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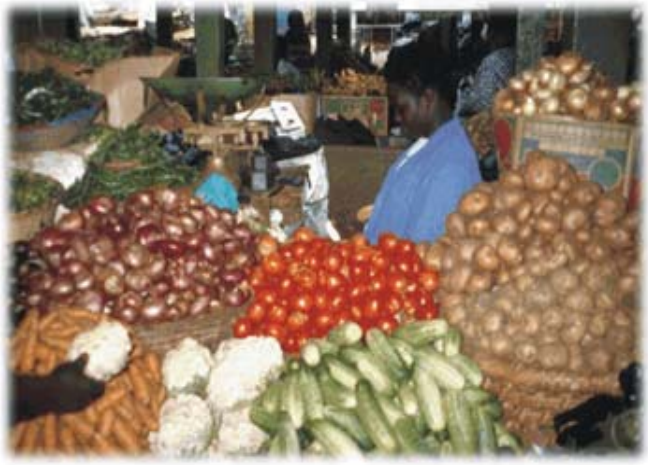

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# Utilisation of management strategies by arable crop farmers to mitigate conflicts with cattle herders in Oyo state, Nigeria

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**Abstract:** Conflict is an inevitable feature of every human society which if not properly managed, threatens sustainability of communities. This study investigated the utilisation of management strategies by arable crop farmers to mitigate conflict with cattle herders in Oyo State, Nigeria. A multistage sampling procedure was used to select 180 respondents for the study. Data were collected with the use of interview schedule which were analysed using descriptive and inferential (Chi-square and PPMC) statistics. Result showed that most (79.4%) of the respondents were male, had formal education (70.6%) with a mean age of 50.9 years, 80.0% had farm size of 0.5-3 hectares. Grazing of on-farm crops ($\bar{x}$ =1.96) and indiscriminate grazing of cattle in the community ($\bar{x}$ =1.93) were identified as major causes of conflict. Effects of conflict on livelihood activities were farm destruction ($\bar{x}$ =2.00) and reduction in crop yield ($\bar{x}$ =2.00). The level of effect of conflict on livelihood activities was high (56.7%). Inadequate fund to secure farmland ($\bar{x}$ =1.83) was the most severe constraint in managing conflict. The study also showed that utilisation of management strategies was low among respondents. Based on the grand mean of the management strategies categories, the most employed by the respondents was competitive management strategy ($\bar{x}$ =1.08). Chi-square result revealed that significant relationship existed between level of education ($\chi^2$ = 4.633), religion ($\chi^2$ = 4.12) and utilisation of management strategies. Government at all levels should formulate policies based on strategies mostly employed by farmers to sustain food security and ensure agricultural sustainability in the nation.
**Keywords:** Cattle herders, competition, crop farmers, management strategy, nomadic

## INTRODUCTION

Conflict is a natural phenomenon that is inevitable in human environments. Conflict is perceived as a serious disagreement about something important that could lead to war and instability in an environment. It is also a struggle or contest between people with opposing needs, ideas, values and goals (Sani, Michael, Tologbonse, Mahmoud, Muhammed, Raji and Abubakar, 2021). According to Soomiyol and Fadairo (2020), it has been affirmed that conflict is not bad but a necessity to evolution, change and development of human organisations. In other words, when conflicts degenerate to violent destructive clashes, they become not only unhealthy, but also counterproductive and disruptive. Conflict could exhibit its importance in some cases like stimulating new thoughts, promoting policy change, defining group relationships and helping the formation of personal identity (Turner, Ayantunde, Patterson and Patterson, 2021).

According to Omisore (2014), conflict is an inevitable feature of every human society, and it is unnatural to have it in societies where natural resources determine the means of livelihood and survival. Conflict between farmers and nomadic cattle herders is one out of many types of conflict and challenges facing Nigeria which include ethnic and religious conflicts, banditry, conflicts among settled farmers, armed robbery, kidnapping, poverty, corruption and environmental degradation (Kingsley, 2017). Factors that account for the increasing conflict include the south ward movement of herders into the humid and sub humid zones as a result of change in climatic conditions, population growth, urbanisation, government policies, insurgency and expansion of farm lands into areas that hitherto served as pasture land (Turner, Ayantunde, Patterson and Patterson, 2021).

Most Fulani's in Nigeria are herdsmen who have their settlement in the northern part of Nigeria. They are known to be territorial in nature and majority of them are nomads, herding cattle, sheep and goats across grass lands of their environment, making them the world's largest pastoral nomadic group (Soomiyol and Fadairo, 2020). The incessant conflict between herders and farmers has been on the increase over the past twenty-five years in all regions in Nigeria (Turner, Ayantunde, Patterson and Patterson, 2021), with more negative impacts such as loss of lives and properties, destruction of farmlands and markets, hatred between ethnic groups, reduction in crop yield and framers' income and death. All these have an impact on agriculture and food prices, resulting in inflation and instability of food prices.

In Nigeria, arable crop farmers account for about 80% of total food requirement and also provide the bulk of the crops consumed locally within the country. They play an important role in the national economy despite the country's reliance on crude oil by ensuring survival of many rural dwellers and farm families in towns and villages (Sabo, 2017). Moreover, it has been observed that Nigerian agricultural production consists of rural-based small-scale arable crop farmers who account for 80% of total food requirement. Also, out of the 71 million hectares of cultivable land in Nigeria only half of it has been utilised for farming by arable crop farmers, this might be linked to herders invading farmlands and inadequate modern facilities and technology. It is therefore observed that these activities of herders in almost all areas in the nation have considerably affected the rate of food

production and prices. This has incapacitated the high efficiency of the nation to produce at optimal level (Oladele, 2017).

Studies in different States in Nigeria provided reports that there have been massive herdsmen invasions on local farmlands which have triggered violent and land use conflicts (Aliyu, 2015). Furthermore, Idowu (2017) submits that violence has displaced more than 100,000 people in Benue and Enugu States and left them under care of relatives or in Internally Displaced Persons (IDPs) camps.

Conflict management seeks to indicate the fact that conflict is inevitable and that not all conflicts are resolvable. Conflict management seen in the right perspective, correctly assumes that conflicts are long term process that often cannot be quickly resolved but can be managed. Employing several conflict management strategies has been found to be a veritable tool in solving conflicts in different part of the world (Soomiyol and Fadairo (2020), contributing to peace and sustainable agricultural practices.

Oyo State is also not left out in the incessant attacks and conflicts between herders and farmers in recent times. Despite efforts to put an end to all these conflicts from different institutions like security personnel, community effort and government at large, it is obvious that their effort is not strong enough to curb these unpleasant situations. Hence, the need to manage conflict becomes pertinent by all stakeholders involved so as to ensure safety and security of lives and properties.

The general objective of this study is to assess the utilisation of management strategies by arable crop farmers to mitigate conflicts with cattle herders in Oyo State, Nigeria. The specific objectives are to:

1. describe the socio-economic characteristics of the respondents,
2. determine the causes of conflicts between arable crop farmers and nomadic cattle herders,
3. ascertain the effects of conflicts on the livelihood activities of the respondents
4. identify the constraints respondents face in managing the conflict
5. examine the utilisation of management strategies employed by arable crop farmers

**Hypotheses of the study**

**$H_0$1**: There is no significant relationship between the socioeconomic characteristics and utilisation of management strategies.

**$H_0$2**: There is no significant relationship between effects of conflict on livelihood activities and utilisation of management strategies.

## METHODOLOGY

The study was carried out in Oyo state, Nigeria. It covers an area of approximately 28,454 km$^2$ and lies between latitude 8.1574$^o$N and longitude 3.614$^o$E with a population of 7,840,864 million people. The land scape consists of old hard rocks and shaped hills, which rise gently from about 500 meters in southern part to about 1,219 meters above sea level in the northern part. The State has the first University in Africa situated in it. Several ethnic groups and tribes reside in the State like Yorubas, Fulanis, Igbos etc. Agriculture is the main occupation of the people of Oyo State. Oyo State has 33 Local Government Areas with over 400 major towns and villages. Polygamous marriage as well as accumulation of wives and children is one of their ways of measuring a man's wealth and prestige especially in rural communities.

A multistage sampling procedure was used to select respondents for this study. In the first stage, a random selection of two agricultural zones out of the four existing agricultural zones classified by Oyo State Agricultural Development Programme (OYSADEP) which are Ibadan/Ibarapa and Saki agricultural zones. Ibadan/Ibarapa agricultural zone consists of nine blocks and Saki agricultural zone consists of eight blocks. The second stage involved a simple random sampling of 20% of 9 blocks in Ibadan/Ibarapa; Ibarapa north, Ido and 20% of the 8 blocks in Saki; Saki East, Irepo, respectively. In stage three, a random selection of three cells each from the Ibadan/Ibarapa block and three cells from Saki, making a total of twelve cells. In the last stage, 45% of arable crop farmers from each cell was selected proportionately to make 180 arable crop farmers in the study area. Quantitative data was collected with the aid of a structured interview schedule which was analysed using descriptive and inferential (Chi square and PPMC) statistics employing the use of Statistical Package for Social Sciences (SPSS).

**Measurement of variables**

**Causes of conflicts:** This was measured using a response option of to a great extent (2), very little extent (1) and not at all (0). The mean value was also used to rank the scores of respondents.

**Effects of conflicts on the livelihood activities**: This was measured by providing answers to set of questions that were classified into physical, economic and social effect. This was measured by using a response option of agree (2), uncertain (1) and disagree (0). The grand mean was used to select the category of conflict mostly affecting respondents in the study area. The mean score of 24.5 was generated which was used to rank respondents into those having high and low effects of conflicts on livelihood activities.

**Constraints faced in managing conflicts:** This was measured using a response option of severe constraint (2), mild constraint (1) and not a constraint (0). The mean value generated for each constraint was used to rank them in order of severity.

**Utilisation of management strategies which is the dependent variable was measured using**

**three broad components of conflict management strategy namely:** compromising, collaborating and competing management strategies with 17 items which was measured using the response options of always utilised (2), often utilised (1) and not utilised at all (0). The minimum score was 0 while the maximum score was 34.0. The mean score of 17.4 was generated which was used to categorise into respondents having low (7.0-17.4) and high (17.5-28.0) utilisation of management strategies. Also, the grand mean for each management strategy was generated to know the best strategy employed by arable crop farmers.

## RESULTS AND DISCUSSION

Table 1 revealed that the mean age of respondents was 50.9 ± 9.5years with 2.8% as young adults. The implication of this is that youths are not actively involved in farming, and this is not good for agricultural sustainability, this may also have a negative effect on the management strategies employed by farmers to defend their community against the unlawful entrance on their agricultural land. This corroborates with the findings of Yekinni, Adeniyi and Adebisi (2017) that crop farmers are getting old and may not have the required physical strength to defend their community. The distribution of respondent's sex revealed that most arable crop farmers (78.9%) were male. This suggests that arable crop farming is a male dominated enterprise in the study area. This is in tandem with the findings of Kolawole (2020) that majority of arable farmers were male. From table 1, majority (93.3%) of the respondents were married. This implies that most of the farmers in the study area have families of their own, who can supply them labour force on their farm, thereby reducing the cost of production. The distribution of respondents' educational attainment revealed that majority (70.6%) of the respondents had formal education which could help them to get adequate information from various channels that will help to manage conflict with strategies it entails. The mean annual income of respondents was ₦509,166.7±415.783.4, this suggests that the profit from agricultural activities may not be sufficient to meet the demands of farmers especially at the home front not to talk of getting extra income to ensure security of their farmlands, therefore, adequate resources and technology are needed to help make the sector grow better. Results from table 1 also revealed that majority (80.0%) of the respondents had between 0.5 – 3 hectares of land which agrees with the findings of Obaniyi (2020) in a similar study where 86.6% of arable crop farmers had a farm size of between 1- 5 hectares. The implication of this result is that the arable crop farmers have a reasonable hectare of farmland under cultivation. It further means that they would have to provide extra security to keep their farm safe from cattle herders. Also, the mean value for farming experience is 13.36±7.86 years which suggests that most of the respondents had been into farming for over a decade and could understand the trend of conflict and its management over the years. It was also indicated from the findings of the study that farmers cultivated crops like maize, cassava, potatoes and vegetables. The result from Table 1 also indicates that 55.6% of the respondents were engaged in secondary occupation which implies that most of the respondents do not depend on farming as their only means of livelihood which might be as a result of uncertainty involved in agricultural activities which may be caused by climate change and conflict in the study area. This is in tandem with the findings of Adeniyi and Yekinni (2015) who reported that crop farmers diversify into other livelihood activities to cope with their financial obligations especially during off season and time of conflict.

**Table 1: Distribution of respondents according to socioeconomic characteristics**

| Variable | Frequency | Percent | Mean | SD |
|---|---|---|---|---|
| **Age (years)** | | | | |
| Less than or equal to 25 | 2 | 1.1 | | |
| 26 – 35 | 3 | 1.7 | | |
| 36 – 45 | 48 | 26.7 | 50.9 | 9.5 |
| 46 – 55 | 79 | 43.9 | | |
| 56 – 65 | 32 | 17.8 | | |
| Older than or equal to 66 | 16 | 8.9 | | |
| **Sex** | | | | |
| Male | 143 | 79.4 | | |
| Female | 37 | 20.6 | | |
| **Marital status** | | | | |
| Single | 8 | 4.4 | | |
| Married | 168 | 93.3 | | |
| Divorced | 4 | 2.2 | | |
| **Level of education** | | | | |
| Non-formal | 53 | 29.4 | | |
| Formal | 127 | 70.6 | | |
| **Annual income (₦)** | | | | |

| Variable | Frequency | Percent | Mean | SD |
|---|---|---|---|---|
| Less than or equal to 100000 | 2 | 1.1 | | |
| 100001-300000 | 39 | 21.7 | | |
| 300001-600000 | 95 | 52.8 | 509,166.7 | 415.783.4 |
| 600001-900000 | 37 | 20.6 | | |
| Greater than or equal to 900001 | 7 | 3.9 | | |
| **Farm size(hectares)** | | | | |
| Less than or equal to 1 | 52 | 28.9 | | |
| 1.5 – 2 | 52 | 28.9 | 2.40 | 1.36 |
| 2.5 – 3 | 40 | 22.2 | | |
| 3.5 – 4 | 19 | 10.6 | | |
| 4.5 and above | 17 | 9.4 | | |
| **Farming experience (years)** | | | | |
| Less than or equal 10 | 101 | 56.1 | | |
| 11 – 20 | 64 | 35.6 | 13.36 | 7.86 |
| 21 – 30 | 13 | 7.2 | | |
| 31 and above | 2 | 1.1 | | |
| **Type of crops cultivated** | | | | |
| Maize | 175 | 97.2 | | |
| Cassava | 156 | 86.7 | | |
| Vegetables | 129 | 71.7 | | |
| Potatoes | 58 | 32.2 | | |
| **Secondary occupation** | | | | |
| None | 78 | 43.3 | | |
| Trading | 100 | 55.6 | | |
| Artisan | 2 | 1.1 | | |

Source: Field survey, 2021

**Causes of conflicts between arable crop farmers and cattle herders**

The results according to the mean scores on Table 2 showed that grazing of on-farm crops was ranked first ($\bar{x}$ =1.96) among all other causes of conflict. This is followed by indiscriminate grazing of cattle in the community ($\bar{x}$ =1.93), lackadaisical attitude by herders for traditional authority ($\bar{x}$ =1.91), while other causes were population growth ($\bar{x}$ =0.51) and changing climatic conditions ($\bar{x}$ =0.56). This implies that grazing of on-farm crops, indiscriminate grazing of cattle in the community, lackadaisical attitude of herders for traditional authority were the main causes of conflict among arable crop farmers and herders in the study area. The result is in tandem with the findings of Yekinni, Adeniyi and Adebisi (2017) that conflict occurs when cattle herders tamper with crop farmers' livelihood.

**Effects of conflicts on livelihood activities of respondents**

Based on the information provided by the respondents on Table 3a, effects of conflicts on respondents' livelihood activities were classified into physical, economic and social effect. Based on physical effect, farm destruction ($\bar{x}$ =2.00), sustaining wound and injury ($\bar{x}$ =1.99) and death (1.97) were some of the physical effects of conflicts. This implies that effects of conflict on people's lives is quite devastating especially on farmer's livelihood. This corroborates the findings of Ibekwe and Nwankwo (2018) that loss of lives and properties were major effects of conflict between farmers and herders. Also, the economic effect that mostly affects farmers' livelihood activities were reduction in crop yield ($\bar{x}$ =2.00), reduced output and income ($\bar{x}$ =1.98). This implies that the economy and livelihood of respondents will be greatly affected thereby having a ripple effect on the food production and prices in the nation.

Table 3 also shows the social effects of conflict on livelihood activities which are fear of personal safety ($\bar{x}$ =1.99), restriction of movement in the community ($\bar{x}$ =1.99) and deterioration of personal/family health ($\bar{x}$ =1.38). This finding is corroborated by Kugbega and Aboagye (2021) that fear and insecurity of people's lives in the community among others were the effect of conflict on the arable crop farmers. Furthermore, the result on table 3a showed that economic effect had the highest grand mean ($\bar{x}$ =1.92). This implies that the economy of respondents is more affected by conflicts.

**Table 2: Distribution of respondents on the causes of conflicts between arable crop farmers and cattle herders**

| Causes of conflict | To a great extent | Very little extent | Not at all | SD | Mean | Rank |
|---|---|---|---|---|---|---|
| Grazing of on-farm crops | 96.1 | 3.3 | 0.6 | 0.23 | 1.96 | 1st |
| Indiscriminate grazing of cattle in the community | 93.9 | 5.0 | 1.1 | 0.29 | 1.92 | 2nd |
| Lackadaisical attitude by herders for traditional authority | 93.9 | 3.3 | 2.8 | 0.37 | 1.91 | 3rd |
| Damage of harvested crops by cattle | 78.3 | 20.6 | 1.1 | 0.45 | 1.77 | 4th |
| Forced ejection of farmers from their farms | 78.9 | 11.1 | 10.0 | 0.65 | 1.69 | 5th |
| Sexual harassment of women | 64.4 | 32.2 | 3.3 | 0.55 | 1.61 | 6th |
| Distrust between herders and farmers | 60.0 | 40.0 | 0 | 0.49 | 1.60 | 7th |
| Contamination of stream by cattle | 60.0 | 39.4 | 0.6 | 0.50 | 1.59 | 8th |
| Denial of access to water resources | 55.0 | 40.0 | 5.0 | 0.59 | 1.50 | 9th |
| Reactions to anti-grazing law | 38.9 | 60.6 | 0.6 | 0.49 | 1.38 | 10th |
| Indiscriminate bush burning | 51.7 | 10.6 | 37.8 | 0.94 | 1.13 | 11th |
| Population growth | 10.6 | 30.0 | 59.4 | 0.68 | 0.51 | 12th |
| Changing climatic conditions | 9.4 | 36.7 | 53.9 | 0.66 | 0.56 | 13th |
| Urbanisation | 7.8 | 30.6 | 61.7 | 0.64 | 0.46 | 14th |
| Harassment of nomads by youths of the host community | 2.8 | 37.2 | 60.0 | 0.43 | 0.43 | 15th |

Source: Field survey, 2021

However, from Table 3b, there was high (56.7%) effects of conflict on arable crop farmers livelihood activities. This implies that the effect of conflict on livelihood activities is more on agricultural production causing farmers to adjust by shifting to other jobs to ensure a means of livelihood and survival. This finding corroborates with the findings of Sunday (2013) that effect of conflict is a threat to peace, livelihood, human security, food security and national stability.

**Table 3a: Distribution of respondents according to effects of conflicts on the livelihood activities**

| Effects | Agree | Uncertain | Disagree | SD | Mean | Grand mean | Rank |
|---|---|---|---|---|---|---|---|
| **Physical effect** | | | | | | 1.73 | |
| Farm destruction | 100 | 0 | 0 | 0.00 | 2.00 | | 1st |
| Sustain wound and injury | 98.9 | 1.1 | 0 | 0.11 | 1.99 | | 2nd |
| Death | 96.7 | 3.3 | 0 | 0.18 | 1.97 | | 3rd |
| Assault | 91.7 | 8.3 | 0 | 0.28 | 1.92 | | 4th |
| Rape | 71.7 | 28.3 | 0 | 0.45 | 1.72 | | 5th |
| Destruction of market | 21.7 | 37.8 | 40.6 | 0.77 | 0.81 | | 6th |
| **Economic effect** | | | | | | 1.92 | |
| Reduction in crop yield | 97.8 | 2.2 | 0 | 0.15 | 2.00 | | 3rd |
| Reduced output | 100 | 0 | 0 | 0.00 | 1.98 | | 1st |
| Reduced income from crops | 98.3 | 1.7 | 0 | 0.13 | 1.98 | | 2nd |
| Debt | 81.1 | 18.9 | 0 | 0.39 | 1.81 | | 5th |
| Internal displacement and poverty | 83.9 | 13.9 | 2.2 | 0.44 | 1.82 | | 4th |
| **Social effect** | | | | | | 1.74 | |
| Distrust in relating with outsiders | 47.2 | 44.4 | 8.3 | 0.64 | 1.39 | | 5th |
| Restriction of movement in the community | 97.8 | 2.2 | 0 | 0.15 | 1.98 | | 2nd |
| Fear of personal safety | 99.4 | 0.6 | 0 | 0.15 | 1.99 | | 1st |
| Deterioration of personal/family health | 41.1 | 56.1 | 2.8 | 0.54 | 1.38 | | 6th |
| Worry/anxiety | 88.3 | 11.7 | 0 | 0.32 | 1.83 | | 3rd |
| Reduction in social capital/connection | 79.4 | 20.6 | 0 | 0.41 | 1.79 | | 4th |

Source: Field survey, 2021

**Table 3b: Categorisation on the level of effect of conflict on livelihood activities**

| Level of effect on livelihood activities | Frequency | Percentage | Minimum | Maximum | Mean | SD |
|---|---|---|---|---|---|---|
| Low (18.0-24.5) | 102 | 43.3 | 18.0 | 34.0 | 24.5 | 3.9 |
| High (24.6-34.0) | 78 | 56.7 | | | | |
| Total | 180 | 100.0 | | | | |

Source: Field survey, 2021

**Constraints faced by respondents in managing conflicts**

Results on Table 4 revealed the constraints respondents face in managing conflicts. According to the mean values, inadequate fund to secure farmland ($\bar{x}$ =1.83) was ranked first. This implies that fund is a major challenge facing the arable crop farmers in the management of conflict in the study area. Incommensurate compensation for farmers ($\bar{x}$ =1.74), poor access to secure land and property rights ($\bar{x}$ =1.72) and inadequate support from security personnel ($\bar{x}$ =1.67) were also part of the constraints faced in managing conflicts. This implies that fund is crucial in combating conflict as many resources will be needed to ensure security in communities, inability to achieve this will lead to high cost of food produce and food insecurity. Also, security personnel must be conscious of their role in ensuring that conflict is reduced to a minimal level in communities across the nation. This finding is in tandem with Adewunmi (2019) stating that fund, inadequate support from security personnel were part of the constraints faced in managing conflicts.

**Table 4: Distribution of respondents' according to constraints faced in managing conflicts**

| Constraints | Severe constraint | Mild constraint | Not a constraint | Mean | SD | Rank |
|---|---|---|---|---|---|---|
| Inadequate support from security personnel | 71.7 | 28.3 | 0 | 1.67 | 0.45 | 4th |
| Poor access to secure land or property rights | 68.3 | 30.0 | 0 | 1.72 | 0.51 | 3rd |
| Inadequate knowledge about appropriate conflict management strategies | 42.2 | 37.2 | 20.6 | 1.22 | 0.76 | 7th |
| Inadequate support from community/traditional leaders | 51.7 | 46.7 | 1.7 | 1.50 | 0.53 | 6th |
| Restricted access to sale of produce | 25.6 | 52.8 | 21.7 | 1.04 | 0.69 | 8th |
| Low farming experience | 7.2 | 51.1 | 41.7 | 0.66 | 0.61 | 9th |
| Lack of assistance from other support group | 76.7 | 21.1 | 2.2 | 1.65 | 0.51 | 5th |
| Inadequate fund to secure farmland | 83.3 | 16.1 | 0.6 | 1.83 | 0.39 | 1st |
| Incommensurate compensation for farmers | 76.7 | 51.1 | 41.7 | 1.74 | 0.49 | 2nd |

Source: Field survey, 2021

**Utilisation of management strategies by arable crop farmers to mitigate conflict**

The result from Table 5a showed the management strategies used in this study was classified to three broad categories: compromising, collaborating and competing management strategies. According to the mean value, use of experience ($\bar{x}$ =1.48) ranked first under compromising management strategies, followed by appeasing the other party ($\bar{x}$ =1.47). This implies that most farmers will rather try to reach an agreement or settlement with herders to reduce conflicts. This is in tandem with the result of Soomiyol and Fadairo (2020) that farmers appease to each other to cope with existence of conflicts. Also, from table 5a, formation of farmer's association ($\bar{x}$ =1.19) was the most employed collaborating management strategy by the respondents followed by seek help from union and association ($\bar{x}$ =0.97). This implies that farmers work in groups to reduce attacks by herders which may also reduce conflict in the study area. Based on the findings on table 5a, it was revealed that report to litigation ($\bar{x}$ =1.63), creating boundaries around farms such as fence for security ($\bar{x}$ =1.58) and use of traditional means for protection ($\bar{x}$ =0.94) were strategies employed under competing management strategies. Others are retaliation, punishment of offenders and indigenous way of planting. This implies that farmers will always want to defeat their enemies in a conflict situation as they try to dominate other party by suppression and issuing of threat. Furthermore, the result on table 5a showed that competing management strategy had the highest grand mean (($\bar{x}$ =1.08) implying that competing management strategy was the mostly employed by

respondents which means that farmers will want to fight back and defeat the herders with the aim of eradicating them from the community.

Based on the findings on Table 5b, the respondents' level of utilisation of management strategies was low (53.9%). This implies that some of the management strategies used by respondents were probably just being used and overtime it is expected that it will yield better result of peace and stability in the study area.

**Table 5a: Distribution of respondents on utilisation of management strategies employed by arable cop farmers to mitigate conflict**

| Management strategies | Always utilised | Often utilised | Not utilised at all | SD | Mean | Grand mean | Rank |
|---|---|---|---|---|---|---|---|
| **Compromising management strategy** | | | | | | 1.05 | |
| Relocate farm from cattle route | 31.1 | 41.1 | 27.8 | 0.77 | 1.03 | | 3rd |
| Shifting to another job | 23.3 | 56.7 | 20.0 | 0.66 | 1.03 | | 3rd |
| Appeasing the other party | 56.1 | 35.0 | 8.9 | 0.65 | 1.47 | | 2nd |
| Use of experience | 54.4 | 34.4 | 6.1 | 0.61 | 1.48 | | 1st |
| Early harvest | 20.6 | 56.7 | 22.8 | 0.65 | 0.98 | | 5th |
| Sowed less to minimise losses | 7.8 | 22.8 | 69.4 | 0.63 | 0.38 | | 6th |
| **Collaborating management strategy** | | | | | | 0.92 | |
| Seek help from local leaders | 31.7 | 31.1 | 37.2 | 0.83 | 0.94 | | 3rd |
| Help from union and association | 12.2 | 72.2 | 15.6 | 0.53 | 0.97 | | 2nd |
| Formation of farmers association | 35.0 | 48.9 | 16.1 | 0.69 | 1.19 | | 1st |
| Practice group farming | 14.4 | 51.7 | 33.9 | 0.66 | 0.81 | | 4th |
| Religious help | 23.9 | 19.4 | 56.7 | 0.84 | 0.67 | | 5th |
| **Competing management strategy** | | | | | | 1.08 | |
| Retaliation | 25.6 | 35.6 | 38.9 | 0.79 | 0.87 | | 5th |
| Punishment of offenders | 8.3 | 34.4 | 57.2 | 0.65 | 0.51 | | 6th |
| Report to litigation | 64.4 | 33.9 | 1.7 | 0.52 | 1.63 | | 1st |
| Creating boundaries around farms such as fence for security | 61.1 | 36.1 | 2.8 | 0.55 | 1.58 | | 2nd |
| Use of traditional means for protection | 22.2 | 50.0 | 27.8 | 0.71 | 0.94 | | 3rd |
| Indigenous method of planting | 20.0 | 53.9 | 26.1 | 0.68 | 0.93 | | 4th |

Source: Field survey, 2021

**Table 5b: Distribution of respondents based on their level of utilisation of management strategies**

| Management strategies level of utilisation | Frequency | Percentage | Minimum | Maximum | Mean | SD |
|---|---|---|---|---|---|---|
| Low (7.0 - 17.4) | 97.0 | 53.9 | 7.0 | 28.0 | 17.4 | 4.4 |
| High (17.5 - 28.0) | 83.0 | 46.1 | | | | |
| Total | 180 | 100.0 | | | | |

Source: Field survey, 2021

Table 6a indicates that a significant relationship existed between level of education ($x^2$=4.633; p=0.034) and utilisation of management strategies. This agrees with the findings of Obaniyi, Kolawole, Ajala, Oguntade (2020) that farmers who are educated have a high sense of exposure to different methods of responding to sudden disasters. Also, that there was a significant relationship between religion ($x^2$=4.115; p=0.049) and utilisation of management strategies. This implies that religion has a way of influencing people towards peaceful co-existence, since they can be identified through faith-based organisations. This finding is in tandem with Yekinni, Adeniyi, and Adebisi (2017) that farmers could be identified through faith-based organisation in case of conflict intervention programmes. There was also a significant relationship between sex ($x^2$=10.939; p=0.001) and utilisation of management strategies. This implies that males were more conscious of security issues in most communities than female.

**Table 6: Chi square analysis between selected socioeconomic characteristics of arable crop farmers and utilisation management strategies**

| Socioeconomic characteristics | $\chi^2$ | Df | p-value | Decision |
|---|---|---|---|---|
| Sex | 10.939 | 1 | 0.001 | Significant |
| Level of Education | 4.633 | 1 | 0.034 | Significant |
| Marital status | 0.463 | 2 | 0.793 | Not significant |
| Religion | 4.115 | 1 | 0.049 | Significant |

Source: Field survey, 2021

Data on Table 7 indicates there was a significant relationship (r=0.619, p=0.000) between effects of conflict on livelihood activities and utilisation of management strategies. This implies that the strategy that will be employed depends on the extent of the impact of the effects of conflict on their livelihood activities. This corroborates the findings of Umar (2013) that farmers use many techniques to seek solutions to the problems arising from the setback they encountered on their livelihood activities.

**Table 7: Correlation analysis between effects of conflict on livelihood activities and utilisation of management strategies**

| Variable | r-value | p-value | Decision |
|---|---|---|---|
| Effects | 0.619 | 0.000 | Significant |

Source: Field survey, 2021

## CONCLUSION AND RECOMMENDATION

The study concluded that arable crop farmers in the study are gradually getting old which is not good for agricultural sustainability. Also, most of the respondents were educated with a reasonable years of farming experience. It was also concluded that conflicts occurred between arable crop farmers and cattle herders as a result of grazing of on-farm crops, indiscriminate grazing of cattle which interferes with the normal activities of farmers in their community. Effect of conflict on farmers' livelihood activities was high which can lead to difficulty in achieving agricultural sustainability and food security. The study also concluded that farmers employed the use of competing, than compromising and collaborating management strategies. It was also concluded that utilisation of management strategies was low by the respondents.

It is therefore recommended that there should be more awareness among arable farmers on the need to employ more management strategies in tackling conflict as it has been confirmed to be effective in ensuring peace and stability in the study area. Also, government at all levels should ensure that farmers that lost their crops and other properties should be compensated and the need to secure farmlands should be reiterated which will help to achieve security and agricultural sustainability in the nation.

## REFERENCES

Adeniyi, R. T. and Yekinni, O. T. (2015). Arable crop farmers' characteristics affecting the utilization of Information and Communication Technologies for Agricultural Market Information in Oyo State, Nigeria. *Nigerian Journal of Rural Sociology*. Vol. 16, No. 1, pp. 23-29

Adewunmi, A., (2019). Effects of conflict on food security and poverty status of Irish potato farmers in Plateau State, Nigeria. *Ageconsearch.umn.edu*

Aliyu, A. S. (2015). Causes and Resolution of Conflict between Cattle Herders and Crop Farmers in Kastina State, an MSc. Dissertation by the School of Post Graduate Studies, Ahmadu Bello University Zaria. pp. 1-74

Ibekwe, C. C., and Nwankwo U. I (2018). Prevalence of Herdsmen and Farmers Conflict in Nigeria. *International Journal of innovative studies in sociology and humanities*. Sociology and Criminology.

Idowu, A. O. (2017). Urban violence dimension in Nigeria: Farmers and herders onslaught. *AGATHOS International Review*, 187-206.

Kingsley, C.F. (2017). Demographic implications of nomadic herdsmen and farmer clashes in Nigeria,

Kolawole, A.E. (2019). Environmental change impacts on agribusiness and food security in Sub-Sahara Africa: A practical way forward, Medwell Journal of Engineering Applied Sciences; Vol. 14, No.24: pp. 39–44

Kugbega, S.K and Aboagye, P.Y. (2021). Farmer-herder conflicts, tenure insecurity and farmer's investment decisions in Agogo, Ghana, Agric Econ, 9, 19 (2021), Accessed on 18th October, 2021 from https://doi.org/10.1186/s40100-021-00186-4

Obaniyi K. S., (2020). Environmental change impacts on agribusiness and food security in Sub-Sahara Africa: *a practical way forward,* Medwell. Journal of Engineering Applied Sciences Vol. 14, No. 24, pp. 9639–9644

Obaniyi, K.S., Kolawole, A.E., Ajala, A.O., Owolabi, A.O and Akangbe, J. A. (2019). Environmental change impacts on agribusiness and food security in Sub-Sahara Africa: *a practical way forward, Medwell. J Eng Appl* Sci. ;14 (24):9639–44.

Oladele, O.T., (2017). Effect of pastoralist-farmers conflict on access to resources in savanna area of Oyo state, Nigeria*. Life Science Journal*. 8(2):616-621. DOI: 10.75371mars/sy080211.86

Omisore, B., (2014). Organizational Conflicts: Causes, Effects and Remedies. International Journal of Academic Research in Economics and Management Scaiences 3(6). DOI: 10.6007/IJAREMS/v3-i6/1351

Sabo, B.B., (2017). Role of Smallholder Farmers in Nigeria's Food Security. Journal of Agricultural Science. Vol. 7(1), 1-5

Sani, M.Y., Michael, W. M., Tolgbonse, E. B., Mahmoud, B.A., Muhammed, T.B., Raji, T.M and Abubakar, M. (2021). Effects of Farmer- Herder conflicts on Rural Household Food Security in Gombe State, Nigeria, Journal of Agricultural Extension, Vol. 25, No 1, pp. 11-20.

Soomiyol, M.V. and Fadairo, O. (2020). Climate-induced conflicts and livelihoods of farming households in Nigeria: lessons from farmers-herdsmen conflict–ridden communities in Benue State, Agricultura Tropica et Subtropica, Vol. 53, No 2, pp. 93-103

Turner, M.D., Ayantunde, A.A., Patterson, E.D and Patterson, K. P. (2021). Farmer- herder relations and conflict management in agro-pastoral zones of Niger, Accessed on 29th October, 2021 at www. Core. ac.uk/downloadpdf/132645986.pdf.

Umar B.F., (2013). Coping strategies among farmers and herders during post conflict situation in Kebbi. *Journal of Educational and social research*. DOI: 10.5901/jes.2013.v3n9p59

Yekinni O.T., Adeniyi, R.T and Adebisi, S.A. (2017). Crop farmer's adaptation strategies to mitigate conflict with nomads in Oyo State, Nigerian Journal of Rural Sociology, Vol.17, No. 1, pp. 19-26.

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# Level of digital literacy among crop farmers in Oyo state

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**Abstract:** Digital agriculture technologies have the potential to increase the efficiencies and productivity of farmers. However, the use of these digital technologies requires its users to have some level of digital skills – digital literacy. This study, therefore examined the level of digital literacy of crop farmers in Oyo state. A multistage sampling procedure was used in selecting 120 respondents from the study area. A structured questionnaire was used to collect primary data. Data were analysed using descriptive (frequency, percentage, and mean) and inferential statistics (Chi-square and PPMC) were used. Results reveal that majority of the respondents were male (70%), married (90.8%), had no formal education (42.5%), with a mean age of 56 years and average farming experience of 25 years. About 79.0% had between 0.5 and 8 acres of farmland, 68.3% did not practice mixed farming, 73.3%had never used social media, and 72.5% used feature phones. Furthermore, 57.5% had a favourable perception of the use of digital tools with low knowledge (55%) of basic concepts and processes of digital agriculture and platforms. The level of digital literacy (71.7%) among crop farmers in Oyo state was low. Lack of training to develop digital skills ranked the most severe constraint to digital literacy and usage among respondents. However, the perception of the use of digital tools was favourable. The digital literacy level of crop farmers was generally low. There is a need for government to establish a digital literacy initiative specifically targeted at farmers to develop and improve their digital skills through training.
**Keywords**: Digital literacy, Digital agriculture, Digital transformation, Digital technologies, Digital tools.

## INTRODUCTION

The advent of technology with the emergence of efficient practices and the development of resources (machinery, disease resistant-seeds, etc.) has shaped agriculture and played pivotal roles in achieving a food-secure world. The agricultural sector has experienced a wide spectrum of revolutions contributing to the drive for efficiency, yield, and profitability even to levels that were thought to be unattainable (Rose, 2020). The first revolution was characterized by the transition to farming from hunting. Following the first agricultural revolution is the mechanization of production, the introduction of improved and resistant crop varieties and agrochemicals like chemical fertilizers and pesticides, which were further complemented by the invention of genetic modification technologies, and most recently the digital agricultural revolution. The digital agriculture revolution builds on the use of electronics and information technology to automate production alongside the incorporation of artificial intelligence and autonomous robots (Rose, 2020). These technologies are capable of achieving more efficiency and productivity in agriculture than the field has ever experienced.

The contribution of digital technologies and their integration into agriculture has been recognized as a critical element in the transformation of production practices. Trendov, Varas and Zeng (2019) described it as the future that would transform the agri-food sector and offer numerous opportunities through widespread information access and availability, and connectivity. Digital agriculture has the potential to influence farmers' behaviour, activities of input providers and other stages of the agri-food value chain. According to Food and Agriculture Organization (2017), the use of digital technologies, particularly the internet and mobile phones, has the potential to not only improve farmers' access to information but also offer capacity building opportunities for rural communities, revolutionising early warning systems through data and also revolutionize extension and advisory services. Evidence from studies suggests that it is beneficial to all stakeholders of the agricultural sector and not just the farmers. ICTs could promote learning which would foster technology adoption among farmers; update researchers on farmers' needs; and even allow policymakers to access a more comprehensive overview of agricultural changes and trends in their country (Torrero, 2014).

In an attempt to meet this trend, various initiatives are in place to incorporate digitalization into the Nigerian agricultural sector. The Nigerian Digital Agriculture Strategy (NDAS) is one of these initiatives that have been set in motion to achieve the purpose to improve farmers' access to information and achieving sustainable agricultural production. Coupled with this, the International Institute of Tropical Agriculture developed a series of digital tools such as the Interactive Voice Recording (IVR) service, to provide farmers with cassava cultivation tips; IITA herbicide calculator, to give an accurate estimation of herbicide quantity to be used by farmers and spray service providers among others (Cassava matters, 2020). Most of these digital tools developed by IITA would ensure Nigerian farmers' access to tailored text and voice messages on available markets, advisory services on best practices, and localized weather forecasts, allowing them to make informed decisions during planting and post-planting processes (Fudzagbo, 2021).

Furthermore, numerous digital agricultural platforms like Farmcrowdy, ThriveAgric, and

Agrogrite among others have been developed to improve farmers' access to credit, market and even storage facilities (Unah, 2018). These are all digital technology-enabled opportunities that are at the disposal of Nigerian farmers to take advantage of for improved productivity. The benefits the Nigerian agricultural sector stands to gain from digital technologies cannot be overemphasized. However, the success of this technology is only as good as the skills of its user. The use of digital technologies by farmers is dependent on different factors like access to digital devices, and internet infrastructure among others. However, even if these factors are addressed, there is still a big question about the users' skills to use this innovation: their level of digital literacy.

Digital literacy is an essential skill that farmers need to translate the services provide by digital agriculture into practice. It is the "ability to use information and communication technologies to find, evaluate, create, and communicate information which requires both cognitive and technical skills" (American Library Association, 2013). Digital literacy implies not only IT proficiency but also involves analytical skills, an awareness of the standards behaviours, and an understanding of the shared social issues created by digital technologies. For digital agriculture to be successful in Nigeria, farmers are required to possess a significant level of digital literacy.

While efforts are being made to increase the availability of digitally enabled technologies for farmers' use, experts believe digital literacy would be a great constraint on the adoption of digital agricultural technologies as well as a factor that would determine the successful implementation on farms as the use of these digital agricultural technologies require at least basic digital competence (Trendov *et al*., 2019). This stud, therefore, examined the level of digital literacy among crop farmers in Oyo State. The specific objectives were to:

1. Determine the personal characteristics of farmers in the study area.
2. Assess the perception of respondents towards the use of digital devices.
3. Investigate respondents' knowledge level on the use of digital devices for farm-related information.
4. Identify the constraints to digital usage among respondents in the study area.

**Hypotheses of the study**

$H_0$1: There is no significant relationship between farmers' personal characteristics (age, sex, marital status, farm size, farming experience, level of education, type of mobile phone used, and type of crop produced) and level of digital literacy.

$H_0$2: There is no significant relationship between the perception of farmers on the use of digital tools and digital literacy.

$H_0$3: There is no significant relationship between level of knowledge of farmers on digital agriculture and platforms and level of digital literacy.

$H_0$4: There is no significant relationship between constraints to digital usage and level of digital literacy.

**METHODOLOGY**

The study area was Oyo State. Oyo State is an island state in southwestern Nigeria with 33 local government areas. It shares a border with Osun state, Kwara state, Ogun state and the Republic of Benin at the east, north, south, and southwest, respectively. The population of the study comprised crop farmers in Oyo state from Ido and Egbeda local government areas.

A multistage sampling procedure was used to determine the respondents for the study. Out of the 33 local government areas in Oyo state, two were selected using simple random sampling, that is, Ido and Egbeda local government areas. In each of these local government areas, the prominent farmers' association was identified, and a list of the crop farmers was obtained in each of the local government areas. Using simple random sampling, a total of 150 respondents were selected. The primary data were obtained from the respondents using an interview schedule consisting of both close and open-ended questions. Out of the 150 questionnaires, only 120 were returned.

The dependent variable of this study is the level of digital literacy. A list of basic digital skills was devised to measure respondents' usage and competence (ability to use) basic digitally enabled resources. The respondents were asked to indicate the digital skill they have with response options of Yes and No, score as 1 and 0, respectively. The mean score was generated to determine the level of digital literacy and categorized into high or low. The data collected were analyzed using descriptive statistics (frequencies, percentage, and mean). The hypotheses were tested using inferential statistics (Pearson Product Moment Correlation (PPMC) and Chi-square) to show the relationship between the variables as stated in the hypotheses.

Other key variables were;

Perception of respondents to digital agriculture; this was measured by providing respondents with 10 perceptional statements which they responded to by indicating their level of agreement using a 5-point Likert type scale of strongly agree, agree, undecided, disagree and strongly disagree with scores of 5,4,3,2,1 respectively for positive statements and reversed for negative statements.

Knowledge of respondents on digital agriculture and platform: It was measured by providing respondents with knowledge statements on digital agriculture and platform with response option of true- 1 or false- 0.

## RESULTS DISCUSSION

### Personal characteristics of respondents

The result in Table 1 indicates that the mean age was 56 years. Age could influence the ability of farmers to develop or improve their digital skills as previous studies indicate that the level of digital literacy tends to be lower in older adults according to Iskandar *et al.* (2020). The result further reveals that 70.0% of the respondents were male while 30.0% of the respondents were female. Adeleke (2020) affirmed that gender is an influencing factor in the digital divide with more men than women engaging in digital usage (Adeleke, 2020). Also, most of the respondents (90.8%) were married. This suggests that respondents are mature people who could get assistance from their children, who are expected to have higher levels of digital literacy than their parents since digital literacy is higher among the younger population.

A larger percentage of the respondents had no formal education (42.5%), 21.7% of the respondents had primary education, 13.3% had secondary education, and 22.5% had tertiary education. This implies that majority of the respondents have a low or no level of education. McLean (2015) explained that a higher level of illiteracy is one of the predictors of low digital usage in Nigeria. This also implies that respondents with higher education attainment could have higher levels of digital literacy, and a higher level of knowledge on digital agriculture and digital technologies than those with low or no education.

**Table 1: Frequency distribution of respondents' personal characteristics**

| Variables | Frequency | Percentage (%) | Mean ±SD |
|---|---|---|---|
| **Sex** | | | |
| Male | 84 | 70.0 | |
| Female | 36 | 30.0 | |
| **Age** | | | 56±9.8years |
| 25-34 | 4 | 3.3 | |
| 35-44 | 8 | 6.7 | |
| 45-54 | 32 | 26.7 | |
| 55-64 | 50 | 41.7 | |
| 65 and above | 26 | 21.7 | |
| **Marital status** | | | |
| Single | 4 | 3.3 | |
| Married | 109 | 90.8 | |
| Divorced | 2 | 1.7 | |
| Widow(er) | 5 | 4.2 | |
| **Level of education** | | | |
| No formal education | 51 | 42.5 | |
| Primary education | 26 | 21.7 | |
| Secondary education | 16 | 13.3 | |
| Tertiary education | 27 | 22.5 | |
| **Farming experience** | | | 24.9±13.01years |
| 2-14 | 31 | 25.8 | |
| 15-27 | 35 | 29.2 | |
| 28-40 | 43 | 35.8 | |
| 41-53 | 10 | 8.3 | |
| 54-66 | 1 | 0.8 | |
| **Farm size** | | | 6.4±8.4acres |
| 0.50-8 | 94 | 78.3 | |
| 9-16 | 13 | 10.8 | |
| 17-24 | 11 | 9.2 | |
| 35 and above | 2 | 1.7 | |
| **Type of mobile phone** | | | |
| Smartphones | 33 | 27.5 | |
| Feature phones | 87 | 72.5 | |
| **Presence on social media** | | | |
| Never | 88 | 73.3 | |
| Sometimes | 19 | 15.8 | |
| Always | 13 | 10.8 | |

**Source: Field survey, 2021**

The mean year of respondents' farming experience was 25years while the average farm size was 6.4acres as revealed in Table 1. Farmers with smaller farm size may not appreciate the need to adopt digital agriculture thus preventing them from developing their digital competence or using digital technologies for their farm processes. Also, 72.5% of the respondents use feature phones while 27.5% of the respondents had smartphones. This implies a low availability or widespread of web-enabled smartphones among farmers which could result in low levels of digital literacy as they lack the necessary tools that would encourage digital usage and development of digital skills. Furthermore, 73.3% of the respondents had never used any social media platform, while 26.6% of the respondents use social media platforms sometimes or always. It is expected that those who have a presence on social media and use smartphones would have higher levels of digital literacy, a higher level of knowledge of digital agriculture and digital technologies.

**Perception of respondents toward the use of digital tools**

Table 2 below shows the frequency distribution of respondents' perceptions of the use of digital tools. As shown in Table 2a, majority (4.0) of the respondents agreed that the benefits derived from the use of digital devices for farm purposes outweigh its cost. They also affirmed that the use of digital devices for information access and advisory services can improve access and save time (4.1). Most of the respondents agreed that only young people can have necessary digital skills to use digital devices (3.6) and were too old to use digital devices (3.

Table 2b below shows the categorization of respondents' perception of the use of digital tools. The perception of the respondents towards the use of digital tools and its implication for agriculture was favourable for most (69.0%) of the respondents. The favourable perception of appreciable proportion may influence their willingness to undergo necessary trainings to develop their digital skills and competence as well as any relevant digital agriculture technology made available to them. Contrary to this finding is the study of Ajayi, Alabi and Okanlawon (2016) which found that many farmers are indifferent to the use of digital ICT tools for agricultural purposes.

**Table 2a: Frequency distribution of respondents' perception of the use of digital tools**

| Perceptional Statement | SA F (%) | A F (%) | U F (%) | D F (%) | SD F (%) | Mean |
|---|---|---|---|---|---|---|
| I'm too old to use digital devices | 24 (20.0) | 26 (18.3) | - | 36 (30.0) | 38 (31.7) | 3.35 |
| Only young people can have the necessary digital skills to use digital devices | 13 (10.8) | 20 (16.7) | 1(0.8) | 51(42.5) | 35 (29.2) | **3.**63 |
| Only people with formal education can use digital devices | 19 (15.8) | 29 (24.2) | 3 (2.5) | 51 (42.5) | 18 (15) | 3.17 |
| The use of digital devices for obtaining information and marketing is complicated and difficult | 20 (16.7) | 18 (15) | 20 (16.7) | 45 (37.5) | 17 (14.2) | 3.18 |
| The cost of using digital tools is too high | 42 (35) | 40 (33.3) | 11 (9.2) | 18 (15) | 9 (7.5) | 2.27 |
| There are no available infrastructures to support digital agriculture in Nigeria | 9(7.5) | 27 (22.5) | 16 (13.3) | 58 (48.3) | 10 (8.3) | 3.28 |
| With appropriate training, anybody can become digitally literate | 30 (25) | 37 (30.8) | 29 (24.2) | 16 (13.3) | 8 (6.7) | 3.54 |
| The use of digital devices for information access and advisory services can improve access and save time | 39 (32.5) | 58 (48.3) | 17 (14.2) | 3 (2.5) | 3 (2.5) | 4.10 |
| The benefits derived from the use of digital devices for farm purposes outweigh their cost | 32 (26.7) | 57 (47.5) | 24 (20) | 7 (5.8) | - | 4.00 |
| Digitalization should be integrated into the Nigerian agricultural sector | 14 (11.7) | 66 (55) | 36 (30) | 1 (0.8) | 3 (2.5) | 3.73 |

**Table 2b. Categorization of respondents based on their perception of use of digital tools**

| Perception | Frequency | % | Min | Max | S.D | Mean |
|---|---|---|---|---|---|---|
| Unfavourable | 51 | 42.5 | 15 | 50 | 7.7 | 34.1 |
| Favourable | 69 | 57.5 | | | | |
| **Total** | 120 | 100 | | | | |

**Level of knowledge of respondents on digital agriculture and platforms**

Many respondents seem to know the basic use of digital agriculture and how it works as majority know that digital agriculture is useful for information access and communication (99.2%) and that it requires internet connectivity to function (97.5%), as shown in Table 3. However, many of them lack the knowledge of emerging digital agriculture solutions like drones and automation (62.5 %), the services offered by digital agricultural platforms (69.2%), and the use of digital ICT tools like social media for marketing (69.2%). This is in tandem with the findings of Alabi and Okanlawon (2016) which indicated that farmers have more knowledge of traditional ICT tools than digital ICT tools, implying a low level of knowledge of digital tools among farmers.

The result in Table 4 further revealed that majority (55.0%) of the respondents had low or limited knowledge of digital agriculture and relevant platforms, while 45.0% of the respondents had high knowledge. This finding could be a reflection of the limited educational attainment found among respondents. It shows that many of the respondents are unaware of the advanced concepts behind digital agriculture and the specific additional benefits it has to offer.

**Table 3: Frequency distribution of respondents' level of knowledge on digital agriculture and platforms**

| Knowledge Statement | True F (%) | False F (%) |
|---|---|---|
| Digital devices can be used to communicate and access information | 119 (99.2) | 1 (0.8) |
| Digital devices can be used for social networking | 118 (98.3) | 2 (1.7) |
| Digital devices require mobile data for internet access | 117 (97.5) | 3 (2.5) |
| Digital agriculture is the collection and sharing of necessary information via digital tools across all stages of farm production | 94 (78.3) | 26 (21.7) |
| Digital agriculture also encompasses automation, the use of drones, sensors etc. to monitor farm conditions and processes | 45 (37.5) | 75 (62.5) |
| Organizations like farm crowdy, agrorite, agrolinka, Thrive etc.) are digital platforms that offer several services to farmers online | 37 (30.8) | 83 (69.2) |
| Relevant information on weather, input supply, market price etc. can be easily accessed online | 76 (63) | 44 (36.7) |
| Only information from empirical studies and websites of relevant organizations (like NIHORT, Ministry of Agriculture etc.) are reliable | 89 (74.2) | 31 (25.8) |
| Wikipedia is a reliable source for obtaining farm-related information | 38 (31.7) | 82 (68.3) |
| Marketing of agricultural produce cannot be done via social media and digital agricultural platforms | 37 (30.8) | 83 (69.2) |
| The use of digital devices is limited to information access and exchange | 67 (55.8) | 53 (44.2) |
| Digital agriculture is just the collection and sharing of necessary information across all stages of farm production | 97 (80.8) | 23 (19.2) |
| Digital agriculture is limited to mobile phones and information access | 80 (66.7) | 40 (33.3) |
| Digital agricultural platforms do not offer credit and financial facilities | 92 (76.7) | 28 (23.3) |
| Digital agricultural platforms do not offer storage facilities for harvested products | 103 (85.8) | 17 (14.2) |

**Table 4: Frequency distribution of respondents based on their level of knowledge on digital agriculture and platforms**

| Knowledge | Frequency | Percentage | Min | Max | S.D | Mean |
|---|---|---|---|---|---|---|
| Low | 66 | 55.0 | 4 | 15 | 2 | 10.1 |
| High | 54 | 45.0 | | | | |
| Total | 120 | | | | | |

**Constraints to digital literacy and usage among respondents**

Table 5 reveals the frequency distribution and ranks of constraints based on their level of severity. The result shows that lack of training to develop digital skills (1.87) ranked the most severe constraint to digital literacy among respondents. Unstable or lack of power supply (1.47) ranked second most severe constraint. This might have been a result of unavailability of adequate infrastructure in different communities. Illiteracy (1.45) ranked third in order of severity which is in conjunction with the study of Fawole and Olajide (2012) which identified illiteracy as a constraint to digital ICT usage among farmers alongside poor electricity, internet infrastructure, and unavailability or substandard relevant digital tools. However, the findings of the study show that unavailability of digital tools (1.38) and poor or no internet access (1.23) were also constraints to digital literacy ranking fourth and fifth in order of severity, respectively. However, financial constraint (1.11) ranked the least severe constraint to digital literacy. This implies that the financial capacity of farmers

does not necessarily affect their level of digital literacy or their ability to use digital tools.

**Table 5: Frequency distribution of constraints to digital literacy among respondents**

| S/N | Constraints | Not a constraint F (%) | Severe F (%) | Very severe F (%) | Mean | Rank |
|---|---|---|---|---|---|---|
| 1. | Financial constraint | 15 (12.5) | 76 (63.3) | 29 (24.2) | 1.11 | 7th |
| 2. | Unavailability of necessary digital devices | 26 (21.7) | 23 (19.2) | 71 (59.2) | 1.38 | 4th |
| 3. | Poor or no internet access | 18 (15) | 57 (47.5) | 45 (37.5) | 1.23 | 5th |
| 4. | Unstable or lack of power supply | 5 (4.2) | 74 (61.7) | 40 (33.3) | 1.47 | 2nd |
| 5. | Lack of trainings to develop digital skills | 2 (1.7) | 12 (10) | 106 (88.3 | 1.87 | 1st |
| 6. | Illiteracy | 29 (24.2) | 8 (6.7) | 83 (69.2) | 1.45 | 3rd |
| 7. | Lack of social support networks | 33 (27.5) | 39 (32.5) | 48 (40) | 1.12 | 6th |

**Level of digital literacy**

As indicated in Table 7 below, majority of respondents were not skilled enough to; send and receive text messages, emails, or through social media( 70.0%),use Google and other search engines to find out general information( 73.3%), use Google and other search engines to find out general information (75.0%), share information and knowledge to others digitally (75.0% ), use digital platforms to network with other farmers, input suppliers, and buyers (78.3%), use mobile apps like IITA herbicide calculator to determine the quantity of herbicide necessary (87.5% ).

The result in Table 8 further revealed that the level of digital literacy was low among respondents which may be due to their educational attainment and the type of mobile phone they have access to or use. Evidence from the study of Okoedo-Okojie and Omoregbe (2012) corroborates the study as their findings showed that farmers had low digital usage and competence owing to their low educational level and lack of appropriate digital tools. The implication of this is that if the NDAS is introduced to Oyo state, many of the farmers from the state may not be able to utilize any of the digital agriculture technology, as proposed by the NDAS.

**Table 7: Frequency distribution of respondents' basic digital skills**

| Basic Digital Skills | Yes F (%) | No F (%) |
|---|---|---|
| I can send and receive text messages, emails, or through social media | 36 (30.0) | 84 (70.0) |
| I can use Google and other search engines to find out general information | 32 (26.7) | 88 (73.3) |
| I can use Google and other search engines to find out farm-specific information | 30 (25.0) | 90 (75.0) |
| I am able to share information and knowledge with others digitally | 30 (25.0) | 90 (75.0) |
| I can use digital platforms to network with other farmers, input suppliers, and buyers | 26 (21.7) | 94 (78.3) |
| I can search for agricultural inputs online and compare prices | 25 (20.8) | 95 (79.2) |
| I can use the internet to access weather forecast | 23 (19.2) | 97 (80.8) |
| I can interpret weather forecasts found online | 7 (5.8) | 113 (94.2) |
| I use the internet (search engines, social media etc.) to stay updated on the market price for my products | 19 (15.8) | 101 (84.2) |
| I am able to evaluate all contents found online for their accuracy and reliability | 19 (15.8) | 101 (84.2) |
| I use digital agricultural platforms (like agrorite) to market my farm products | 17(14.2) | 103 (85.8) |
| I use digital agricultural platforms (like agrorite) to access credit facilities | 11 (9.2) | 109 (90.8) |
| I can use mobile apps like IITA herbicide calculator to determine the quantity of herbicide necessary | 15 (12.5) | 105 (87.5) |
| I can use digital platforms to seek out advisory services for experts | 25 (20.8) | 95 (79.2) |
| I'm aware of and capable of taking necessary measures to protect personal data and privacy online | 24 (20.0) | 96 (80.0) |

**Table 8: Frequency distribution showing respondent's level of digital literacy**

| Basic digital skills | Frequency | Percent | Min. | Max | S.D | Mean |
|---|---|---|---|---|---|---|
| Low | 86 | 71.7 | 0 | 15 | 4.8 | 2.8 |
| High | 34 | 28.3 | | | | |
| Total | 120 | | | | | |

**Relationship between respondents' personal characteristics and level of digital literacy**

The Chi-square analysis in Table 9 shows that there was no significant relationship between respondents' sex ($X^2$ = 0.946, p = 0.331) and respondents' level of digital literacy. However, there were significant relationships between level of education ($X^2$ = 74.265, p < 0.001), type of mobile phone ($X^2$ = 87.775, p < 0.001), marital status ($X^2$ = 16.029, p = 0.001) and respondents' level of digital literacy. This suggest that the use of smartphones could increase the level of digital literacy than using feature phones. Furthermore, digital literacy could be determined by level of education and marital status.

Also, there was a significant relationship between the respondents' age (r = -0.550, p < 0.001), farming experience (r = -0.569, p < 0.001), and farm size (r = -0.396, p < 0.001) and their level of digital literacy. However, the negative r values of these independent variables indicate negative correlations which suggest that as these variables (age, farm size, and farming experience) increase, the level of digital literacy reduces and vice versa. This implies that farmers with high farming experience have low digital literacy and usage to obtain information but farmers with lower years of experience tend to actively use the internet and other digital tools to obtain information relevant in their production process. Similarly, it is also consistent with the findings of Moore *et al*. (2015) that showed that the level of digital literacy tends to reduce as age increases.

**Table 9: Relationship between personal characteristics and level of digital literacy**

| Variables | $\chi^2$ | df | | p-value |
|---|---|---|---|---|
| Sex | 0.946 | 1 | | 0.331 |
| Marital status | 16.029 | 3 | | 0.001* |
| Education level | 74.265 | 3 | | 0.000* |
| Type of mobile phone | 87.775 | 1 | | 0.000* |
| Type of crop produced | 0.525 | 1 | | 0.469 |
| Age | | | -0.550 | 0.000** |
| Farming experience | | | -0.569 | 0.000** |
| Farm size | | | -0.396 | 0.00** |

**Source: Field survey, 2021**

**Perception on use of digital tools, knowledge of digital agricultural tools, constraints to digital literacy and level of digital literacy**

Table 10 below shows that the perception of respondents towards the use of digital tools had a positive but weak correlation with the level of digital literacy (r = 0.429) and a significant relationship between the variables also exists (p < 0.001). This finding suggests that respondents' level of digital literacy increases with favourable perceptions. Favourable perception toward digital technologies among the respondents indicates that they could be willing and eager to seek or participate in training organized to develop digital skills. Also, there was no significant relationship between the knowledge of respondents on the use of digital literacy and the level of digital literacy (p = 0.504) and no correlation between the two variables (r = - 0.062). This finding suggests that farmers' knowledge of digital agriculture and platforms does not necessarily translate to a high level of digital literacy. Furthermore, there was also a significant relationship between constraints to digital literacy and respondents' level of digital literacy (p < 0.001). However, the negative value of r (r = -0.533) indicates a negative correlation between constraints and the level of digital literacy. This result suggests that the more constraints faced by farmers, the lower their level of digital literacy. The implication of this is that if efforts are made to address the identified constraints, then farmers' level of digital literacy could improve.

**Table 10: Distribution according to relationship between perception of respondents on use of digital tools and level of digital literacy**

| Variable | R | p |
|---|---|---|
| Perception vs. level of digital literacy | .429 | .000** |
| Knowledge vs. level of digital literacy | -0.062 | 0.504 |
| Constraints vs. level of digital literacy | -0.533 | 0.000** |

**= significant at p≤ 0.01

**CONCLUSION**

Based on these findings, it can be concluded that the level of digital literacy among crop farmers was low. Most of the farmers were married male old adults with low educational attainment. They made use of feature phones and have used any social media platform. They also had favourable perception towards digital tools and agriculture. Lack of necessary trainings to develop their digital skills was the most severe constraints affecting digital usage and literacy among farmers, However,

farmers are willing to participate in trainings that would develop their digital skills such as trainings on how to: handle digital devices.

The following recommendations are made based on the findings of this study to ensure sustainable adoption and implementation of digital agriculture.

1. In order to bridge the knowledge gap in digital skills of farmers, public and private extension personnel should focus on training farmers to develop their digital skills as well as encourage seasonal trainings to keep their digital skills updated and improved, since digital technologies continue to evolve.
2. Government can partner with telecommunication companies to provide farmers with subsidized digital tools in order to improve their access to broadband internet connection.

**REFERENCES**

Adeleke, R. (2020). Digital divide in Nigeria: The role of regional differentials. *African Journal of Science, Technology, Innovation and Development* 13.3: 333-346.

Ajayi, A. Alabi, O. and Okanlawon, B. (2016). Knowledge and perception of farmers on the use of information and communication technology (ICT) in Ife-Central Local Government Area of Osun State: Implications for rural development. *Journal of Agricultural Extension and Rural Development* 10.3:44-53.

American Library Association (2013). Digital literacy. *American Library Association.*

American Library Association (2013). Digital literacy. *American Library Association.*

Cassava Matters (2020). Eight IITA digital tools every smart farmer must have in 2020. International Institute of Tropical Agriculture.

Fawole, O. andOlajide, R. (2012). Awareness and Use of Information Communication Technologies by Farmers in Oyo State, Nigeria. *Journal of Agricultural and Food Information* 13.4:326-337

Food and Agriculture Organization (2017). Information and communication technology (ICT) in agriculture. *Food and Agriculture Organization*.1-37.

Fudzagbo, J. (2021). How digital extension can transform rural farming in Nigeria. Futux Consult.

Iskandar, E., Amanah, S., Hubeis, A. andSadono, D. (2020). Factors affecting internet literacy of smallholder cocoa farmers in Aceh, Indonesia. *International Journal of Advanced Science and Technology*29.5:4074-4084.

McLean, P. (2015). Human networks bridging the digital divide in rural Nigeria. *Public Sphere Project*. 52.

Okoedo-Okojie, D. and Omoregbe, F. (2012). Determinants of access and farmers' use of information and communication technologies (1CTs) in Edo State, Nigeria. *Journal of Applied Science and Environmental Management* 16.1: 41-44.

Rose, D. (2020). The fourth agricultural revolution is coming – but who will really benefit? *TheConversation*.

Torrero, M. (2014). 2013 Global food policy report chapter: information and communication technologies: farmers, markets, and the power of connectivity. IFPRI. 63-73.

Trendov, N., Varas, S. and Zeng, M. (2019). Digital technologies in agriculture and rural areas. *Food and Agricultural Organization*. 1-18.

Unah, L. (2018). Agritech startups in Nigeria. *Devex*.l

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# Analysis of food insecurity status and its determinants among farming households in Ogbomoso agricultural zone of Oyo state, Nigeria

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**Abstract:** The aim of the study was to analyse the food insecurity status of farming households in Oyo State, Nigeria. The study made used of primary data which were randomly collected from 120 farming households with the aid of structured questionnaire, the study analysed the food insecurity status of farming households and its determinants in the study area. Additionally, various coping strategies employed against food insecurity status by the respondents in the study area were also identified. The analytical technique employed included descriptive statistics, Foster Greer and Thorbecke (1984) and Logit regression model. The study showed that the mean age was 48.55. It revealed that majority of the respondents were male with a percentage of 87.5%. It was shown that majority of the respondents were married 83.33%, 62.50% were Christians, with mean household size of 7. It was also discovered that 48.33% of the respondents were food secured while 51.67% were food insecure. With food insecurity line of ₦16755.06 the head count ratio of food insecurity incidence ($\alpha_0$) was 0.4001, depth ($\alpha_1$) was 0.0871and severity ($\alpha_2$) was 0.0327. The significant variables affecting food insecurity status included household size at 1% level, and Farming experience at 10% level, Level of education at 1% level and number of remittances received at 1% level. The study showed that majority of the respondents in the study area shift to less preferred food as their coping strategy in the study area with the percentage of 46.66%.
**Keywords:** Determinants, poverty status, coping strategies, farming households, Nigeria

## INTRODUCTION

Food insecurity is a substantial problem in nearly every advanced capitalist nation, with sizable portions of residents in many affluent countries struggling to eat healthily every day (Laborde *et al.,* 2021). Twenty percent of U.S. households classified as food insecure had midrange or high incomes, according to responses to the 1995-97 Current Population Survey (Nord and Brent 2002). During the last two decades hunger has reemerged as an important social issue in the United States. As a result, efforts were initiated to adequately define hunger and food insecurity (i.e., limited or uncertain access to nutritionally adequate and safe foods) and to develop appropriate indicators for their measurement (Hanson and Connor, 2014). Four grades of the severity of food insecurity among the households resulted: food secure and occasionally, moderately and extremely food insecure (Frongillo *et al.,* 2003).

Food insecurity is a salient health issue comprised of four dimensions – food access, availability, utilization, and stability over time (Ashby *et al.,* 2016). Accumulating evidence suggests that food insecurity in US colleges and universities is higher than in US households, making this a new public health priority (Nazmi *et al.,* 2018). Food insecurity, which has been recognized as an important determinant of health, is estimated to have affected almost one in ten Canadian households in 2004. Analyses of indicators of household food insecurity on several recent population health surveys have shed light on markers of vulnerability and the public health implications of this problem (Kirkpatrick and Tarasuk, 2008). The global economic policy drivers of food insecurity have been widely acknowledged and debated in the literature, and in policymaking forums.

Action on economic policy reform in support of food security, however, has been only weak and selective in practice. Since the 2007 to 2008 food crisis and in the context of an ongoing precarious global food security situation, global food security initiatives have been situated squarely within the existing global economic regulatory framework. These initiatives include most prominently measures to increase food production and to share information on markets and investments in World Hunger and the Global Economy: Strong Linkages, Weak Action ways that encourage them to operate smoothly and responsibly (Clapp, 2014).

The recurring storm of poverty and food insecurity in the sub-Sahara Africa has continually posed major challenge to the global community. This signals an alarming threat to the region's ability to fully achieve the desired sustainable development (Oyebanjo *et al.,* 2013). Existing evidence on the association between food insecurity and childhood obesity is mixed. In addition, literature from developing countries in general and Ethiopia in particular on the nexus and impact of household and child food insecurity on childhood obesity in the context of urbanization remains limited (Biadgilign *et al.,* 2021). Food insecurity is one of the determinant factors of malnutrition in developing countries. (Betebo *et al.,*2017).

Food insecurity is not having sufficient quantities of good-quality foods—is inversely related to physical and mental health and directly related to poor dietary intake (Bawadi *et al.,* 2012) Addressing the challenges of global food security will benefit from the simultaneous incorporation of nutritional priorities that contribute to the good health of populations (Shetty 2009).

Although household income, income per capita, income of fathers and income of mothers were found to be risk factors for food insecurity and nutritional status of children to differ significantly according to food security level in other studies, this study did not find similar results. This may be due to factors such as the differences in culture, religion and geographic location of this study compared to the previous studies (Sharif and Merlin, 2001). Measures of socio-economic status (SES) were compared with a measure of physical well-being, mid-upper arm circumference (MUAC), in the food insecure regions of Ethiopia. Income, housing conditions and education had the greatest correlation to MUAC, and significant differences in these measures were observed between malnourished and adequately nourished individuals. Findings indicate that in rural Ethiopia, income, education and housing quality may be better indicators of SES than wealth and measures encompassing home and landownership (Doocy and Burnham, 2006).

Agriculture is an important tool for reducing the effects of household food insecurity, unemployment and poverty which are major problems in urban areas in Nigeria. Food insecurity continues to worsen in some urban areas of the country and many households resorted into urban farming as a means of coping (Yusuf *et al.,* 2015). About two-thirds of rural households in Nigeria are engaged in crop and livestock production as their main source of livelihood. These households are especially vulnerable to chronic food shortages owing to adverse weather and the unavailability of enough food from home production, especially during the post-planting season (Adepoju and Adejare, 2013). In general, the food insecure households were characterized by households living below poverty line and had larger household size, more children, school- going children and non-working (Shariff and Lin, 2004).The new global and African food security agenda is overwhelmingly production's and rural in its orientation, and is based on the premise that food insecurity is primarily a rural problem requiring a massive increase in smallholder production (Crush and Frayne, 2011).

Food insecurity has been associated with diverse developmental consequences for U.S. children primarily from cross-sectional studies. We used longitudinal data to investigate how food insecurity over time related to changes in reading and mathematics test performance, weight and BMI, and social skills in children (Jyoti etal.,2005). Even though food insecurity is experienced in different degrees, and in many forms and periods, most studies have often classified food insecurity as mild/very low, moderate/low and severe. This study reveals that food insecurity is a rural and productivity problem and not a poverty issue (or inadequate credit).

It is essential therefore, to have the analysis of food insecurity done in the household level to understand the actual demand for food and thus its effect on the food security situation on households. Specifically, the study analysed the food insecurity status as well as its determinants with their coping strategies in the study area.

## METHODOLOGY

The study was conducted in Ogbomoso, Oyo State. Ogbomoso is one of the largest towns in the state. Ogbomoso comprises five local government areas namely Surulere, Ogo-Oluwa, Orire, Ogbomoso north and Ogbomoso south. Ogbomoso town is geographically located on latitude 8.10N and longitude 3.290E. The population was approximately 166,034 as of 2006 census, an area of 23km$^2$ with about 45% civil servant who as well engaged in farming, and the other 55% are into full time farming (both crops and animal production) and different trading activities.

Primary data collected through a well-structured questionnaire were used for the study. Multistage random sample technique was used in the selection of the respondents. In all, 120 registered farming households were used for data analysis. Descriptive statistics, Foster Greer and Theorbecke (FGT) 1984 food insecurity index and Logit regression model were used to analyze the data. Descriptive statistics such as Tables, mean, frequencies, percentage, and cumulative frequencies Foster, Greer and Thorbecke (FGT) 1984 Food insecurity index.

Using the method of estimation of the Foster, Greer and Theorbeke poverty index (1984), the food insecurity index was estimated as:

$\mathbf{F\alpha\ (y,z)\ =1/n\ \sum^{q}_{i=1}(Z\text{-}yi)^{\alpha}/z}$, Where, $F_\alpha$= Food security index; Z= Food security line for the respondents in the study area; Q= Number of farmers below the food security line; N= Total number of farmers in the population; $Y_i$= per capita food expenditure in increasing order for all farmers; α= is the aversion parameter that takes values of Zero, one and two.

Logit model was used to estimate the determinant of food insecurity among farmers in the study area.

$P_{i=}\sum (Y+1|xi) = 1|\ 1+ e^{-(\alpha+\beta\times i)}$; $P_I = 1|1\text{-}e\text{-}zt$

Where, $Z_i = \beta_1 X_1\ \beta_2 X_2 + \ldots\ldots\ldots + \beta_n X_n$

$F_I$ is the cumulative logistic distribution function. In order to obtain the value of $Z_I$, the likelihood of obtaining the sample need to be form by introducing the dichotomous response variables ($Y_i$) such that;

$Y_i$ = 1 if food secure and 0 if food insecure

$X_i$ = independent variables; 1,2,3…..13; $\alpha_i$ and $\beta_i$ are the hypothesized independent variables that were used;

$X_1$ = gender, $X_2$ = age (years); $X_3$ = religion, $X_4$ = Marital status of household head (1single; 2 if married, 3 if divorced, 4 if separated and 5 if

widow(er)); $X_5$ = Family size in number, $X_6$ = dependency ratio, $X_7$= cooperative society, $X_8$ = contact with extension agent, $X_9$ = secondary occupation; $X_{10}$ = farm size, $X_{11}$= farming experience, $X_{12}$ = educational level, $X_{13}$ = amount of remittances received. The CSUI employed to assess the extent of use of the coping strategies by farming households in analyzing the extent of the use of any of the coping strategies by farming household, a coping strategy index (CSI) was developed by ranking. The extent of use of coping strategies was expressed using a four-point scale with the following order, 1,2, and 3 for Never, Always and Sometimes respectively. CSUI = $N_1X_3 + N_2X_2 + N_3X_1$. Where; CSUI = Coping strategies use index. N1 = Number of households that never uses a-particular CSI. N2 = Number of households using a particular CSI always. N3 = Number of households that sometimes used a particular CSI.

## RESULTS AND DISCUSSION

### Socioeconomic characteristics of respondents

The socio-economic characteristics of the respondents consist of Gender, age, household size, religion, marital status. Table1; revealed that 87.5% of the respondents were male while, 12.5%of the respondents were female. The implication is that there were more male farmers in the study area than female. This finding corroborated with the work of Fanifosi and Amao (2016) titled socioeconomic analysis of nexus between food insecurity and poverty status of farming households in Osun State, Nigeria. Which showed that majority of the farming households were male headed with 80.59%. The table revealed that 7.50% of the respondents falls between the ages of 30 or less.12.50%of the respondents were between the ages of 31-40, 36.67%were between 41-50, 33.3%were between the ages of 51-60 and 10.00% were above 60.The implication is that majority of the respondent were between ages of 41-50with 36.67%.The mean age of the respondents was 48.55. This finding corroborated with the work of Kelly *et al*, (2018) Titled Analysis of food security among cocoa producing households in Ghana which revealed the average age of farmers in the study area to be 48years. The table also showed that 75 respondents (62.50%) were Christians .41 respondents with percentage of 34.17% were Muslim and 4 which has the percentage of 3.33% were traditional in the study area. This implies that there were more Christians in the study area. This finding was corroborated by the work of Yekinni *et al*, (2015) titled coping strategies to food insecurity among rural household in Ido local government area of Oyo state where the majority of the respondent were Christians with 55.0%. The table further revealed that 15.00% of the respondents were single, 83.33% of the respondents were married, 0.83% of the respondents were divorced, and 0.83% of the respondents were separated. The implication is that majority of the respondents in the study area were married with 83.33%.

**Table 1: Distribution of respondents based on socioeconomic characteristics**

| Gender | Frequency | Percentage | C% |
|---|---|---|---|
| Male | 105 | 87.5 | 87.5 |
| Female | 15 | 12.5 | 100 |
| **Age** | | | |
| < 30 | 9 | 7.50 | 7.50 |
| 31-40 | 15 | 12.50 | 20.00 |
| 41-50 | 44 | 36.67 | 56.67 |
| 51-60 | 40 | 33.33 | 90.00 |
| Above 60 | 12 | 10.00 | 100 |
| Mean | 48.55 | | |
| **Religion** | | | |
| Christianity | 75 | 62.50 | 62.50 |
| Islam | 41 | 34.17 | 96.67 |
| Traditional | 4 | 3.33 | 100 |
| **Marital Status** | | | |
| Single | 18 | 15.00 | 15.00 |
| Married | 100 | 83.33 | 98.33 |
| Divorced | 1 | 0.83 | 99.17 |
| Separated | 1 | 0.83 | 100 |
| Household size | | | |
| < 5 | 42 | 35.00 | 25.00 |
| 6-10 | 77 | 64.17 | 99.17 |
| Above 10 | 1 | 0.83 | 100 |
| Mean | 5.94 | | |
| Total | 120 | 100 | |

Source: Field survey, 2021.

This finding corroborated with the work of Yekinni *et al* (2015) titled coping strategies of food insecurity among rural household in Ido local government area of Oyo state, where majority of the respondents were married with 75%. And finally from table, it was revealed that 35.00% of the respondents households were <=5, 64.17% of the household size were between 6-10, 0.83% were above 10. The mean of the household size is 5.94. This implies that majority of the household were 6-10. This result corroborated with the work of Fanifosi and Amao (2016) in Nigeria where the mean is 7.

**Food security status of the respondents in the study area using FGT food insecurity index.**

Table 2 showed the two broad issues in the measurement of food security, there are establishment of a food insecurity line. The total annual expenditure for all the households in the study area was N4,888,000. The mean annual expenditure of the respondents in the study area was N40,733.33k per annum. The total per capita expenditure was N3,015,911.306k the mean per capita expenditure was N25,132.59 per annum.it is necessary to get the food insecurity line to determine the number of food insecure people i.e. those below the food insecurity line. The food insecurity line is computed as 2/3 of per capita income mean. (2/3of N 25,132.59k) which give N16,755.06k. Therefore an household spending less than the amount obtained above annually on consumption is described as being food insecure relative to other household, while any other household spending exactly the stipulated amount or higher than it on annual consumption connotes that the respondent is food secured. However, with food insecurity line of N16755.06k the head count of food insecurity incidence ($a_0$) was 0.40000001. This indicates that 40% of the respondents in the study area were below the food insecurity line. The food insecurity depth or gap ($_{al}$) for the respondents in the study area was 0.08714280. However, this value indicated that only 8.71%were below food insecurity line and therefore require more improvement in spending to reach food insecurity line. The food insecurity severity ($a_2$) was 3.28%for the farming household. This low value indicated that food insecurity was less severe in the study area. Table 2 revealed that 40% of the respondents fell below the food insecurity line. This implied that food insecurity was less persuasive and not deeper and that the income of household must be raised by 8.71% to move out of food insecurity line while 3.28%showed that food insecurity was less severe among the respondents in the study area This findings corroborated with the work of Dare *et al* (2013) where the overall incidence of food insecurity and depth were 58.8% and 19.5% respectively.

**Table 2: Distribution of Respondents using FGT food insecurity index**

| Food Security | Respondents Index | Percentage (%) |
|---|---|---|
| α = 0 | 0.40 | 40 |
| α = 1 | 0.08 | 8 |
| α = 2 | 0.03 | 3 |

Source: Field survey, 2021

**Food insecurity status of respondents in the study area**

Households were profiled into food secured and food insecure groups based on their per capita expenditure. Per capita expenditure is the division of household total expenditure by the household size. Food insecurity line defined as two-third of the mean per capita expenditure of the total respondents. Therefore, households whose per capita expenditure falls below the food insecurity line were designated food insecure while household whose per capita expenditure equals or above the food insecurity line were food secured. The food insecurity line is equal to #16755.06k. Respondents whose per capita expenditure falls below #16755.06k is food insecure while respondents whose per capita expenditure is equal or above #16755.06k is food secured.

Table 15 showed the distribution of respondents based on food security status in which 48.33% were food secure and 51.67 were food insecure. By implication majority of the respondents in the study area were food insecure. This result contradicted with the work of Ifeoma and Agwu (2014) where 74.2% of respondents were food secured while 25.8% were food insecure.

**Table 3: Summary of food security and food insecurity**

| Food insecurity status | Frequency | Percentage (%) | Cumulative (%) |
|---|---|---|---|
| Food secure | 58 | 48.33 | 48.33 |
| Food insecure | 62 | 51.67 | 100.0 |
| Total | 120 | 100.0 | |

Source: Field survey 2021

**Analysis of determinants of food insecurity status of the respondents in the study area using Logit Regression model**

Table 4 showed the logit regression result for food insecurity level of the respondents. This result gave the probability of the food insecurity level of the respondents Gender, age, religion, marital status, household size, dependency ratio, members of cooperative society, access to extension agent, secondary occupation, farm size, farming experience, level of education and amount of remittances received from both local and international. The table revealed that 5 out of 13 variables that determine the level of food insecurity in the study area were significant. Age had a positive coefficient of 0.2270 and was significant at 5% level and indicates a direct relationship. The implication was that the higher the age the respondents, the higher the level of food insecurity in the study area. $X_5$ (Household size) had a negative coefficient of -0.7011 and was significant at 1% level and indicates an indirect relationship. The implication was that the probability of food insecurity decreases with increase in household size in the study area. This result corroborated with the work of Aidoo *et al* (2013) titled determinants of household food security in Sekyere-Afram plain district of Ghana where household size had a negative and significant relationship with food security at 1% significant level implying that, the probability of food security decreases with increase in household size. $X_{11}$ (Farming experience) had a positive coefficient of 0.6157 and was significant at 10% level and indicates a direct relationship. The implication is that a year increase in farming of the household would lead to reduction in food insecurity. This is attributable to the fact that as farming experience increases, the farmers make better output through the appropriate combination of factors of production. This subsequently leads to increase in income and welfare of the farmers. This finding corroborated with the work of Adekoya (2009) titled food insecurity and coping strategies among rural household in Oyo State Nigeria in which farming experience is significant at 10%. $X_{12}$ (level of education) had a negative coefficient of -0.6787 and was significant at 1% level and indicates and indirect relationship. The implication was that the lower the level of education, the lower the revenue. An increase in level of education of the respondents will help to increase the efficiency and performance of the farmers which will lead to increase in the amount of output to be realized because when one is literate, the formal education acquired is an added advantage. $X_{13}$ (Amount of remittances) had a positive coefficient of 0.1898 and was statistically significant at 1% level and indicated a direct relationship. The implication is that the higher the amount of remittance, the higher the level of food insecurity. This result contradicted with the work of Adepoju and Adejare (2013) which had a negative effect on household food security status implying that household with access to remittances have a lower probability of being food insecure.

**Table 4: Analysis determinants of food insecurity status using logit regression model.**

| Variable | Coefficient | Standard error | P>\|z\| |
|---|---|---|---|
| Constant | 5.7228 | 1.9399 | 0.0032 |
| $X_1$ Gender | 0.8036 | 0.6819 | 0.2387 |
| $X_2$ Age (years) | 0.2270 | 0.3657 | 0.035** |
| $X_3$ Religion | -0.7126 | 0.4464 | 0.1104 |
| $X_4$ marital stat | -0.7388 | 0.3457 | 0.8308 |
| $X_5$ household size | -0.7011 | 0.2079 | 0.0007*** |
| $X_6$ dependency ratio | 0.9022 | 0.2764 | 0.7442 |
| $X_7$ cooperative society | -0.2602 | 1.0257 | 0.7998 |
| $X_8$ extension agent | -0.5071 | 0.6027 | 0.4001 |
| $X_9$ sec occupation | -0.4860 | 0.1112 | 0.6622 |
| $X_{10}$ farm size | -0.1474 | 0.1456 | 0.3144 |
| $X_{11}$ farming exp | 0.6157 | 0.3440 | 0.0735* |
| $X_{12}$ education | -0.6787 | 0.2463 | 0.0059* |
| $X_{13}$ amount of remittance | 0.1898 | 0.8932 | 0.0336** |

*Significance at 10%, **Significance at 5% ***Significance at 1%
Source: Field survey 2021

**Coping strategy of the respondents in the study area**

Table 5 showed that 46.66%of the respondents adopted shifting to less preferred food, 8.33% of the respondents in the study area borrow from relatives, friends or neighbors. 12.5% of the respondents in the study area buy food on credit, 10%of the respondents in the study area send some household members to live with other relatives, 2.5% of the respondents in the study area sold their farm or household assets to buy food, 3.33% of the respondents reduce expenditure of household to buy food and 13.33% of the respondents adopted more than one coping strategy in order to secure food. The implication is that majority of the respondents in the study area shift to less preferred meals as their

coping strategy with 46.66%. This result corroborated with the work of Sisha (2010) titled, household level food insecurity assessment, evidence from panel data, Ethiopia. Where the most frequently used coping strategy is relying on less preferred food with (45.93%).

**Table 5: Coping strategies employed against food insecurity by the respondents in the study area**

| Coping strategy | Frequency | Percentage | C% |
|---|---|---|---|
| Shift to less preferred Food | 56 | 46.66 | 46.66 |
| Borrow food from relatives, Friends and neighbor | 10 | 8.33 | 55.00 |
| Buy food on credit | 15 | 12.5 | 67.50 |
| Reduce number of Daily meals | 12 | 10 | 77.50 |
| Send some household Member to live with other relatives | 4 | 3.33 | 80.83 |
| Sales of farm or household Assets to buy food | 3 | 2.5 | 83.33 |
| Reduce expenditure of hh To buy food | 4 | 3.33 | 86.66 |
| More than one Coping strategy | 16 | 13.33 | 100 |
| Total | 120 | 100 | |

*Multiple Responses
Source: Field survey, 2021

## CONCLUSION

The study analyzed the determinants of food insecurity status among farming households in Ogbomoso ADP Zone of Oyo state. It can be concluded from the study that majority of the households in the study area were male headed and married. The result of the analysis indicated that Household size and level of education were significant with a negative coefficient on the food insecurity of households while Gender, farming experience and amount of remittances has positive coefficient. The result of the analysis further shows that advancing g in age, household size, farming experience, level of education and amount of remittances are the factors that determine the food insecurity level among households in the study area. To meet the food needs of the households, respondents engaged in multiple employments and adopted a number of coping strategies. Strategies adopted by the households included shifting to less preferred food, borrow food from, buy food on credit, reduce number of daily meals, send some household members to live with other relatives, sales of farm or household assets to buy food, reduce expenditure of households to buy food, in sum majority of the households adopted multiple coping strategies.

Based on the findings of this study, it was observed that age was significant. Therefore there is need to encourage youths to go into farming in the study area since only a few percentage of the respondents in the study area were below fifty years of age showing most farmers were not youth. It has also been observed that household size was significant with a negative coefficient and inverse relationship which implies that the higher the number of households the lower the level of food insecurity. Farmers should be lectured about family planning so as to improve their food security level. It was also observed that level of education was significant with a negative coefficient and inverse relationship which implies that the higher the level of education the lower the level of food insecurity. Farmers should therefore be encouraged to improve their literacy level so as to enhance their human capacity. There is need for adult literacy class, extension services and other forms of informal education. This is expected to help the rural populace to improve their food security level. It was also revealed that the coping strategies of the respondent in the study area is shifting to less preferred food. It is expected of them to increase their production and diversify into other business so that there will be enough income to purchase food and they will consume balance diet.

## REFERENCES

Adekoya, A. E. (2009). Food insecurity and coping strategies among rural households in Oyo State, Nigeria. *Journal of Food Agriculture and Environment*, *7*(4), 187-191.

Adeniyi, O. R., and Ojo, O. A. (2013). Food security status of rural farming households in Iwo, Ayedire and Ayedaade local government areas of Osun State, South-Western Nigeria. *African Journal of Food, Agriculture, Nutrition and Development*, *13*(5), 8209-8223.

Adepoju, A. O., and Adejare, K. A. (2013). Food insecurity status of rural households during

the post-planting season in Nigeria. *Journal of Agriculture and Sustainability*, *4*(1),38-45.

Aidoo, R., Mensah, J. O., and Tuffour, T. (2013). Determinants of household food security in the Sekyere-Afram plains district of Ghana. *European Scientific Journal*, *9*(21), 104-15.

Ashby, S., Kleve, S., McKechnie, R., and Palermo, C. (2016). Measurement of the dimensions of food insecurity in developed countries: a systematic literature review. *Public health nutrition*, *19*(16), 2887-2896.

Bawadi, H. A., Tayyem, R. F., Dwairy, A. N., and Al-Akour, N. (2012). Prevalence of food insecurity among women in northern Jordan. *Journal of health, population, and nutrition*, *30*(1), 49.

Betebo, B., Ejajo, T., Alemseged, F., and Massa, D. (2017). Household food insecurity and its association with nutritional status of children 6–59 months of age in east Badawacho District, south Ethiopia. *Journal of environmental and public health*, *2017*. 4(1), 62-67.

Biadgilign, S., Gebremariam, M. K., and Mgutshini, T. (2021). The association of household and child food insecurity with overweight/obesity in children and adolescents in an urban setting of Ethiopia. *BMC Public Health*, *21*(1), 1-8.

Clapp, J. (2014). World hunger and the global economy: Strong linkages, weak action. *Journal of International affairs*, 30(1), 1-17.

Crush, J. S., and Frayne, G. B. (2011). Urban food insecurity and the new international food security agenda. *Development Southern Africa*, *28*(4), 527-544.

Dare. T. A. Olamilekan. B. D and Victor. O. B. (2013): Food Security Initiatives in Nigeria: Prospects and Challenges. *Journal of Sustainable Development in Africa*, 11(1): 186-202

Doocy, S., and Burnham, G. (2006). Assessment of socio-economic status in the context of food insecurity: Implications for field research. *World health and population*, *8*(3), 32-42.

Fanifosi, G. E., and Amao, J. O. (2016). Socioeconomic analysis of nexus between food insecurity and poverty status of farming households in Osun State, Nigeria. *International Journal of Advance Agricultural Research IJAAR 1 (1)*, 30-36.

Foster J.,Greer J.and Theorbecke E.(1984); " A Class of Decomposable Poverty Measures" Econometrica 52(3); 761-766

Frongillo, E. A., Chowdhury, N., Ekstrom, E. C., and Naved, R. T. (2003). Understanding the experience of household food insecurity in rural Bangladesh leads to a measure different from that used in other countries. *The Journal of nutrition*, *133*(12), 4158-4162

Hanson, K. L., and Connor, L. M. (2014). Food insecurity and dietary quality in US adults and children: a systematic review. *The American journal of clinical nutrition*, *100*(2), 684-692

Ifeoma, I., and Agwu, A. (2014). Assessment of food security situation among farming households in rural areas of Kano state, Nigeria. *Journal of central European agriculture*, 3(2), 148-155.

Jyoti, D. F., Frongillo, E. A., and Jones, S. J. (2005). Food insecurity affects school children's academic performance, weight gain, and social skills. *The Journal of nutrition*, *135*(12), 2831-2839

Kelly, J. D., Richardson, E. T., Drasher, M., Barrie, M. B., Karku, S., Kamara, M., ... and Weiser, S. D. (2018). Food insecurity as a risk factor for outcomes related to ebola virus disease in Kono District, Sierra Leone: a cross-sectional study. *The American journal of tropical medicine and hygiene*, *98*(5), 1484.

Kirkpatrick, S. I., and Tarasuk, V. (2008). Food insecurity in Canada. *Canadian Journal of Public Health*, *99*(4), 324-327

Laborde, D., Martin, W., andVos, R. (2021). Impacts of COVID-19 on global poverty, food security, and diets: Insights from global model scenario analysis. *Agricultural Economics*. 6(5), 7-15

Nazmi, A., Martinez, S., Byrd, A., Robinson, D., Bianco, S., Maguire, J., ... and Ritchie, L. (2019). A systematic review of food insecurity among US students in higher education. *Journal of Hunger and Environmental Nutrition*, *14*(5), 725-740

Nord, M., and Brent, C. P. (2002). *Food insecurity in higher income households*. US Department of Agriculture, Economic Research Service, *journal of Hunger and Environmental Nutrition*. 10(5), 525-534.

Ogunlela, Y. I., and Mukhtar, A. A. (2009). Gender issues in agriculture and rural development in Nigeria: The role of women. *Humanity and social sciences Journal*, *4*(1), 19-30.

Ogunniyi, A. I., Omotoso, S. O., Salman, K. K., Omotayo, A. O., Olagunju, K. O., and Aremu, A. O. (2021). Socio-economic Drivers of Food Security among Rural Households in Nigeria: Evidence from Smallholder Maize Farmers. *Social Indicators Research*, 22(1), 180-191.

Oh, S. Y., and Hong, M. J. (2003). Food insecurity is associated with dietary intake and body size of Korean children from low-income families in urban areas. *European journal of clinical nutrition*, *57*(12), 1598-1604.

Olayiwola, S. A., Tashikalma, A. K., and Giroh, D. Y. (2017). Analysis of Food Security Status and Coping Strategies among Rural Households in Oluyole Local Government Area of Oyo State, Nigeria. *Trends in Science and Technology Journal*, *1*(2), 28-32

Olukunle, O. T. (2013). Challenges and prospects of agriculture in Nigeria: the way forward. *Journal of Economics and sustainable development*, *4*(16), 37-45

Oyebanjo, O., Ambali, O. I., and Akerele, E. O. (2013). Determinants of food security status and incidence of food insecurity among rural farming households in Ijebu Division, Ogun state, Nigeria. *Journal of Agriculture and Sustainability.* 22(1), 130-135.

Sharif, Z. M., and Ang, M. (2001). Assessment of food insecurity among low income households in Kuala Lumpur using the Radimer/Cornell food insecurity instrument–a validation study. *Malaysian Journal of Nutrition*, *7*(1 and 2), 15-32.

Shariff, Z. M., and Lin, K. G. (2004). Indicators and nutritional outcomes of household food insecurity among a sample of rural Malaysian women. *Journal of Nutrition*, *30*(1) 50-55.

Shetty, P. (2009). Incorporating nutritional considerations when addressing food insecurity. *Food Security*, *1*(4), 431-440.

Sisha, T. A. (2020). Household level food insecurity assessment: Evidence from panel data, Ethiopia. *Scientific African*, *7*(2), 133-137.

Weigel, M. M., Armijos, R. X., Hall, Y. P., Ramirez, Y., and Orozco, R. (2007). The household food insecurity and health outcomes of US–Mexico border migrant and seasonal farmworkers. *Journal of Immigrant and Minority Health*, *9*(3), 157-169.

Yekinni, O. T., Abegunrin, O. O., and Gbadebo, A. E. (2015). Coping strategies to food insecurity among rural households in Ido Local Government Area of Oyo State. *Nigerian Journal of Rural Sociology*, 16(2) 15-22.

Yoade, A. O., Olatunji, S. A., and Adeyemi, O. O. (2018). Vulnerability to food insecurity among rural households in Sub-Saharan Africa. *Agricultural and resource economics: international scientific e-journal*, 4(4), 72-84.

Yusuf, S. A., Balogun, O. L., and Falegbe, O. E. (2015). Effect of urban household farming on food security status in Ibadan metropolis, Oyo State, Nigeria. *Journal of Agricultural Sciences (Belgrade)*, *60*(1), 61-75.

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# Assessment of women participation in community and social development projects in Kwara state, Nigeria

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**Abstract:** The study assessed women's participation in community and social development projects in Ilorin West local government, Kwara State, Nigeria. A two-stage random sampling procedure was used to select 120 respondents for the study. An interview schedule was used for data collection. Data collected were analysed using frequency counts, percentages, mean scores and Chi-square analysis. The result shows that most of the respondents were young (mean=43.5years), married (74.2%), had a secondary level of education (50%), and were Muslims (55%). Findings also revealed that most of the women were aware (67.5%) and participated (69.2%) in community and social development projects. The women played an active role in the monthly environmental sanitation in the community (mean=3.0). Leading factors hindering participation were lack of proper education for women (mean=3.24) and inconsistency of women's behaviour (mean=3.22). At $p<0.05$, the results of Chi-Square test revealed that age ($\chi^2$=24.212) and education ($\chi^2$=31.599) influences women's participation in community and social development projects. The study concluded that the level of participation of women in community and social development projects in Ilorin West Local Government Area of Kwara State, Nigeria was high. This study, therefore, recommends that women should always be encouraged to participate in community development projects. The Government should provide even more assistance for women in rural areas to empower them and give them a sense of belonging.
**Keywords:** Women participation, community development and social development

## INTRODUCTION

In the world today, women excel in various fields of human endeavours, from academia, manning positions in government, leading the nations as presidents and so on. Women have the largest untapped reservoir of talents which needs to be discovered. Women have the potential to effectively engage in developmental roles in their communities (Obbo, 2015). In recent times women have showcased their talents as they scale new heights and have equally expanded their horizons as they engage constantly in the struggle to overcome the shackles of all forms of discrimination and inequality to improve their livelihood (Ajayi and Okunlola, 2020; Ochepo *et al*. 2018).

Women and girls in recent times cannot be denied their rights any longer if the world must make lasting progress because it is commonly believed that the denial of their rights goes hand in hand with the socioeconomic instability of every nation (Igbuzor, 2012). As mothers of the home, they play critical roles in the education and socialization of the children in teaching new trends of home management, maintenance of the body, environmental cleanliness, physical development of the society, and as well contributing to their income (Owolabi *et al*., 2018). In any form their services are required; they are always willing to do so. No limit should be placed on what they can collectively contribute to community development because women constitute a powerful social class.

However, the attempt by women to come together and work in such groupings has been hindered by several factors. Often, the role of women in community development in Nigeria is perceived as secondary and most times, very inferior to that of men. In our society, the factors militating against women's role in community development have caused a lot of economic, social, and political setbacks. At times, the principal obstacle to the roles of women in community development in Nigeria are not intentional but a result of unexamined assumptions about women's care, interest, unquestioned over time (Oluwole, 2018).

In Kwara State, the major problem facing the Ilorin west community is that of deprivation of women's right to participate in their full capacity in religious, economic, political, and social activities just like their male counterparts (Okoji and Ayuba, 2018). This hinders their ability to operate in their full capacity in development projects. The literate women in Ilorin west outnumber the illiterate but still create little ignorance among some of the other women defending their rights. Another major source of the problem is that men still dominate in controlling the affairs of their families, preventing or sanctioning their wives from participating or partaking in some activities of women from the local government (Ojo and Osundina, 2021).

Despite the struggle of women for their right by participating in community and social development projects that concern them in recent times (Ojo and Osundina, 2021), it is unfortunate that no information is available in the literature of roles played by women in their participation in community and social development projects, most especially in Ilorin Local Government Area (LGA) of Kwara State. It, therefore, becomes imperative in this study to assess women's participation in community and social development projects in Ilorin West local government, Kwara State, Nigeria. Specific objectives were to:

i. ascertain the level of awareness of women on community and social development projects in their communities;
ii. examine the roles women played in the community and social development projects in their study area; and
iii. determine the factors hinder women participation in community and social development projects.

The study's hypothesis stated that there is no significant relationship between the socioeconomic characteristics of women and their participation in community and social development projects.

## METHODOLOGY

This study was carried out in Kwara State Nigeria. Kwara is located within the North Central geopolitical zone. Kwara State is situated between parallels 8Â° and 10Â° north latitudes and 3Â° and 6Â° east longitudes, with Niger State in the north, Kogi State in the east, Oyo, Ekiti and Osun States in the south and an international boundary with the Republic of Benin in the west. Agriculture is the main source of the economy. The average temperature ranges between 27ºC and 35ºC with a mean annual rainfall of 1,000-1,500mm. It has two main seasons- wet and dry. The wet season is between early April and late October while the dry season is between November and late March.

The population of the study involves all women in Ilorin West local government, Kwara state. A two-stage sampling procedure was used to select respondents for the study. The first stage involved the random selection of two (2) wards out of twelve (12) wards in Ilorin West local government due to concentration of community and social development projects in these wards. In the second stage, 60 women were randomly selected from each of the wards to give a total sample size of 120 respondents. A structured questionnairewas designed and used to gather information from the respondents.Awareness of women to participate in community and social development projects was measured on a 5 point rating scale ofHighly Aware (5), Aware (4), Not Sure (3), Not Aware (2), Highly Not Aware (1), Roles of women and factors hindering women participation in community and social development projects were measured on 5 point scale: Strongly Disagree=1, Disagree=2, Not sure=3, Agree=4, Strongly Agree=5.Descriptive statistics(weighted mean, frequency, percentages) were used to analyze the objectives while Chi square analysis was used to test the hypothesis.

## RESULTS AND DISCUSSION

### Socioeconomic characteristics

The result presented in Table 1 shows that the minimum age of the respondents was 20 years while the maximum age was 60 years. Most of the respondents (62.5%) were between the age range of 30 and 49 years. The mean age of 43.50 ± 11.03 implies that the respondents were in their active, economic and productive age where they can participate in the design, implementation and monitoring. This corroborates with the findings of Ajayi *et al*., (2019) in their study on Women Participation in Community and Social Development Project (CSDP) in Ondo State, Nigeria. They reported that women participants in CSDP were young, active, and desire a good living standard

As shown in Table 1, most of the respondents (74.2%) were married while only 10 percent were single. About 16 percent were either divorced or widowed. This would influence their decision positively to participate in CSDP. This finding agrees with Farinde *et al*. (2004) that most of the women who participated in the rural community project were married. From Table 1, the result reveals that 24.2% of the respondents were civil servants, 45.8% were into farming, 23.3% were into trading and only 6.7% were into crafting. The result implies that most of the respondents were farmers. This distribution shows the relative importance of farming to other occupations in the study area, implying that most of the respondents (farmers) would like to participate in any project that may improve their livelihood activities. This finding supports Ogunbameru *et al*. (2006) that most women were involved in agricultural activities.

As presented in Table 1, all the respondents had one form of education or the other. Half of the respondents (50%) had a secondary level of education while 29.1% had only a primary level of education. Only 20.9% of the respondents had a tertiary level of education. The result implies that all the respondents could either read or write. This implies that the level of education might affect the respondents' exposure to sources of information and participation in Community Social Development Project that are related to their livelihood activities. The result shows that more than half of the respondents (55.0%) were Muslims while 45% were Christians. Religious institutions could be a means of getting information of community projects.

**Table 1: Socioeconomic characteristics of respondents**

| Variables | Frequency | Percentage |
|---|---|---|
| **Age (years)** | | |
| 20-29 | 25 | 20.8 |
| 30-39 | 39 | 32.5 |
| 40-49 | 36 | 30.0 |
| ≥50 | 20 | 16.7 |
| Mean=43.5±11.03SD | | |
| **Marital Status** | | |
| Single | 12 | 10.0 |
| Married | 89 | 74.2 |
| Divorced | 11 | 9.2 |
| Widowed | 8 | 6.6 |
| **Occupation** | | |
| Civil Servant | 29 | 24.2 |
| Farmer | 55 | 45.8 |
| Petty Trader | 28 | 23.3 |
| Crafting | 8 | 6.7 |
| **Level of Education** | | |
| Primary | 35 | 29.1 |
| Secondary | 60 | 50.0 |
| B. Sc. | 25 | 20.9 |
| **Religion** | | |
| Christian | 54 | 45.0 |
| Muslim | 66 | 55.0 |

**Awareness of women to community development projects**

As shown in Table 2, the result reveals that the respondents were mostly aware that community development project is not all about the fund (MS=3.12) and that community development project reduces urban-rural migration (MS=3.00). In descending order, the respondents were aware that community development projects can be driven by individuals too (MS= 2.98), the government has participated in women empowerment project(s) with great impact to women in the community (MS=2.83), government has undertaken community project(s) in my area in the last five years (MS=2.80). The project(s) embarked upon by the government in my community has greatly improved my way of life (MS=2.53). The respondents were least aware of the real meaning of community development projects (MS=2.34). Awareness is central to the success of any developmental effort as it helps people to better appreciate and understand how to negotiate their local contexts and design and implement interventions that are more contextually adapted. This may lead to more efficient use of resources and more functional outcomes, including, but not limited to reduced capture and/or corruption by local elites (Sheree and Alyoscia, 2014). It also increases the level of participation by community members in developmental projects in their communities. The People will feel a better sense of belonging when they have information about the happenings in their communities and they feel more concerned and be able to contribute better towards the accomplishment of such efforts. Findings by Echeme and Nwachukwu (2010), also affirmed that community sensitization and participation have positive effects on the implementation of the CDD project.

The result presented in Table 3 shows women's awareness on community and social development projects in Ilorin west local government of Kwara State, Nigeria. The result shows that most of the respondents (67.5%) had a high level of awareness while 32. 5% had a low level of awareness. A mean score of 2.80 implies a high level of awareness of community and social development projects in the study area.

**Table 2: Awareness of Women to Community Development Projects**

| Awareness | HNA | NA | NS | A | HA | Score | MS |
|---|---|---|---|---|---|---|---|
| Community development project is not all about fund | 6(5.0) | 22(18.3) | 50(41.7) | 36(30.0) | 6(5.0) | 375 | 3.12 |
| Community development projects reduce urban-rural migration | 8(6.7) | 24(20.0) | 54(45.0) | 28(23.3) | 6(5.0) | 360 | 3.00 |
| Community development projects can be driven by individuals too | 12(10.0) | 29(24.2) | 35(29.2) | 38(31.6) | 6(5.0) | 357 | 2.98 |
| The government has participated in women empowerment project(s) with great impact on women in the community | 13(10.8) | 26(21.7) | 53(44.2) | 24(20.0) | 4(3.3) | 340 | 2.83 |
| The government has undertaken community project(s) in my area in the last five years | 12(10.0) | 31(25.8) | 48(40.0) | 26(21.7) | 3(2.5) | 337 | 2.80 |
| The project(s) embarked upon by the government in my community has greatly improved my way of life | 11(9.2) | 55(45.8) | 37(30.8) | 13(10.8) | 4(3.4) | 304 | 2.53 |
| I am aware of the meaning of community development projects | 16(13.3) | 68(56.7) | 19(15.8) | 13(10.8) | 4(3.4) | 281 | 2.34 |

*Source: Field Survey, 2021.* MS-Mean Score; HA-Highly Aware, A-Aware, NS-Not Sure, NA-Not Aware, HNA-Highly Not Aware

**Table 3: Level of Awareness of Women to Community Development Projects**

| Level | Frequency | Percentage | Mean |
|---|---|---|---|
| ≤ 2.50 (Low) | 39 | 32.5 | 2.80 |
| ≥ 2.50 (High) | 81 | 67.5 | |

*Source: Data Analysis, 2021*

**Roles played by women in community and social development projects**

Table 4 shows that women mostly participate actively in the monthly environmental sanitation in the community (Mean score=3.0). Other roles by women include vigilant watch of the community for information to security agents (Mean score=2.98), proper child upbringing (Mean score=2.98), part of the agricultural development and/or poverty eradication programme for women and children (Mean score=2.96), contribution to the development of the community financially and/or morally (Mean score=2.91). The respondents' least role was that they belong to women's group/society in the community (Mean score=2.60).

**Table 4: Roles Played by Women in Community and Social Development Projects**

| Roles | SD | D | NS | A | SA | Score | MS |
|---|---|---|---|---|---|---|---|
| I participate actively in the monthly environmental sanitation in my community | 7(5.8) | 26(21.7) | 53(44.2) | 28(23.3) | 6(5.0) | 360 | 3.00 |
| Vigilant watch of the community for information to security agents | 7(5.8) | 32(26.7) | 42(35.0) | 34(28.3) | 5(4.2) | 358 | 2.98 |
| Proper child upbringing | 6(5.0) | 33(27.5) | 46(38.3) | 29(24.2) | 6(5.0) | 356 | 2.97 |
| I am part of the agricultural development and/or Poverty eradication programme for women and children | 8(6.7) | 32(26.7) | 45(37.5) | 27(22.5) | 8(6.6) | 355 | 2.96 |
| I belong to a women's group/society in my community | 5(4.2) | 38(31.7) | 49(40.8) | 19(15.8) | 9(7.5) | 349 | 2.91 |
| I have had the opportunity to participate in women empowerment programme in the past | 5(4.2) | 57(47.5) | 33(27.5) | 18(15.0) | 7(5.8) | 325 | 2.71 |
| I have contributed to the development of my area financially and/or morally | 10(8.3) | 59(49.2) | 28(23.3) | 15(12.5) | 8(6.7) | 312 | 2.60 |

*Source: Data Analysis, 2021; Strongly Disagree-SD, Disagree-D, Not sure-NS, Agree-A, Strongly Agree-SA, MS-Mean score, f=frequency, %=percentage*

The result presented in Table 5 shows the level of participation of women on community and social development projects in Ilorin west local government of Kwara State, Nigeria. Result shows that most of the respondents (69.2%) had a high level of participation while 30.8% had a low level of participation. A mean score of 2.88 implies a generally high level of participation of women in community and social development projects in the study area. This finding differs from report by Ajayi, Ajiboye and Oluwatosin (2019) who indicated that women's participation in community and social development projects is low.

**Table 5: Level of Participation of Women to Community Development Projects**

| Range | Level | Frequency | Percentage | Mean |
|---|---|---|---|---|
| Below 2.50 | (Low) | 37 | 30.8 | 2.88 |
| 2.5 and above | (High) | 83 | 69.2 | |

*Source: Data Analysis, 2021*

**Factors hindering women participation in community and social development projects**

The result in Table 6 reveals the factors hindering women participation in community development projects. The major factors identified were lack of proper education for women (MS=3.24) and inconsistency of women's behaviour (MS=3.22). This implies that the provision of education and information would enhance women's participation in CSDP. The finding agrees with Ajayi *et al*. (2019) that lack of adequate information affects participation in CSDP projects in Ondo state. Ndambiri (2018) similarly found that education levels hindered women participation in community development projects in Mombasa County, Kenya.

Other factors in order of severity were lack of government support in women empowerment and participation (MS=3.18), the dominant character of men towards women (MS=3.18), women are less respected in the community (MS=3.16), poverty (MS=3.09) and biological, cultural and financial factors (MS=3.05). The least factor identified as a hindrance to women's participation in community and social development projects was the lack of women at top places thereby reducing their roles (MS=2.98).

**Table 6: Factors Hindering Women Participation in Community and Social Development Projects**

| Problems | SD | D | NS | A | SA | MS | Rank |
|---|---|---|---|---|---|---|---|
| Lack of proper education for women has been a problem | 9(7.5) | 16(13.3) | 42(35.0) | 43(35.8) | 10(8.4) | 3.24 | 1st |
| Inconsistency of women's behavior | 10(8.3) | 22(18.3) | 34(28.3) | 40(33.3) | 14(11.7) | 3.22 | 2nd |
| Lack of Government Support is one of the factors responsible for the dearth of women empowerment and participation | 11(9.2) | 18(15.0) | 38(31.7) | 44(36.7) | 9(7.4) | 3.18 | 3rd |
| The dominant character of men towards women has been a problem | 9(7.5) | 26(21.7) | 31(25.8) | 43(35.8) | 11(9.2) | 3.18 | 3rd |
| Women are less respected in the community | 9(7.5) | 23(19.2) | 37(30.8) | 42(35.0) | 9(7.5) | 3.16 | 5th |
| Poverty | 11(9.2) | 24(20.0) | 36(30.0) | 41(34.2) | 8(6.7) | 3.09 | 6th |
| Biological, cultural and financial factors are responsible for the lack of women participation in community development | 9(7.5) | 24(20.0) | 51(42.5) | 24(20.0) | 12(10.0) | 3.05 | 7th |
| The lack of government assistance has hindered the empowerment of women and community development | 9(7.5) | 27(22.5) | 43(35.8) | 34(28.3) | 7(5.9) | 3.03 | 8th |
| Lack of women at top places thereby reducing their roles | 12(10.0) | 26(21.7) | 48(40.0) | 21(17.5) | 13(10.8) | 2.98 | 9th |

*Source: Data Analysis, 2021; Strongly Disagree-SD, Disagree-D, Not sure-NS, Agree-A, Strongly Agree-SA, MS-Mean score, f=frequency, %=percentage*

**Test of Hypothesis**

Result in Table 7 shows the result of chi-square analysis of the relationship between socio-economic characteristics and participation of women in community and social development project. Result reveals that age ($\chi^2$=24.212; p≤0.05) influences women participation in community and social development projects. This finding corroborates with Ajayi *et al*. (2019) that age of women significantly influenced their participation in

community and social development project. Results also show that education ($\chi^2$=31.599) influences women participation in community and social development projects. This finding shows that education played a significant role in women participation in community and social development projects in the study area. This finding is similar to that of Anselm and Taofeeq (2010) who reported that education plays a significant role in positively influencing the status of women in firm decision making and participating in development projects.

**Table 7: Relationship between women socioeconomic characteristics and participation in CSDP**

| Variable | Value($\chi^2$) | p-value | Decision |
|---|---|---|---|
| Age | 24.212 | 0.029 | Significant |
| Marital Status | 3.861 | 0.722 | Not Significant |
| Occupation | 5.331 | 0.283 | Not Significant |
| Education | 31.599 | 0.012 | Significant |

## CONCLUSION

The study concluded that the level of participation of women in the community and social development projects in Ilorin West Local Government Area of Kwara State, Nigeria was high. The level of awareness of community and social development projects was also high among the respondents. Socio-economic characteristics such as the age and level of education of the women also influenced the extent of their participation in community and social development projects.

## RECOMMENDATIONS

This study, therefore, recommends that:

1. Women should be always encouraged to participate in community development projects
2. The Government should provide even more assistance for women in the rural areas to empower them and give them a sense of belonging.

## REFERENCES

Ajayi, G. T., Ajiboye A., and Oluwatusin, F. M. (2019). Women Participation in Community and Social Development Project (CSDP) in Ondo State, Nigeria. *International Journal of Trend in Scientific Research and Development,* 4(1): 271-277.

Ajayi, G. T. and Okunlola, J. O. (2020). Women's Perception of the Effects of Community and Social Development Project (CSDP) on their Livelihood Activities in Ondo State, Nigeria. *Asian Journal of Agricultural Extension, Economics and Sociology,* 38(11): 142-154

Anselm, A. E. and Taofeeq, A. A. (2010). Determinants of women's contribution to farming decision making in cocoa-based agroforest household of Ekiti State, Nigeria. *The journal of field actions*, 4: 228-320.

Echeme, I. I. and Nwachukwu, C. C. (2010). An Investigation on the Impact of FADAMA II Project Implementation in Imo State. *American Journal of Scientific and Industrial Research,* 1, 523-538.

Farinde, A. J., Okunade, E. O. and Laogun, E. A. (2004). Community Perception of Women Occupying Leadership Position in Rural Development Projects of Osun State, Nigeria, *The Anthropologist*, 6:4, 273-278, DOI: 10.1080/09720073.2004.11890867

Ndambiri, A. M. (2018). Determinants of Women Participation in Community Development Projects. A Case of Mombasa County, Kenya. *International Journal of Social Science and Technology*, 3(1); 9-24.

Obbo, E. (2015). Gender Equality, Human Rights and Development, in CODESRIA Bulletin, Special Issue, Re-thinking African Development: Beyond Impasse, Towards Alternatives, 6-10 December 2005, Maputo, Mozambique.

Ochepo, C.O., Ejembi, E.P., Agada, M.O., andJiriko, R.K. (2018). Effects of community and social development projects on rural communities in north-central Nigeria. *International Journal of Innovation and Research in Educational Sciences,* 5(6), 650- 655.

Ogunbameru, B. O., Gwary, M. M., Idrisa, Y. L., Ani, A. O. and Yero, A. B. (2006), Empowerment of women through Urban Agriculture Development in Maiduguri Metropolitan, Borno State: Proceeding's 11th Annual national conference of the Agricultural Extension Society of Nigeria (AESON), 3rd- 6th April, Pp 147-156.

Ojo, M. and Osundina, O. (2021). Sustainable Development Goal 4 and Women Empowerment in Ilorin West Local Government, Kwara State, Nigeria. *KIU Journal of Humanities*, 6(2): 41-47.

Okoji, O.O. and Ayuba, O. T. (2018). The clogs on women participation in community development programmes in Ilorin Metropolis, Nigeria: implications on sustainable development. *Gender and Behaviour,* 16 (3)

Oluwole, S. (2018). Women in the Rural Environment; A paper presented at the

International Conference on Women in the Rural Environment, Nov, 29.\UNDP. (2015). Millennium Development Goal 3: Promote Gender Equality. Retrieved October 26, 2021, from www.undplao.org/mdgs/mdgs3.php

Owolabi, K. E., Okunlola J. O., and Mafimisebi T. E. (2018). Influence of participation in community and social development projects on beneficiaries' income in Ondo and Kwara States, Nigeria. *International Journal of Agricultural Extension*,6(3):203-214.

Igbuzor, O. (2012) Challenging Patriarchy and Promoting Women's Rights. Abuja

Sheree, B. and Alyoscia, D. (2014). Beyond Critique: Revised Approaches to Community-Driven Development. An Inception Paper 30th April

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# Inclination of young maize farmers to practice climate-smart agriculture

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**Abstract:** Dependency on rainfall and other climatic factors have exposed farmers to various climate risks. To reduce the effect of climate risk, various climate change adaptive strategies have to be employed including climate-smart agricultural practices. Hence, the study researched the inclination of youth maize farmers to practice climate-smart agriculture. A total of 120 maize farmers were selected in Ogun State, Nigeria through a multi-stage sampling procedure. Data was obtained using a structured questionnaire and interview schedule. The data were described using frequency counts, mean, percentages and ranks. Chi-square and PPMC analyses were used to test the relationship between independent variables and dependent variable. The result shows that most (83.3%) of the respondents rented land used for farming, with a mean farm size of 7.90 ± 9.98 acres and mean years of farming experience of 16.21±9.53 years. Fellow farmers ($\bar{x} = 1.22$) were the main source of information on climate smart agricultural practices. There was high level (70.8%) of knowledge of climate smart agriculture. Channel of information for climate change information ($\bar{x} = 1.44$) and high labour cost ($\bar{x} = 1.41$) ranked first of constraints to practice climate smart agriculture. Willingness (70.8%) to practice climate smart agriculture was high. There was a significant relationship between respondents' source of labour ($\chi^2$=6.001, p< 0.05), farm size (r= 0.338, p<0.05) and inclination to use climate-smart agricultural practices. The study concludes that young farmers involved in maize production are willing to practise climate smart agriculture. Extension agents from government and non-governmental organizations should adopt e-extension for disseminating climate- smart agricultural practices to young farmers.
**Keywords:** Climate Smart Agriculture, Maize Farmers, Youth.

## INTRODUCTION

In recent years, agricultural production has been threatened by climate change. Impacts of climate change vary depending on the state of development of a region. For example, IPCC (2013) suggested that rising temperatures and changing precipitation rates will most likely hamper the success of rain-fed agriculture in most developing countries. Africa is one of the continents that is projected to experience rising temperatures of at least 1 to 2°C and a higher likelihood of extreme weather (Mulenga, Wineman and Sitko, 2017). Thus, the effects of climate change will more directly affect agriculture because about three-quarters of Africa's population depends on agriculture for a livelihood and Africa's agriculture is mainly rain-fed (Amondo and Simtowe, 2018; Tetteh, Opareh, Ampadu and Antwi, 2014).

For Sub-Saharan Africa (SSA) including Nigeria, agriculture is the occupation of majority of the people in rural areas and significantly contributes to the Gross Domestic Product (GDP) of most countries. Thus, many people in SSA including Nigeria are employed in agriculture and increasing agricultural productivity is necessary to reduce poverty and food insecurity (AGRA, 2014). However, the rise in temperatures and increased stochastic rainfall variations have both direct and indirect grave consequences on crop yields and agricultural productivity.

Though it is important to build the agricultural sector of developing countries like Nigeria, however, most agricultural sectors in SSA have performed poorly relative to other developing world regions (Tetteh, Opareh, Ampadu and Antwi, 2014). According to Kotir (2011) in the past 50 years, agricultural productivity has been steadily declining in SSA and recorded the slowest increase across the world over and this would only get worse with climate change. This evidence suggests the production of maize, a vital crop for many millions in SSA (Shiferaw, Prasanna, Hellin and Bänziger, 2011) may have its production in danger in the face of climate change. Maize, a field crop that is one of the most cultivated crops in the world, is a staple crop for most countries in SSA (Shiferaw *et al*.,, 2011). While maize remains an important crop for many millions in SSA, its yields in developing countries are lower than in developed countries (Ng'ombe, Brorsen and Raun, 2019). More importantly, maize production depends on water availability, and most of SSA's agriculture is rain-fed, which makes maize production an obvious candidate to be affected by weather shocks such as droughts—one of the negative consequences of climate change.

Lobell, Bänziger and Magorokosho (2011) suggest maize is sensitive to daytime high temperatures above 30°C and with climate change, the projected 2°C in temperatures for most parts of Africa would affect maize production, which would further lower maize productivity levels in SSA despite the increasing demand for maize.

In recent years, there has been an increased level of participation of youth in agriculture. Challenges such as climate change can lead to low profit which would then justify the long-held belief that agriculture is related to poverty. This could lead to the disengagement of agriculture as a profession among the youth. Hence, the need to encourage youth farmers to adopt climate-smart agriculture in a bid to mitigate the effect of climate change. Climate change impacts are seemingly being felt,

numerous studies have examined the impacts of climate change on maize production and productivity resulting in several adaption strategies being promoted to negate the negative effects of climate change (e.g., Mulenga, Wineman and Sitko, 2017; Cairns, Hellin, Sonder Araus, MacRobert, Thierfelder, Prasanna, 2013). However, studies on the inclination of youth to practice climate smart agricultural practices, a practice that can reduce the impact of climate change have not been explored. Hence, the study examined the inclination of youth farmers to practice climate smart agriculture. The study specifically;

1. described the enterprise characteristics of respondents in the study area;
2. ascertained the sources of information on climate smart agriculture among respondents;
3. determined respondents' knowledge of climate smart agricultural practices;
4. identified perceived constraints to respondents' practice of climate smart agriculture.

The following hypotheses were tested for this study:

1. There is no significant relationship between enterprise characteristics of respondents and inclination to use climate smart agricultural practices.
2. There is no significant relationship between respondents' knowledge on climate smart agricultural practices and inclination to practice climate smart agricultural practices.

## METHODOLOGY

The study was carried out in Ogun State of southwest Nigeria. The population of the study constituted all youth involved in maize production between the ages of 18-45 years in Ogun state. A Multistage sampling procedure was used to select respondents for the study. The first stage involved the selection of four local government areas using a random sampling technique. The local governments were Obada-Oko (273) Ado- Odo (205) Ilishan (487) and Ososa (256) LGAs. (OGADEP, 2021). The second stage involved the random selection of 10% of youth maize farmers each from the selected local government areas Obada-Oko (27), Ado-Odo (20), Ilishan (48) and Ososa (25) making a total of 120 respondents. A structured questionnaire along with an interview schedule were used in obtaining data for the study.

The dependent variable of the study is the inclination to practice climate smart agricultural practices. Respondents were presented with some climate smart agricultural practices for maize production and selected from response options, willing, less willing, and not willing which were assigned scores of 2, 1 and 0 respectively.

Other key variables are knowledge of climate-smart agriculture: A list of 11 statements indicating the knowledge of climate smart agricultural practices was generated and the level of agreement of the respondents to each statement was indicated as True or False. Scores of 1 and 0 were assigned to correct and incorrect answers respectively.

Perceived constraints to the practice of climate smart agricultural practices: From a list of possible constraint, challenges to practice climate smart agriculture were measured with response options; not a constraint, mild constraint and severe constraint which were assigned scores of 0, 1 and 2 respectively.

## RESULTS AND DISCUSSION

### Enterprise characteristics of respondents

As revealed in Table 1, 83.3% of respondents rent the land used for farming while 16.7% inherited the land. Also, the mean farm size of respondents was 7.90±9.98 acres with majority (89.2%) having a farm size of 1-10 acres. Majority (68.9%) of the respondents hired labour for their agricultural production while 20.8% made use of family labour and 1.7% make use of communal labour. The mean years of farming experience as revealed in Table 2 was 16.21±9.53 years. Findings further showed that 72.5% of the respondents got credit for their production activities from personal savings, 14.2% got theirs from family and friends while 11.7% got theirs from cooperative societies and 1.7% through bank loans. The results are in line with the findings of Folayan and Bifarin (2013) which showed that most farmers depend on their personal savings as a source of credit.

### Sources of information on climate smart agriculture

As shown in Table 2, fellow farmers ($\bar{x} = 1.22$) ranked first as the main source of information on climate smart agricultural practices among youth farmers. The result of the study further revealed farmers' association ($\bar{x} = 1.15$) as second in rank among the sources of information on climate smart agricultural practices. This result is not surprising as it is expected that common problems facing farmers, among which is climate change will be raised, discussed and provided solutions to, during farmers' associational meetings. As shown on Table 3, radio ($\bar{x} = 1.02$) ranked 3rd among the sources of information on climate smart agricultural practices to youth farmers in the study area. This could be because most radio stations disseminate information in vernacular languages which will enhance the utilization of climate smart agricultural practices. In addition, radio is the most cost-effective channel in terms of transmission, presentation and portability (Khanal, 2013).

**Table 2: Distribution of respondents by enterprise characteristics**

| Variable | Frequency | Percentages | Mean |
|---|---|---|---|
| **Land ownership** | | | |
| Rent | 100 | 83.3 | |
| Inheritance | 20 | 16.7 | |
| **Farm size** | | | |
| 1-10 | 107 | 89.2 | |
| 11-20 | 6 | 5.0 | |
| 21-30 | 1 | .8 | |
| 31-40 | 2 | 1.7 | |
| 41-50 | 4 | 3.3 | 7.90±9.98acres |
| **Labour used** | | | |
| Family labour | 25 | 20.8 | |
| Hired labour | 93 | 77.5 | |
| Communal labour | 2 | 1.7 | |
| **Years of farming experience** | | | |
| 1-10 | 50 | 41.7 | |
| 11-20 | 41 | 34.2 | |
| 21-30 | 23 | 19.2 | |
| 31-40 | 6 | 5.0 | 16.22±9.53years |
| **Farm yield** | | | |
| 1-10 | 93 | 77.5 | |
| 11-20 | 19 | 15.8 | |
| 21-30 | 6 | 5.0 | |
| 31-40 | 2 | 1.7 | 8.70±7.68 tonnes |
| **Source of credit** | | | |
| Personal Savings | 87 | 72.5 | |
| Family and friends | 17 | 14.2 | |
| Bank loans | 2 | 1.7 | |
| Cooperative society | 14 | 11.7 | |

Source: Field Survey, 2021

**Table 2: Distribution of respondents by frequency of access to source of information on climate smart agricultural practices**

| Sources of information on climate smart agricultural practices | Always | | Occasionally | | Never | | Mean | Rank |
|---|---|---|---|---|---|---|---|---|
| | F | % | F | % | F | % | | |
| Television | 0 | 0 | 104 | 86.70 | 16 | 13.30 | 0.87 | 5th |
| Radio | 11 | 9.20 | 100 | 83.30 | 9 | 7.50 | 1.02 | 3rd |
| Newspaper | 1 | 0.80 | 92 | 76.70 | 27 | 22.50 | 0.80 | 8th |
| Farmers association | 26 | 21.70 | 86 | 71.70 | 8 | 6.70 | 1.15 | 2nd |
| Extension agents | 5 | 4.20 | 103 | 85.80 | 12 | 10.00 | 0.94 | 4th |
| Internet | 8 | 6.70 | 60 | 50.00 | 52 | 43.30 | 0.63 | 10th |
| Fellow farmers | 39 | 32.50 | 68 | 56.70 | 13 | 10.80 | 1.22 | 1st |
| Seminars | 1 | 1.70 | 97 | 80.80 | 21 | 17.50 | 0.84 | 6th |
| Conference | 1 | 0.80 | 77 | 64.20 | 42 | 35.00 | 0.66 | 9th |
| Friends and neighbors | 16 | 13.30 | 66 | 55.00 | 38 | 31.70 | 0.82 | 7th |
| Handbills | 7 | 5.80 | 47 | 39.20 | 66 | 55.00 | 0.51 | 11th |
| Posters | 0 | 0 | 23 | 19.20 | 97 | 80.80 | 0.19 | 12th |
| Journals | 1 | 1.70 | 17 | 14.20 | 101 | 84.20 | 0.18 | 14th |
| Facebook | 4 | 3.30 | 15 | 12.50 | 101 | 84.20 | 0.19 | 12th |
| Twitter | 4 | 3.30 | 8 | 6.70 | 108 | 90.00 | 0.13 | 15th |
| Instagram | 4 | 3.30 | 4 | 3.30 | 112 | 93.30 | 0.10 | 16th |

Source: Field survey, 2021

**Knowledge of climate-smart agricultural practices**

As revealed on Table 3, majority (98.3%) of the respondents ascertained that climate-smart agricultural practices are aimed at achieving the following: increased productivity, enhanced resilience and reduced emissions. The result in Table 3 further revealed that majority (83.3%) knew

that climate smart agriculture entails addressing climate change from different perspectives of agricultural production. In addition, majority (80.0%) of the respondents established that adopting a comprehensive soil cover of vegetation is an important climate smart agricultural practice. This could be because soil cover is a less expensive and tedious climate smart agricultural practices which have proven to produce results for the farmers. However, majority (82.5%) of the respondents did not know that climate smart agricultural practices is dependent on the location of the agricultural enterprise. This could have contributed to their dependence on fellow farmers as main source of information on climate smart agricultural practices.

The result in Table 4, shows a high level (70.8%) of knowledge of climate smart agricultural technologies among respondents. The prevalence of the climate change problem could have contributed to the desire for solutions that can mitigate this effect. Search for solutions to climate change might have increased the farmer's knowledge of climate smart agricultural technologies. A high level of knowledge of climate smart agricultural technologies could favour farmers' willingness to adopt climate smart agricultural practices among the youth farmers. This position was asserted by Lorenzoni *et al*., (2007) who stated that in order to increase harvests, improve farming and hasten efforts in adaptation and fathoming climate change and variability, frequent education, awareness, knowledge become critical components in improving farmers' understanding.

**Table 3: Distribution of respondents by knowledge of climate smart agricultural practices**

| Knowledge statements | Correct | | Incorrect | |
|---|---|---|---|---|
| | F | % | F | % |
| Climate smart agricultural practices is aimed at achieving all of the following; increased productivity, enhanced resilience and reduced emissions | 118 | 98.30 | 2 | 1.70 |
| Climate smart agricultural practices to be adopted is not dependent on the location of the agricultural enterprise | 21 | 17.50 | 99 | 82.50 |
| Climate smart agricultural practices do not address the relationship between agriculture and poverty | 31 | 25.80 | 89 | 74.20 |
| Breeding of higher-yielding crop varieties is a climate-smart agricultural practice | 91 | 75.80 | 29 | 24.20 |
| Climate smart agriculture entails addressing climate change from different angles of agricultural production | 100 | 83.30 | 20 | 16.70 |
| Index based insurance is among the enabling environment for climate smart agricultural practices | 83 | 69.20 | 37 | 30.80 |
| Climate-smart agricultural practices do not involve soil water management | 88 | 73.30 | 32 | 26.70 |
| Adopting a comprehensive soil cover of vegetation is an important climate smart agricultural practice | 96 | 80.00 | 24 | 20.00 |
| The use of inorganic fertilizers is encouraged in climate-smart agricultural practices | 35 | 29.20 | 85 | 70.80 |
| Land terracing is a climate-smart agricultural practice | 91 | 75.80 | 29 | 24.20 |
| Replacing potentially vulnerable annual crop with hardier perennial crop is a climate smart agricultural practice | 112 | 93.30 | 8 | 6.70 |

Source: Field survey, 2021

**Table 4: Categorisation of respondents by level of knowledge of climate smart agricultural practices**

| Level of knowledge | Frequency | Percentage | Min | Max | Mean | SD |
|---|---|---|---|---|---|---|
| Low (3.00-7.21) | 35 | 29.2 | 3.00 | 11.00 | ±7.22 | 1.56 |
| High (7.22-11.00) | 85 | 70.8 | | | | |
| Total | 120 | 100 | | | | |

Source: Field survey, 2021

**Perceived constraints to practise climate-smart agriculture**

As revealed in Table 5, the inadequate channel of information for climate change information ($\bar{x} = 1.44$) ranked first among the constraints to the use of climate smart agricultural practices. This corroborates with the report of Rohila, Shehrawat and Malik (2018) who reported that lack of climate-related information ranked first among the constraints in the adoption of climate smart agricultural practices. Though farmers are faced with the reality of climate change, however, the desire to mitigate this largely depends on available information. Climate smart agricultural practices are a set of information that needs to be taught. Farmers would only be willing to use the information they are familiar with. It was further revealed on Table 5 that high labour cost ($\bar{x} = 1.41$) ranked second among the constraints to the use of climate smart agricultural practices. This shows that the

respondents perceive climate smart agricultural practices to be labour-intensive. This calls for the introduction of less labour-intensive climate smart agricultural practices to farmers. Farmers' thought that most climate smart agricultural practices are labour intensive can affect their willingness to adopt climate smart agricultural practices. Inadequate knowledge of climate smart agricultural practices ($\bar{x} = 1.39$) ranked third of the constraints to the willingness to adopt climate smart agricultural practices. Adequate knowledge various disseminated climate smart agricultural practices will enable the farmers to choose the practices that best address their climate change problems whereas, inadequate knowledge will leave them with nothing to choose from. Also ranked third is inadequate access to climate-resistant varieties ($\bar{x} = 1.39$). This corroborates the report of Rohila *et al* (2018) who reported lack of resources as a major constraint to the adoption of climate smart agricultural practices. Farmers who lack resources such as climate-resistant-varieties would be unwilling to use climate smart agricultural practices even in the face of the great effect of climate change.

**Table 5: Distribution of respondents by constraints to practise climate smart agriculture**

| Constraint | Severe constraint | Mild constraint | Not a constraint | Mean | Rank |
|---|---|---|---|---|---|
| Inadequate channel of information for climate change information | 47.5 | 49.2 | 3.3 | 1.4417 | 1st |
| Lack of trust of climate change information source | 41.7 | 53.3 | 5.0 | 1.3667 | 5th |
| Inadequate exposure to climate smart agricultural practices | 25.8 | 70.0 | 4.2 | 1.2167 | 6th |
| High labour cost | 46.7 | 48.3 | 5.0 | 1.4167 | 2nd |
| Inadequate knowledge of climate smart agricultural practice | 40.8 | 57.5 | 1.7 | 1.3917 | 3rd |
| Inadequate access to climate resistant varieties | 40.0 | 59.2 | 0.8 | 1.3917 | 3rd |
| Illiteracy | 25.0 | 50.0 | 25.0 | 1.0000 | 7th |
| Deviation of climate information to climate realities | 3.3 | 60.0 | 36.7 | 0.6667 | 8th |
| More incidence of pest and disease | 3.3 | 55.8 | 40.8 | 0.6250 | 9th |

Source: Field survey, 2021

**Inclination to practise climate smart agriculture**

As revealed in Table 6 most of the farmers were willing to integrate crop and livestock production ($\bar{x} = 1.94$). This could be due to the uncertainties in profit maximization from maize production because of the effects of climate change. This might have led to livelihood diversification. The same livelihood diversification must have led to the practice of intercropping and mixed cropping system ($\bar{x} = 1.93$) which ranked third of climate smart agricultural practices respondents were willing to use. It is not surprising that crop diversification is among the climate smart agricultural practices respondents were more willing to use. This is because according to Joshi (2005), crop diversification (crop rotation and inter-cropping) is one of the most ecologically feasible, cost effective and rational ways of reducing uncertainties in agriculture especially among smallholder farmers. The respondents who were mainly smallholder farmers and youth just starting out in their agricultural profession would prefer a cost-effective climate smart agricultural practice. As revealed in Table 6, planting drought resistant seed varieties ($\bar{x} = 1.86$) ranked second among the climate smart agricultural practices respondents were willing to use.

Among the climate smart agricultural practices respondents were least willing to adopt was to stop making use of inorganic fertilizers ($\bar{x} = 1.29$) which ranked 13th of the climate smart agricultural practices. Close to this is stopping the use of inorganic herbicides and pesticides which ranked 12th among the climate smart agricultural practices respondents were unwilling to adopt. This could be due to several challenges farmers encounter in organic farming. The result justifies the assertion of Adebiyi (2014) that the adoption of organic agriculture in Africa is generally low.

The result in Table 7 revealed respondents' high level (70.8%) of willingness to make use of climate-smart agricultural practices. The high level of knowledge could have influenced the respondents' willingness to make use of climate-smart agricultural practices.

**Table 6: Distribution of respondents by the inclination to practise climate smart agriculture**

| Are you willing to? | Willing | | Less willing | | Not Willing | | Mean | Rank |
|---|---|---|---|---|---|---|---|---|
| make use of drought resistant seed varieties for planting | 112 | 93.3 | 7 | 5.8 | 1 | 0.8 | 1.93 | 2nd |
| adopt crop rotation | 97 | 80.8 | 19 | 15.8 | 4 | 3.3 | 1.7750 | 9th |
| practice intercropping/mixed cropping system | 103 | 85.8 | 17 | 14.2 | 0 | 0 | 1.8583 | 3rd |
| stop making use of inorganic fertilizers | 51 | 42.5 | 53 | 44.2 | 16 | 13.3 | 1.2917 | 13th |
| application of manure to your plants | 97 | 80.8 | 20 | 16.7 | 32 | 2.5 | 1.7833 | 8th |
| practice zero tillage for maize cultivation | 82 | 68.3 | 28 | 23.3 | 10 | 8.3 | 1.6000 | |
| practice mulching on your maize plants | 101 | 84.2 | 17 | 14.2 | 2 | 1.7 | 1.8250 | 4th |
| manage your residue by incorporating the plant remains into the soil | 98 | 81.7 | 19 | 15.8 | 3 | 2.5 | 1.7917 | 7th |
| plant trees or shrubs in or around farmland | 99 | 82.5 | 20 | 16.7 | 1 | 0.8 | 1.8167 | 6th |
| irrigate your maize plants when there is an absence of water | 94 | 78.3 | 16 | 13.3 | 10 | 8.3 | 1.7000 | 11th |
| stop the use of inorganic herbicides and pesticides | 55 | 45.8 | 46 | 38.3 | 19 | 15.8 | 1.3000 | 12th |
| make use of high yielding hybrids seeds of maize | 100 | 83.3 | 13 | 10.8 | 7 | 5.8 | 1.7750 | 9th |
| integrate crop and livestock production | 115 | 95.8 | 3 | 2.5 | 2 | 1.7 | 1.9417 | 1st |

Source: Field survey, 2021

**Table 7: Categorisation of respondents by the willingness to practise climate smart agriculture**

| Level of use | Freq. | % | Minimum value | Maximum value | Mean | Standard deviation |
|---|---|---|---|---|---|---|
| Low | 35 | 29.2 | 16 | 26 | 22.38 | ±2.47 |
| High | 85 | 70.8 | | | | |

Source: Field survey, 2021

**Hypotheses of the study**

There is no significant relationship between enterprise characteristics of respondents, respondents' knowledge of climate-smart agriculture and their inclination to practise climate-smart agriculture.

As revealed in Table 8, there is a significant correlation between the source of labour ($\chi^2$=6.001, p< 0.05) and inclination to practise climate-smart agriculture. Sources of labour could foster an inclination to use climate smart agricultural technologies because some climate-smart practices could be labour intensive. Hence, it is expected that farmers with available labour sources would be more willing to practise climate smart agriculture including practices that are labour intensive. This opinion is supported by Marenya and Barrett (2007) who asserted that climate smart agricultural practices are labour intensive, hence, larger household size are more likely to adopt the practices.

The PPMC analysis revealed in Table 8 reveals a significant relationship between respondents' farm size (r= 0.338, p<0.05) and inclination to use climate smart agricultural practices. This finding concurs with that of Rehman *et al* (2013) who established that an increase in farm size resulted in access to agricultural information including information on climate smart agricultural practices. This significant relationship could be because farmers with large farm size would have invested so much into production and are at higher risk of loss than smaller farmers. The desire to maximize profit from their bulk investment would increase the willingness to make use of climate smart-agricultural practices. This is in accordance with Maddison (2006) assertion that farm size positively influences climate adaptation strategies.

Also, Table 8 reveals there was a significant relationship (r=0.268, p<0.05) between respondents' knowledge of climate smart-agriculture and inclination to use climate smart agricultural practices. This implies that increased knowledge of climate-smart agricultural practices will lead to corresponding increased willingness to practise climate smart agriculture. The result is not surprising as adequate knowledge is needed for climate smart agricultural practices. Farmers would only be willing to adopt an innovation when aware of the benefits as well as the know-how. This finding corroborates Etuk *et al* (2012) who asserted that education of farmers on technologies is important in the adoption and utilization of innovation.

**Table 8: Relationship between enterprise characteristics of respondents, knowledge and their inclination to practice climate smart agriculture**

| Variables | $\chi^2$ | df | p-value | r-value | Remark |
|---|---|---|---|---|---|
| Source of labour | 6.001 | 2 | 0.050 | | Significant |
| Farm size | | | 0.000 | 0.338 | Significant |
| Knowledge | | | 0.003 | 0.268 | Significant |

Source: Field survey, 2021

## CONCLUSION

The study concludes that youth farmers involved in maize production are willing to practise climate-smart agriculture. They have a high level of knowledge of climate smart-agriculture although with various perceived constraints associated with climate-smart agricultural practices. However, the source of labour, farm size and high level of knowledge may influence their willingness to practise climate-smart agriculture.

## RECOMMENDATIONS

There was a low level of use of social media to disseminate information on climate-smart agricultural practices, therefore extension agents from government and non-governmental organizations should adopt E-extension for disseminating climate-smart agricultural practices. This will enable youth who are the most users of social media to have increased access to information on climate smart agricultural practices which would, in turn, affect its adoption.

It is recommended that government, extension agents, media personnel and non-governmental organization organize more programmes for the dissemination of climate-smart agricultural technologies to youth farmers.

Practices that are less tedious and require fewer resources should be introduced to the youth farmers so that they can be willing to adopt them.

## REFERENCES

Adebiyi, J. A. (2014). Organic agriculture development strategies in Tunisia and Uganda: Lessons for African Organics. Master's Thesis, IOWA State University, Ames, IA, USA, 2014.

AGRA. (2014). Alliance for a Green Revolution in Africa. Africa Agriculture Status Report: Climate Change and Smallholder Agriculture in Sub-Saharan Africa. Nairobi, Kenya: Alliance for a Green Revolution in Africa (AGRA)

Amondo E, Simtowe F. (2018). Technology innovations, Productivity and Production Risk Effects of Adopting Drought Tolerant Maize Varieties in Rural Zambia. Vancouver: International Association of Agricultural Economics (IAAE)

Cairns J. E., Hellin J., Sonder K., Araus J. L., MacRobert J. F., Thierfelder C, Prasanna B. M. (2013). Adapting maize production to climate change in sub-Saharan Africa. Food Security, 5(3):345-360

Etuk, U. R., Ekanem, J.T., and Cookey, I., M. (2012). Analysis of the contribution of Green River Project to agricultural and rural development in Rivers State. African Journal of Agriculture Technology and Environment – AJATE, 1(1): 59-64.

Folayan J. A and Bifarin J.O. (2013). Profitability analysis of honey production in Edo North Local Government Area of Edo State, Nigeria. J. Agric. Econ. Dev. 2(2):1-5

IPCC. Climate Change (2013). The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate. Cambridge, United Kingdom/New York, NY, USA: Cambridge University Press

Joshi, P. (2005) Crop diversification in India: nature, pattern and drivers. In: New Delhi India: Asian Development Bank

Khanal S.R (2013). Role of radio on agricultural development: A review. Bodhi An Interdisciplinary Journal 5(1) DOI:10.3126/bodhi.v5i1.8054

Kotir, J. H. (2011). Climate change and variability in Sub-Saharan Africa: A review of current and future trends and impacts on agriculture and food security. Environment, Development and Sustainability, 587-605.

Lobell, D. B., Bänziger, M., Magorokosho, C. and Vivek, B. (2011). Nonlinear heat effects on African maize as evidenced by historical yield trials. *Nature Climate Change*, 1:42-45

Lorenzoni, I., Nicholson-Cole, S. and Whitmarsh, L. (2007) Barriers Perceived to Engaging with Climate Change among the UK Public and Their Policy Implications. Global Environmental Change, 17, 445-459. http://dx.doi.org/10.1016/j.gloenvcha.2007.01.004

Marenya, P. P. and Barrett, C. B. (2007). Household-level determinants of adoption of improved natural resources management practices among smallholder farmers in western Kenya Food Pol., 32 (2007), pp. 515-536

Mulenga, B. P., Wineman A, Sitko N. J (2017). Climate trends and farmers' perceptions of

climate change in Zambia. Environmental Management, 59:291-306.

Ng'ombe, J. N, Brorsen, B. W, Raun, W. R, Dhillon, J. S. (2019) Economics of the Greenseeder hand planter. Agrosystems, *Geosciences and Environment*, 2:1

Rehma, F., Muhammad, S., Ashraf, I., Ruby, T. (2013) Effect of farmers' socioeconomic characteristics on access to agricultural information: empirical evidence from Pakistan Young, 52, pp. 21 67

Rohila, A., Shehrawat, P. and Malik, J. (2018). Awareness, constraints and prospects of climate smart agricultural practices (CSAP). Journal of Agrometeorology, 20: 167-171

Shiferaw, B., Prasanna, B. M, Hellin, J., Bänziger, M. (2011). Crops that feed the world 6. Past successes and future challenges to the role played by maize in global food security. Food, 307-327

Tetteh, E. K., Opareh, N. O., Ampadu, R., Antwi, K. B (2014). Impact of Climate Change: Views and perceptions of policy makers on smallholder agriculture in Ghana. International Journal of Sciences: Basic and Applied Research (IJSBAR), 79-89

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# Utilization of improved post-harvest techniques of leafy vegetables among farmers in Ojo local government area of Lagos state, Nigeria

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**Abstract:** This study determined the utilization of improved post-harvest techniques of leafy vegetables among farmers in Ojo Local Government Area of Lagos State. Simple random sampling technique was used to select 150 respondents for the study. Data were collected using a structured questionnaire and analyzed using frequency counts, percentages, mean and Pearson Product Moment Correlation Coefficient (PPMC) at p=0.05. Most respondents were female (84.7%), married (70%), had secondary education (65.3%) and 78.7% had less than 10 years' experience. Harvesting of vegetables according to proper maturity index (84.7%), collection of vegetables from the field on time (88.7%) and keeping the harvested produce in a shady place (86.7%) were the most utilized improved harvesting techniques. In terms of storage, 85.3% of the respondents assembled harvested vegetables under tree shade always, 70.7% of the respondents used Bamboo baskets for packing their produce always. There was a significant relationship between respondents' level of education (r=0.161), farming experience (r=0.083) and farm size (r=0.158) and their utilization of improved postharvest techniques of leafy vegetables. Low level of education characterized the respondents hence, they should be encouraged to pursue reasonable level of formal education. Adult education should also be revamped to enable farmers acquire basic functional literacy to improve their production.
**Keywords**: Postharvest techniques, Leafy vegetables, Vegetable farmers

## INTRODUCTION

African Leafy vegetables are mostly gathered from the wild (Maseko *et al,* 2018). They have important advantages over exotic vegetable species, because of their adaptability to marginal agricultural production areas and their ability to provide dietary diversity in poor rural communities (Maseko *et al*, 2018). Leafy vegetables play a significant role in the food security of smallholder farmers in rural, peri-urban and urban areas (Gogo *et al*, 2016). This group of vegetables also referred to as greens or pot-herbs, are popular around the world, especially in Asia, and they include spinach beet, spinach, lettuce, amaranth, fenugreek and Chinese cabbage (Dhaliwal, 2017). In the human diet, leafy vegetables serve as vital sources of fibre, minerals (like iron, calcium and phosphorous) and vitamins which is the reason why dieticians recommend daily consumption of at least 116g of it in a balanced diet (Dhaliwal, 2017). Moreso, Arasaretnam *et al* (2018), reported that leafy vegetables are essential for life because they are composed of essential major elements such as calcium, magnesium, potassium and sodium. They create employment opportunities for women and youth in the society, hence providing a viable option for alleviating food insecurity (Qiuab *et al*, 2017). They are increasingly being recognized as sources of improved nutrition and food supply (Ramatsitsi and Palane Dub, 2020).

However, among all vegetable species, the leafy vegetable groups show the highest rate of respiration, which has the function of releasing energy from stored chemical compounds in the plant (Alvino and Barbieri, 2016). The depletion of energy reserves leads to the reduction of shelf life of the product because, during the shelf life, the fresh product loses water continuously (transpiration), which causes a moisture reduction of tissues and thus an irreversible loss of turgor (Acedo *et al*., 2016). Water loss is the major cause of postharvest losses in leafy vegetables. Fresh vegetables are extremely perishable due to their relatively short shelf life (Acedo *et al*., 2016; Wagner *et al*., 2020). Alvino and Barbieri (2016) commented on their perishability, stating that they become perishable because once harvested, they can only be stored for a while before displaying undesirable symptoms such as reduction of greenness and appearance of yellowed leaf areas and loss of flavour and aroma. Vegetables can change hands so many times in the postharvest sector, therefore, a high level of management is necessary to ensure that quality is maintained. Each time someone fails to be conscientious in carrying out his or her assigned responsibility, quality is irreversibly sacrificed (Wagner *et al*., 2020).

Moreover, post-harvest losses of vegetables are serious in developing countries due to low knowledge, poor techniques, inadequate facilities for product handling, processing and poor marketing systems (Acedo *et al*., 2016). The corresponding loss of food and economic opportunities contributes to poverty, food insecurity and malnutrition, which mostly affect smallholders who dominate vegetable production. Post-harvest handling includes all steps involved in moving a commodity from the producer to the consumer including harvesting, handling, cooling, curing, ripening, packing, packaging, storing, shipping, wholesaling, retailing and any other procedure that the product is subjected to (Wagner *et al*., 2020). Poor post-harvest handling can result in loss of appreciable amounts of the nutrients present in the vegetables at harvest. It is therefore important to employ appropriate post-harvest handling practices and technologies to preserve the quality of vegetables after harvest.

Harvesting, handling, grading and packaging of vegetables to ensure optimum product quality at the marketplace requires special skills. It makes little difference what the quality is at harvest if it is reduced by poor handling, packaging or storage conditions. This is because the price received for the product is determined by its quality at the marketplace (Wagner *et al*., 2020).

Globally, different post-harvest food loss and waste assessment methodologies have been practiced by various researchers, but there is inadequate information to identify appropriate solutions to reduce the losses, adopt cost-effective practices and make profitable post-harvest agri-business investments (Kitinoja, 2016).Knowing farmers' post-harvest techniques of leafy vegetables in Lagos state systems will allow researchers, extension agents and farmers to adopt practical and efficient technique that will meet the present and future farming needs in the study area given the state's potential for increasing food security.

In sub-Saharan Africa, 30–80% of horticultural crops are lost after harvest, in part due to a lack of awareness about good harvesting and packing practices and a lack of storage facilities. Improper postharvest handling also can cause the nutritional value, quality and shelf life of fresh produce to decline, and may compromise the safety of the food supply. To assist people involved in different aspects of horticultural production to evaluate and address postharvest losses, the University of California - Davis and the Postharvest Education Foundation in collaboration with – The World Vegetable Center organized two Horticultural Postharvest Training Courses at AVRDC's Regional Center for Africa in Arusha, Tanzania from 7-13 October and 14-20 October 2012. The Training of Trainers (ToT) course aimed to develop the skills and knowledge of horticultural professionals (university faculty, agriculture ministry staff, entrepreneurs, producers, etc.) from various countries in sub-Saharan Africa to reduce postharvest losses and improve market access and incomes for small-scale horticultural crop farmers, most of whom are women. It is against this backdrop that this study focused on assessing the utilization of improved post-harvest techniques of leafy vegetables among farmers in Ojo Local government area of Lagos state. The specific objectives addressed in the study include to; describe the socioeconomic characteristics of leafy vegetable farmers in the study area; ascertain the use of improved post-harvest techniques of leafy vegetables among respondents in the study area and identify the constraints faced by respondents in the adoption of improved post-harvest techniques in the study area.

## METHODOLOGY

Ojo Local Government Area of Lagos State located at 6 ° 28′N 3 ° 11′E, was created in 1989, with a landmass of 182sq km and about 30% of it can be described as riverine. Some of the locations where urban agriculture takes place include Iyana Iba, Agboroko, Lagos State University (LASU) campus and, Ojo Cantonment (Akinmoladun and Adejumo, 2011). The LGA is diverse in terms of land use, ethnicity, and income distribution. The population of the study comprised all leafy vegetable farmers in the study area. A two-stage sampling procedure was used to select respondents for the study. In the first stage, Iyana-Iba, Lagos State University campus and Ojo cantonment areas were purposively selected due to high concentration of leafy vegetable farmers. In the second stage a 30% proportionate sampling of all the leafy vegetable farmers was done from each of the three locations to have a sample size of 150 leafy vegetable farmers for the study. Data for the study were gathered through administration of structured questionnaire. Utilization of improved postharvest techniques among respondents was measured on a 4-point scale of always, occasionally, rarely and never. Items were developed covering harvesting, storage, packaging and transportations as postharvest operations. Severity of the constraints was established in the study through ranking using mean values. Data were analyzed using frequency counts, percentages, mean and Pearson Product Moment Correlation (PPMC).

## RESULTS AND DISCUSSION

### Socioeconomic characteristics

The age distribution of farmers in the study area is shown in Table1. Majority (66.7%) were between the age range of 41-50, female dominated, and many (70%) married. Majority (65.3%) of the respondents had up to secondary level of education, farming experience of 10years and below (78.7%) with farm size below one hectare among most (82.7%) of them. Lagos is a state of aquatic splendor with the limited land placed into industrial and urban development, this may account for small farm size among respondents. Umar *et al*., (2015) reported that the age of individuals affects their mental attitude towards new ideas. This can be used to infer that the age of the respondents plays a major role in their adoption of improved post-harvest techniques. Fapojuwo *et al*., (2021) argued that the hectic nature of agricultural activities enables male to get much involved in the job thereby dominating the agricultural workforce. Vegetable production however in the study area was female dominated, this may be due to less hectic nature of the venture, low inputs and capital requirements for vegetable production. Gogo *et al* (2018) established that African leafy vegetable production is primarily by women who were mainly small holder farmers.

Level of education was low among respondents; this could be due to less premium placed on girl-child education and the ravaging effect of cultural belief. According to Najafi (2003) educational attainment is very important because it could lead to awareness of the possible advantages of modern farming techniques which in turn would enhance household food production.

**Table 1: Distribution of respondents based on personal characteristics**

| Variables | Frequency | Percentage | Mean | Standard Dev. |
|---|---|---|---|---|
| **Age (years)** | | | 38.5 | ±9.79016 |
| ≤40 | 38 | 25.3 | | |
| 41-50 | 100 | 66.7 | | |
| 51-60 | 10 | 6.7 | | |
| >60 | 2 | 1.3 | | |
| **Sex** | | | | |
| Male | 23 | 15.3 | | |
| Female | 127 | 84.7 | | |
| **Marital Status** | | | | |
| Single | 35 | 23.3 | | |
| Married | 115 | 70 | | |
| Divorced | 3 | 2.0 | | |
| Widow/widower | 7 | 4.7 | | |
| **Level of education** | | | | |
| No formal Edu | 3 | 2.0 | | |
| Primary | 23 | 15.3 | | |
| Secondary | 98 | 65.3 | | |
| Higher institution | 26 | 17.3 | | |
| **Farming experience** | | | 8.16 | ±5.55032 |
| ≤10 | 118 | 78.7 | | |
| 11-20 | 25 | 16.7 | | |
| >20 | 7 | 4.7 | | |
| | | | | |
| **Types of leafy vegetable grown** | | | | |
| Fluted pumpkin (Ugwu) | | | | |
| Bitter leaf | 42 | 28 | | |
| Waterleaf | 28 | 18.7 | | |
| Amaranthus (Green) | 20 | 13.3 | | |
| Celosia (Shoko) | 40 | 27 | | |
| | 20 | 13.3 | | |
| **Farm size** | | | 0.61 | ±1.65152 |
| < 1 ha | 124 | 82.7 | | |
| 1-5 ha | 26 | 17.3 | | |

Source: Field Survey, 2021

**Improved post-harvest techniques used by the respondents**

**Harvesting Techniques**

Respondents indicated that timely collection of vegetables (88.7%) and keeping of harvested produce in shady place (86.7%) were part of the frequently used improved postharvest techniques during harvesting from the field. Table 2 shows majority (84.7%) of the respondents always harvest vegetables according to proper maturity indices. Timely collection of vegetables among the respondents could be aimed at reducing the incident of pest infestation which often reduces the economic value of the products. Also, the timely collection will help guard against lignification and to make the product attractive to consumers as some consumers look out for fresh and tender vegetables. Keeping under shade as indicated by respondents would help to reduce perishability and in turn improves shelf life. Fruits and vegetables should be harvested very carefully after observing the appropriate maturity level and quality because lower or upper maturity level of produce reduce the storage life and enhance the spoilage (Siddiqui *et al*., 2014; Ahmad *et al*., 2014).

**Storage Techniques**

Results in Table 2 shows assembling harvested vegetables under tree shade (85.3%) and frequent sprinkling of water on harvested vegetables (75.3%) were the mostly used storage postharvest techniques among respondents. These storage techniques do not require any sophistication and have been part of the common ways by which leafy vegetables are stored on and off farms. The ZECC technique was not well used by respondents as only 10% always used it. This may be due to metropolitan nature of

the study area, where charcoal may not be in surplus supply for energy purpose. The Zero Energy Cool Chambers (ZECC) is a type of evaporative cooler which are simple and inexpensive ways to keep vegetables fresh without electricity (Odesola and Onwuka, 2009).

**Packaging Techniques**

The use of polysacks and ventilated crates for packing harvested produce was used by 54% of the respondents always. The use of Bamboo baskets was a well-accepted technique among the respondents as most (70.7%) of them used it always in the study area, this however could be due to availability of the materials locally. Gunny bags in the packaging of harvested leafy vegetables was popular among respondents, majority (65.3%) of them. It could be inferred from the results that ease of getting materials was the basis for the packaging techniques used by respondents. Some of the materials can be put into continuous use from one farming season to another once procured. This way ensuring reduction in production cost and possible increase in profit margin.

**Transportation Techniques**

Generally, most of the respondents (98%) transport their produce to the market from their farms to the market using cars and motorcycles, although at varying frequency, 38% always, 40% occasionally while 20% rarely used the means. Considering safe loading of harvested produce, 94% of the respondents established that they always record safe loading of their produce. In terms of safe offloading, 78.7% of the respondents alluded that they recorded safe offloading of their produce always. This could be attributed to closeness to market and availability of motorable metropolitan roads.

**Table 2: Distribution of respondents by use of improved Post-Harvest Techniques**

| Technologies | Always | Occasionally | Rarely | Never |
|---|---|---|---|---|
| **Harvesting** | | | | |
| Harvesting at proper maturity indices | 127(84.7) | 6(4) | 3(2) | 14(9.3) |
| Collection of vegetables from the field in time | 133(88.7) | 17(11.3) | - | - |
| Keeping harvested produce in a shady place | 130(86.7) | 14(9.3) | 6(4) | - |
| proper cleaning or washing or cleaning before marketing | 101(74) | 11(7.3) | 14(9.3) | 14(9.3) |
| Sorting of vegetables | 110(73.3) | 28(18.7) | 6(4) | 6(4) |
| Grading of vegetables | 116()77.3 | 20(13.3) | 8(5.3) | 6(4) |
| Cooling of vegetables | 85(56.7) | 31(20.7) | 6(4) | 28(18.7) |
| Curing of vegetables | 98(65.3) | 24(16) | 18(12) | 10(6.7) |
| **Storage** | | | | |
| Controlled Atmosphere Storage (CAS) | 20(13.3) | 14(9.3) | 24(16) | 92(61.3) |
| Zero Energy Cool Chambers | 15(10) | 20(13.3) | 29(19.3) | 86(57.3) |
| Use of Charcoal system to produce cold storage | 28(18.7) | 9(6) | 17(11.3) | 96(64) |
| Assembling harvested vegetables under tree shade | 128(85.3) | 14(9.3) | 5(3.3) | 3(2) |
| Blanching | 48(32) | 36(24) | 18(12) | 48(32) |
| Frequent sprinkling of water on harvested vegetables | 113(75.3) | 21(14) | - | 16(10.7) |
| **Packaging** | | | | |
| Modified Atmospheric Packaging | 22(14.7) | 19(12.7) | 23(15.3) | 86(57.3) |
| Active Packaging Technology | 10(6.7) | 11(7.3) | 23(15.3) | 106(70.7) |
| Use of ventilated crates and polysacks | 81(54) | 22(14.7) | 14(9.3) | 33(22) |
| Bamboo baskets | 106(70.7) | 14(9.3) | 3(2) | 27(18) |
| Gunning bags | 98(65.3) | 12(8) | 12(8) | 28(18.7) |
| **Transportation** | | | | |
| Transportation using cars or motorcycles | 57(38) | 60(40) | 30(20) | 3(2) |
| Safe loading | 141(94) | 9(6) | - | - |
| Safe unloading | 118(78.7) | 26(17.3) | 6(4) | - |

Source: Field Survey, 2021

**Constraints faced by the respondents in the use of improved Postharvest techniques**

Table 3 reveals constraints facing respondents in the utilization of improved postharvest techniques of leafy vegetables in the study area. These are unpredictable climate **($\underline{x}$= 3.72),** lack of extension support services **($\underline{x}$ = 3.59)** and high cost of labour **($\underline{x}$ = 3.56)**. Unpredictable climate, lack of extension support services and high cost of labour ranked 1st, 2nd and 3rd respectively. Unpredictability of climate has imposed high risk and uncertainty on every facet of agriculture. The awareness level of climate smart agriculture among farmers is still low, this however remains the option to combat the production

uncertainty associated with climate. Lack of extension support services in the study area could be attributed to the wide extension-farmer ratio in most states in Nigeria, Lagos not an exception. Lagos state prides itself with less than 90 (Ninety) functional village extension agents (LSADA, 2017). High cost of labour in metropolis of Lagos cut across all economic activities employing labour. This could be due to high cost of living, dearth of farm labour and availability of alternative jobs in the study area.

**Table 3: distribution of respondents by constraints faced in the use of improved postharvest techniques**

| Constraints | Mean score ($\underline{x}$) | Rank |
|---|---|---|
| Non-availability of improved seeds | 3.46 | 5th |
| Unpredictable climate | 3.72 | 1st |
| Lack of extension support services | 3.59 | 2nd |
| Inadequate storage and processing facilities | 2.99 | 8th |
| High cost of labour | 3.56 | 3rd |
| High cost of inputs | 3.48 | 4th |
| Absence of crop insurance coverage | 3.23 | 7th |
| High cost of transportation | 3.37 | 6th |
| Middlemen malpractices | 2.59 | 9th |

Source: Field survey 2021

**Relationship between respondents' socioeconomic characteristics and level of utilization of improved postharvest techniques**

There was a significant relationship between respondents' level of education ($r = 0.161$, $P < 0.05$), farming experience ($r = -0.083$, $P < 0.05$) and farm size ($r = 0.158$, $P < 0.05$).and level of utilization of improved postharvest techniques. This implies that level of education of respondents is a determining factor to their utilization of improved postharvest techniques. The higher the level of education, the more likelihood that farmers will adopt an innovation. Farming experience and size of farmland are probable factors that can affect the adoption of innovation among farmers. Farmers with high farming experience tend to embrace new practices. Smallholder farmers often times are not desirous of adopting new techniques compared to large/commercial holders.

**Table 4: Correlation between selected personal characteristics of the respondents and their level of utilization of improved post-harvest techniques**

| Variables | r-value | p-value | Decision |
|---|---|---|---|
| Level of education | 0.161 | 0.002 | Significant |
| Farming experience | -0.083 | 0.005 | Significant |
| Size of farmland in hectares | 0.158 | 0.015 | Significant |

Source: Field survey, 2021

## CONCLUSION AND RECOMMENDATION

Majority of the leafy vegetable farmers are in their middle age with low level of education and are smallholders. Improved postharvest techniques utilized by the farmers covered different postharvest activities such as harvesting techniques, storage techniques, packaging techniques and transportation techniques. The use of improved postharvest techniques among respondents was constrained by unpredictable climate, lack of extension support services and high cost of labour among others. Farmers therefore should be encouraged to pursue reasonable level of formal education. Adult education should also be revamped to enable farmers acquire basic functional literacy to improve their production.

## REFERENCES

Acedo, A. L., Rahman, M. A., Buntong, B., & Gautam, D. M. (2016). *Vegetable Postharvest Training Manual.* Taiwan India: World Vegetable Center.

Ahmad, M. S., Nayyer, M. A., Aftab, A., Nayak, B., and Siddiqui, M. W. 2014. Quality prerequisites of fruits for storage and marketing. Journal of Postharvest Technology, 2(1), 107-123.

Akinmoladun, I. O., and Adejumo, O. T. (2011). Urban agriculture in metropolitan Lagos: An inventory of potential land and water resources. *Journal of Geography and Regional Planning, 4*(1), 9-19.

Alvino, A., and Barbieri, G. (2016). Vegetables of Temperate Climates: Leafy Vegetables. *Encyclopedia of Food and Health*, 393-400. doi:10.1016/B978-0-12-384947-2.00712-1

Arasaretnam, S., Kiruthika, A., and Mahendran, T. (2018). Nutritional and mineral composition of selected green leafy vegetables. *Ceylon Journal of Science, 47*(1), 35-41.

Dhaliwal, M. S. (2017). Leafy and Salad Vegetables. In *Handbook of Vegetable Crops* (pp. 279-310). Research Gate.

Fapojuwo, O. E, Ajayi, M.T., Okubena, B., A., Adebayo, O.A. & Fapojuwo, T.O. (2021). Occupational hazards prevalence and agricultural workers' job performance of agricultural organizations in Oyo State, Nigeria. *KIU Interdisciplinary Journal of Humanities and Social Sciences*, 2(1), 130-140.

Gogo, E., Opiyo, A., Ulrichs, C., & S, H.-K. (2016). Postharvest Treatments of African Leafy Vegetables For Food Security in Kenya: A Review. *African Journal of Horticultural Science, 9*, 32-40.

Gogo, E., Opiyo, A., Ulrichs, C., & S, Huyskens.-Keil. (2016). Loss of African Indigenous vegetables along the supply chain. International Journal of Vegetable Science. Taylor and Francis, Vol. 24:4 https://doi.org/10.1080/19315260.2017.1421595

James, A., & Zikankuba, V. (2017). Postharvest management of fruits and vegetable: A potential for reducing poverty, hidden hunger and malnutrition in sub-Sahara Africa. *Cogent Food & Agriculture, 3*(1), 1-13. doi:10.1080/23311932.2017.1312052

Kitinoja, L., Tokala, V. Y., and Brondy, A. (2018). A review of global postharvest loss assessments in plant-based food crops: Recent findings and measurement gaps. *Journal of Postharvest Technology, 6*(4), 1-15.

Lagos State Agricultural Development Authority (LASADA), 2017. Extension Activities Report (January – December, 2016) presented at the REFILS workshop on OFAR/Extension Report, held between 25th – 28th April, 2017 at IAR&T, Moor Plantation, Ibadan.

Maseko, I., Mabhaudhi, T., Tesfay, S., Araya, H. T., Fezzehazion, M., and Plooy, C. P. (2018). African Leafy Vegetables: A Review of Status, Production and Utilization in South Africa. *Sustainability, 10*(16), 1-16. doi:10.3390/su10010016.

Mehyar, G.F. and Han, J.H. 2011. Active Packaging for Fresh-Cut Fruits and Vegetables, Edited by Aaron L. Brody, Hong Zhuang and Jung H. Han. Blackwell Publishing Ltd, pp. 267-284.

Najafi, B. (2003). An Overview of Current Land Utilization Systems and Their Contribution to Agricultural Productivity.Report of the APO Seminar on Impact of Land Utilization Systems on Agricultural Productivity.

Odesola, I.F., and Onwuka, O. (2009). A review of Porous Evaporative Cooling for the Preservation of Fruits and Vegetables. (Vol. 10). The Pacific Journal of Science and Technology.

Qiuab, Y., Zhaoa, Y., and Liu, J. (2017). A statistical analysis of the freshness of postharvest leafy vegetables with application of water based on chlorophyll fluorescence measurement. *Information Processing in Agriculture, 4*(4), 269-274. doi:https://doi.org/10.1016/j.inpa.2017.08.001

Ramatsitsi, M. N., and Palane Dub, Z. (2020). Post-infectional resistance in traditional leafy vegetable infected with root-knot nematodes. *South African Journal of Botany, 131*, 169-173.doi:https://doi.org/10.1016/j.sajb.2020.01.023.

Siddiqui, M.W., Dutta, P., Dhua, R.S., and Dey, A. 2014. Changes in biochemical composition of mango in response to pre-harvest gibberellic acid spray. *Agriculturae Conspectus Scientificus*(ACS), 784(4), 331-335.

Umar S., Musa M. W., Olayemi Y. T. and Suleiman R. (2015). Awareness and Use of Information and Communication Technologies among Extension Agents in Kaduna State of Nigeria. *Journal of Agricultural Extension*. Vol.19 (1).

Wagner, A. B., Dainello, F. J., and Parsons, J. M. (2020). Chapter X: Harvesting and Handling. In *Vegetable Resources*. Texas: Texas A&M University System. Retrieved 2020, from aggie-horticulture: https://aggie-horticulture.tamu.edu/vegetable/guides/texas-vegetable-growers-handbook/chapter-x-harvesting-handling.

Wijewardane, N. A. 2014. Effect of pre cooling combined with exogenous oxalic acid application on storage quality of mango (Mangifera indica). Journal of Post-Harvest Technology, 2(1), 45-53.

Yumbya, P., Ambuko, J., Shibairo, S., and Owino, W. 2014. Effect of modified atmosphere packaging (MAP) on the shelf life and postharvest quality of purple passion fruit (Passiflora edulis Sims). Journal of Post-Harvest Technology, 2(1), 25-36

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# Information and communication technology usage for marketing among agricultural produce dealers in Ogbomoso north local government area, Oyo state

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**Abstract:** The research focused on Information Communication Technology usage for marketing among Agricultural produce dealers in Ogbomoso North Local Government Area of Oyo State. Data were collected through an interview schedule from 108 respondents through random sampling of 70% from a list of 154 registered produce dealers in Ogbomoso North Local Government, Oyo state. Descriptive statistics such as percentages, mean and standard deviation were used to present the data, and Pearson Product Moment Correlation was used to analyse the data. The findings revealed that the ICT devices available in the area for buyers and sellers included radio, television, internet, newspaper, E-mail, computer, telephone, (Social media apps) WhatsApp, Facebook, and telegram. However, radio was the most readily used ICT device which ranked 1st, followed by telephone which ranked 2nd, and television which ranked 3rd. It was also observed that ICTs facilitated easy access to sellers of Agricultural produce and increased the income of the produce dealers. Several factors constrained the use of ICT devices, among these factors, were lack of knowledge for using ICT devices which ranked 1st with a mean score of 2.3 while the unavailability of ICT centres for training purposes, erratic power supply for ICT, low level of education and low income of farmers to purchase ICT equipment were all ranked 2nd with mean of 2.1 respectively. This study thus recommended that the Agricultural Produce Dealers' Association should organize training programmes on the use of ICT devices to improve their knowledge and facilitate better marketing of Agricultural produce.
**Keywords:** Produce, Information, Dealers, Marketing

## INTRODUCTION

The adoption and application of Information and Communication Technology (ICT) in the agricultural sector plays an important role as it helps to facilitate the transfer of knowledge, enhances agricultural productivity, and meet global food needs (Anyan and Frempong, 2018). Besides labour, land and capital, information is a key resource required for the growth of the agricultural sector, and the flow of information is facilitated using ICT. The introduction of ICT, better known as electronic agriculture (e-agriculture), has positively impacted agriculture and enhanced its all-round development without neglecting the marketing of agricultural produce. However, its level of usage determines to a large extent, the success that can be achieved with it (Eweoya *et al*., 2021).

E-agriculture is defined as an emerging practice that involves exchanging ideas, information, and resources to enhance the development of agriculture and rural development through the use of Information and Communication Technologies for sustainable agricultural practice (Food and Agriculture Organisation (FAO), 2005). ICT provides access to timely information, which enhances the efficiency of market interaction and strengthens the value chain. Aker and Mbiti (2010) posited that information flow is facilitated by ICT, and there is a reductio n in communication costs due to the enhanced communication between buyers and sellers. ICT increases market efficiency and production in the agricultural sector and enhances economic growth (Chavula, 2014) as its application has the tendency to synchronize data between the suppliers and buyers and also facilitates the process of decision making. It also aids attitude change and promotes the adoption of skills (Chikaire *et al*., 2017). The marketing of agricultural products involves various interconnected activities from the point of production to the final consumer (Patel and Skula, 2014). The activities include production, harvesting, transportation, processing, packaging and so on, all of which cannot occur without the transfer of adequate information (Vadivelu and Kiran, 2013). ICT has a great influence on agricultural marketing because of the ease associated with traders getting information both on the products and buyers.

Furthermore, marketing has been plagued with restricted access to information among active players in rural communities. The lack or restricted access became predominant due to Information Communication Technology's dearth amongst farm group leaders and agricultural produce dealers who engages in buying and selling of agricultural crops and has led to huge losses for the dealers and everyone involved in the marketing process. It becomes important, then, to examine the role of ICT usage among agricultural produce dealers as it helps them to effectively market their agricultural produce (Krell *et al*., 2021). The level of education of agricultural dealers also affects to a great extent how they can utilize ICT tools to enhance the marketing of their agricultural produce. This implies that their ability to acquire, adopt, and utilize Information and Communication Technology platforms and networks greatly determine how they can harness them to market their agricultural produce and make

profits (Gavai, Musungwini, & Mugoniwa, 2018). Therefore, the use of ICTs supports agricultural extension services, because it can be very effective in delivering timely and relevant information to farmers, even to those in remote areas, hence this study;

1. described the socio-economic characteristics of the agricultural produce dealers
3. identified the ICT devices available and frequency of use among agricultural produce dealers for marketing agricultural produce.
4. investigated the effect of ICTs use in marketing among the agricultural produce dealers
5. identified the constraint faced by the produce dealers on the usage of ICT for marketing

Hypothesis of the study was stated that there is no significant relationship between the socioeconomic characteristics of the respondent and the ICTs usage for marketing among Agricultural produce dealers.

## METHODOLOGY

The study area, Ogbomoso North Local Government Area (LGA) in Oyo state, Nigeria, is in the south-western part of Nigeria. It lies on the plateau of Yoruba land. The geographical location of this area is 4*10 1E of the Greenwich Meridian and 8*10 1 N of the equator (Ogunkan and Jelili, 2010)). It lies between Latitudes 8 05'N and 8 11'N Longitudes 4 12'E and 4 19'E. The terrain is gently undulating with sub-dendritic drainage pattern. The area is a derived savannah region It is the largest Local Government Area in the city, being the city's major economic nerve with a population of 198,859 people (National Population Commission (NPC), 2006). The LGA is bounded by Ogbomoso South, Orire and Surulere LGAs to the West and East respectively. The major occupation of the people is farming. The population of the study was all the Agricultural produce dealers in Ogbomoso North Local Government Area, Oyo State. The list of registered members of Nigeria Agricultural produce dealers Association in the LGA was obtained and simple random sampling technique was used to select respondents for the study. Through random sampling procedure, seventy percent of the 154 produce dealers on the list were selected, and it gave a total sample size of 108 produce dealers.

The dependent variable of this study was the use of ICTs for marketing among agricultural produce dealers and was measured as frequency of use on a four (4) point rating scale of regularly, occasionally, rarely, and never and scores were assigned values of 3, 2, 1 and 0 respectively. The cut-off point of 1.5 was generated as (3+2+1+0)/4. Data were analyzed using descriptive and inferential statistics. The descriptive tools used were frequency distribution, percentages, mean and ranking. While Pearson Product Moment Correlation (PPMC) analysis was used to test the relationship between selected socio-economic characteristics and the use of ICT by the produce dealers.

## RESULTS AND DISCUSSION

Table 1 shows that majority (69.4%) of the respondents were male while 30.6% of the respondents were female. This result implies that both the male and female were involved in the produce business in the area; however, males were dominant among the agricultural produce dealers. About 45.0% of the respondents were married, 17.5% of the respondents were single, 9.3% were divorced while those separated and divorced were 13.9 respectively. This result implies that majority of the respondents were married and is similar to the findings of Chikaire, *et al*., (2017) on the effect of ICT where majority of the respondents were married. The average years spent schooling by the respondents was 6.1 years ± 3.93 while 13% did not have formal education. This result implies that majority of the respondents were literate though with a low level of education and are likely to be receptive to change and adoption of innovations like the use of ICT for their enterprise. Asiabaka (2002), stated that the resultant effect of lack of education is resistance to change regarding the spread of information on agricultural innovations that are meant to change the lives of farmers positively.

Also, 65.7% of the respondents were traders, 30.6% of the respondents were farmers while 3.7% of the respondents were artisans. This result implies that majority of the respondent were majorly into buying and selling various agricultural produce. The average age of the produce dealers was 35.5years ±7.4 implying that they were still in their active years. The result further shows that majority (91.7%) of the respondents were involved in Cashew trading, 75.9% were involved in trading Cocoa, 59.3%, 39.8% and 22.2% were involved in trading Maize, Soybeans and Rice paddy respectively while 14.8% of the respondent were involved in trading other kinds of crops such as millet and sorghum. This result implies that majority of the respondent were involved mostly in cashew trading which might be because of the high production and value chain activities in the study area (Aremu-Dele *et al.,* 2021). Also, more than half (50.9%) of the respondents had between 4-6 members, with an average of about 4 people in their household. This implies that majority of the respondents were registered members of an association. All (100.0%) the respondents were cosmopolite and travelled an average of five times in a month. deals

**Table 1: Distribution of the Respondents by their Socio-economic Characteristics**

| Socio-economic characteristics | Frequency | Percentage | Mean (SD) |
|---|---|---|---|
| **Sex** | | | |
| Male | 75 | 69.4 | |
| Female | 33 | 30.6 | |
| **Marital status** | | | |
| Single | | 72.5 | |
| Married | 49 | 45.4 | |
| Divorced | 10 | 9.3 | |
| Separated | 15 | 13.9 | |
| Widowed | 1 | 13.9 | |
| **Years spent in school** | | | |
| No formal education | 14 | 13.0 | |
| 1-5 | 33 | 30.5 | |
| 6-10 | 42 | 38.9 | 6.12 years (±3.93) |
| 11-15 | 14 | 13.0 | |
| >15 | 5 | 4.6 | |
| **Major Occupation** | | | |
| Farming | 33 | 30.6 | |
| Trading | 71 | 67.5 | |
| Artisans | 4 | 3.7 | |
| Civil servant | 0 | 0 | |
| **Age** | | | |
| ≤30 | 28 | 25.8 | |
| 31-40 | 52 | 48.3 | 35.5years (±7.4) |
| 41-50 | 26 | 24.2 | |
| Above 50 | 2 | 1.9 | |
| *__Crop marketed__ | | | |
| Maize | 64 | 59.3 | |
| Cocoa | 82 | 75.9 | |
| Rice paddy | 36 | 33.3 | |
| Cashew | 99 | 91.7 | |
| Soy beans | 43 | 39.8 | |
| Palm kernel | 24 | 22.2 | |
| Other | 16 | 14.8 | |
| **House hold size** | | | |
| 1-3 | 47 | 43.6 | |
| 4-6 | 55 | 50.9 | 4 people (±2) |
| Above 6 | 6 | 5.5 | |
| **Cospomoliteness** | | | |
| Yes | 108 | 100.0 | |
| **Travel out of your location** | | | |
| <=6 | 84 | 77.8 | |
| 7-10 | 15 | 30.8 | 5 times (±5) |
| Above 10 | 9 | 8.4 | |

*Multiple responses; **SD**-Standard Deviation
Source: Field survey, 2021

**Available ICT devices and social media applications used by the produce dealers**

The produce dealers ranked Radio as 1st, Telephone was ranked 2nd and Television was ranked 3rd while on social media category WhatsApp was ranked 1st and Facebook was ranked 2nd possible because of the presence of the national body of the association on this social media. Newspaper and was ranked 6th, Computer and E-mail were ranked 8th, while Telegram use was ranked 10th. This implies that the most used devices by the produce dealers were radio and telephone. This study is in line with Singh *et al* (2015) and Chikaire (2018) who found that the most used devices were radio, telephone and television. Also, using a cut-off point of 1.5, the result implies the three ICTs mostly used by the dealers were Radio, Telephone and Television.

**Table 2: Distribution of available ICT and social media applications used by the produce dealers**

| S/N | ICT devices | Always | Occasionally | Rarely | Never | Mean score | Category Ranking |
|---|---|---|---|---|---|---|---|
| 1 | Radio | 2(1.9) | 31(28.7) | 75(69.4) | 0(0) | 2.7 | 1st |
| 2 | Television | 12(11.1) | 60(55.6) | 34(31.5) | 2(1.9) | 2.2 | 3rd |
| 3 | Internet | 41(38.0) | 31(28.7) | 4(3.7) | 32(29.6) | 1.1 | 4th |
| 4 | Newspaper | 25(23.1) | 21(19.4) | 16(14.8) | 46(42.6) | 1.1 | 4th |
| 5 | E-mail | 29(26.9) | 19(17.6) | 2(1.9) | 58(53.7) | 0.7 | 6th |
| 6 | Computer | 28(25.9) | 20(18.5) | 3(2.8) | 57(52.8) | 0.7 | 6th |
| 7 | Telephone | 3(2.8) | 28(25.9) | 75(69.4) | 2(1.9) | 2.6 | 2nd |
| | **Social Media** | | | | | | |
| 8 | WhatsApp | 8(7.4) | 23(21.3) | 55(50.9) | 22(20.4) | 2.0 | 1st |
| 9 | Facebook | 21(19.4) | 39(36.1) | 26(24.1) | 22(20.4) | 1.6 | 2nd |
| 10 | Telegram | 47(43.5) | 6(5.6) | 0(0) | 55(50.9) | 0.6 | 3rd |

Source: Field Survey, 2021 **Cut-off point**=1.5

**Effect of ICTs used in marketing among agricultural produce dealers produce**

Easy access to sellers and buyers of Agricultural produce was ranked 1st with mean score of 2.6, increased income of Agricultural produce marketed was ranked 2nd with mean of 2.3, proper linkage with the produce buyers, fast linkage with the buying agents as intermediary in distribution of Agricultural produce, proper linkage with producer of agricultural produce, finding new buyers and timely information on government schemes were all ranked 3rd with mean of 2.2 respectively, while reduction of stress involved in business transactions was ranked 4th with mean of 2.1. This is like the findings of Chavula (2014) that ICTs helps to provide timely information. This implies that the highest effect of ICT usage was easy access to sellers of agricultural produce leading to increase in the income of agricultural produce dealers.

**Table 3 Distribution according to the effect of ICTs use in marketing among crop produce sellers and buyers**

| S/no | Effect of ICTs usage | High effect | Moderate effect | Low effect | No effect | Mean | Rank |
|---|---|---|---|---|---|---|---|
| 1 | Easy access to sellers of agricultural produce | 65(60.2) | 38(35.2) | 4(3.7) | 1(0.9) | 2.6 | 1st |
| 2 | Increase the income of the agricultural produce marketers | 49(45.4) | 42(38.9) | 17(15.7) | 0(0) | 2.3 | 2nd |
| 3 | Finding new buyers | 39(36.1) | 51(47.2) | 16(14.8) | 2(1.9) | 2.2 | 3rd |
| 4 | Proper linkage with the produce buyers | 18(16.7) | 51 (47.2) | 39 (36.1) | 0.0 | 2.2 | 3rd |
| 5 | Fast link with the buying agents | 21 19.4 | 43 (39.8) | 44 (40.7) | 0.0 | 2.2 | 3rd |
| 6 | Proper linkage with producer of agricultural produce | 32(29.6) | 68(63.0) | 8(7.4) | 0(0) | 2.2 | 3rd |
| 7 | Timely information on government schemes | 39(36.1) | 48(44.4) | 20(18.5) | 1(0.9) | 2.2 | 3rd |
| 8 | Reduction of stress involved in business transactions | 28(25.9) | 63(58.3) | 16(14.8) | 1(0.9) | 2.1 | 4th |

Source: Field survey data, 2021

**Constraints faced by the Agricultural produce dealers in the use of ICT**

Lack of knowledge for using ICT devices was ranked 1st constraint faced by the dealers in their use of ICT for marketing. The dealers also expressed that their lack of training on how to handle ICT, erratic power supply, low level of education and inability to purchase sophisticated ICT due to low income makes it difficult for them to use ICTs and were all ranked 2nd respectively. Also, high cost of ICT facilities, inability to understand the language used to package information about phone usage which are usually in English language because their years of schooling was low and might be that they cannot read the instruction for the use of the ICT. The produce dealers further indicated that unavailability of ICT centres for training purposes limits their use of ICT (Table 4).

Using a cut-off point of 1.5 reveals that the produce dealers were aware that authentic agricultural information exists and they are aware that every needed information exits. This shows that all the perceived constraint listed above, affect respondents' use of ICT devices, however some pose greater hindrance while others are less important constraints. This study is in line with the claims of FAO (2005), that the distribution of information is limited by the lack of the help of trained personnel.

**Table 4: Distribution according to the constraints facing the produce dealers on the usage of ICT**

| SN | Constraints | Very severe | Severe | Mild | Not a constraint | Mean | Rank |
|---|---|---|---|---|---|---|---|
| 1 | Lack of knowledge for using ICT devices | 55(50.9) | 31(28.7) | 16(14.8) | 6(5.6) | 2.3 | 1st |
| 2 | Erratic power supply for ICT use | 57(52.8) | 20(18.5) | 18(16.7) | 13(12.0) | 2.1 | 2nd |
| 3 | Low level of education | 31(28.7) | 64(59.3) | 6(5.6) | 7(6.5) | 2.1 | 2nd |
| 4 | Low income of farmers for the purchasing of some ICT equipment | 33(30.6) | 57(52.8) | 11(10.2) | 7(6.5) | 2.1 | 2nd |
| 5 | Lack of ICT training | 50(46.3) | 33(30.6) | 14(13.0) | 11(10.2) | 2.1 | 2nd |
| 6 | Language barrier | 46(42.6) | 26(24.1) | 21(19.4) | 15(13.9) | 2.0 | 6th |
| 7 | High cost of ICT facilities | 33(30.6) | 55(50.9) | 10(9.3) | 10(9.3) | 2.0 | 6th |
| 8 | Unavailability of ICT centers for training purposes | 42(38.9) | 28(25.9) | 22(20.4) | 16(14.8) | 2.0 | 6th |
| 9 | Inadequate agricultural information | 21(19.4) | 23(21.3) | 43(39.8) | 21(19.4) | 1.4 | 9th |
| 10 | Lack of awareness of information | 18(16.7) | 13(12.0) | 46(42.6) | 31(28.7) | 1.2 | 10th |

Source: Field survey data, 2021

**Test for hypothesis**

The result of the analysis in table 5 shows that among all the selected socio-economics characteristics, years spent in school (r= 0.248, p≥ 0.05) and number of travels made by the produce dealers out of their location (r= 0.361, p≥0.05) were both significant. This implies the higher the number of years spent schooling the more the produce dealers will use ICT because they will be able to read and follow instruction on how to use ICTs. Also, the more they travel outside their location the more they use ICTs. This might be because as they travel and meet people who knows how to use ICT they possibly learn from them. Age (*r*=-0.094, *p*≤ 0.05) and household size household size (r= 0.180, p≥ 0.05) were not significant.

**Table 5: Result of Pearson Product Moment Correlation (PPMC)**

| Variables | Correlation coefficient (*r*) | *p*-value | Remarks | Decision |
|---|---|---|---|---|
| Age | -0.094 | 0.333 | Not significant | Accept |
| Years spent in school | 0.248* | 0.010 | Significant | Reject |
| household size | 0.180 | 0.062 | Not significant | Accept |
| Times travelled | 0.361* | 0.000 | Significant | Reject |

Source; Field survey data 2021

**Hypothesis testing for relationship between socioeconomic characteristics of the produce dealers and their use ICT**

*p* – Level of significance = 0.05
Decision criteria – When $p \leq 0.05$, reject $H_0$

**CONCLUSION AND RECOMMENDATIONS**

The study concludes that the most used ICTs by the produce dealers who were in their active years with few years of schooling were radio, telephone and television and acknowledged that easy access to sellers of agricultural produce and increased income of the agricultural produce marketers were the effect of ICT usage in their business. Furthermore, the study established that there were many constraints inhibiting the use of ICT and this include lack of knowledge for using ICT devices, erratic power supply for ICT use, low level of education, low income of farmers for purchasing some ICT equipment and lack of ICT training. It is therefore recommended that;

1. The Agricultural Produce Dealers' Association should organize training programmes on the use of ICT devices to improve their knowledge and to facilitate better marketing of Agricultural produce.
2. The association should partner with Government and organise adult literacy progamme to educate the produce dealers to be able to have requisite skill required for information management.

3. Agricultural Extension Agencies should work with the association to know how best to package the information to be disseminated.

**REFERENCES**

Aker J.C., Mbiti I.M. (2010). Mobile phones and economic development in Africa. *Journal of Economics Perspective*, 24(3):207-232. http://dx.doi.org/10.1257/jep.24.3.207 .

Anyan, F. Y. and Frempong, G. (2018). An Investigation into Barriers that Hinder the Effective Use of ICT in Farming by Small Scale Farmers in Asuogyaman District, Ghana. *International Journal of Humanities Social Sciences and Education* (IJHSSE) 5(1): 23-32.

Aremu-Dele, O., Adesanya, K.A., Nduka A.B., Bakare, A. A., Rahman, S. B. (2021). Perception of Job-Seeking Graduates in Oyo State Nigeria to Cashew Production. *African Journal of Agriculture and Food Science*. 4(4), 46-55

Asiabaka, C. C. (2002). Agricultural Extension: A Handbook for Developing Practitioners, Molysfem limited services

Chavula, H. K. (2014). The Role of ICTs in Agricultural Production in Africa. *Journal of Development and Agricultural Economics*. 6(7): 279-289.

Chikaire J. U., F. C. Anaeto, E. Emerhirhi, and Orush, J. O. (2017). Effect of Use of ICT on farmers' Agricultural Practices and Welfare in Orlu Agricultural Zone of Imo State, Nigeria. *International Journal of Research in Agriculture and Forestry*, 4(3): 6-15.

Eweoya, I., Okuboyejo, S. R., Odetunmibi, O. A., & Odusote, B. O. (2021). An Empirical Investigation of Acceptance, Adoption and the Use of E-agriculture in Nigeria. *Heliyon*, 7(7), 75-88.

FAO (2005) Bridging the rural digital divide. Food and Agriculture Organization, Rome.

Gavai, P., Musungwini, S., & Mugoniwa, B. (2018). A Model for the Adoption and Effective Utilization of ICTs in Commercial Agriculture in Zimbabwe. *Journal of Systems Integration* 9(4): 1804-2724.

Krell, N. T., Giroux, S. A., Guido, Z., Hannah, C., Lopus, S. E., Caylor, K. K., & Evans, T. P. (2021). Smallholder Farmers' Use of Mobile Phone Services in Central Kenya. *Climate and Development*, *13*(3): 215-227.

National Population Commission, NPC. (2006). Nigerian Population Census Report.

Ogunkan, D. V. and Jelili, M. O. (2012). Influence of Land Use on the Spatial Variation of Begging in Ogbomoso, Nigeria. *Journal of Geography and Regional Planning*. 3(4): 73-83.

Patel, D. J. and Shukla, K. K. (2014). Challenges and Opportunities for ICT Initiatives in Agricultural Marketing in India. *Oriental Journal of Computer Science & Technology* 7(3):377-381.

Singh, V., Sankhwar, S. and Pandery, D. (2015). The role of Information Communication Technology in Agriculture. An overview available at SSRN 2570710.

Vadivelu, A. and Kiran, B. R. (2013): Problems and Prospects of Agricultural Marketing in India: An Overview, *International Journal of Agricultural and Food Science*, 3(3):108-118