of alternative markets, age, and household size on migration decisions suggests that these factors may not be as critical in shaping migration patterns among herders in Nigeria, and therefore, may not require immediate policy attention.

The following recommendations were provided based on the findings:

i. Policy makers and stakeholders should invest in a more efficient feeding system for pastoralists and teach them how to grow feed to sustain their livestock during the dry season. This will reduce transhumance which is the major cause of farmer/herder conflicts and insecurity.

ii. Governments should take proactive measures to address the underlying causes of conflict and promote peaceful coexistence between farmers and herders through setting up mediation processes, establishing community peace committees, and providing training in conflict resolution and negotiation skills. In addition, governments should also promote dialogue between farmers and herders organizing forums, workshops, and other events where members of both groups can come together to discuss their concerns, share their perspectives, and work towards finding common ground.

iii. Stakeholders should also invest in education and training programs for herders on disease prevention and control measures through partnering with local agricultural extension services and veterinary clinics to provide workshops and training sessions on best practices for disease prevention and control. These programs can cover topics such as proper hygiene practices, vaccination schedules, and recognizing signs of illness in livestock. In addition, the government should also ensure that herders have access to veterinary services and medication by setting

up mobile veterinary clinics in rural areas where herders reside.

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