# The Assessment of Gender-Based Participation in Agricultural Digitization in Obi Local Government Area, Nasarawa State, Nigeria

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**KEYWORDS**

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**ABSTRACT**

*Agriculture is recognized as an engine of growth at local and international levels as it has the potentials to improve food security of a country. Gender disparities in agriculture are mainly characterized by unequal access to agricultural inputs. The current wave of increased crisis over land tenure between farmers and herders in Nigeria calls for serious concern. Agricultural digitization has created a veritable opportunity for women to scale through modern day agricultural barriers. Therefore, we seek to address three major objectives, which are to; assess the factors affecting gender participation in agriculture, evaluate the level of agricultural digitization among farming households and determine gender-based constraints to agricultural activities in the study area. A total number of eighty (80) respondents were interviewed to generate the data for this research. The results revealed that majority (78.8%) of the household heads were male while (21.2%) were females. Furthermore, the result shows that men and women participated averagely in agricultural activities with the mean level of 2.48 and 2.43 respectively. On the adoption of agricultural digitization, result shows that majority of the respondents do not have access to digital tools and therefore, find it challenging to adopt new innovations. Also, the female gender faces more challenges that hinder them from participating in agricultural activities in the study area than men. The study therefore recommended that deliberate efforts needs to be put in place to enhance digitalization of agricultural activities among male and females in Obi LGA of Nasarawa State, Nigeria.*

## INTRODUCTION

Agriculture plays a significant role in economic prosperity of the world economy and has a vital importance in developing and underdeveloped countries. There is no doubt that this sector accounts for a small share of the global economy but still remains central to lives of the poor. 26.7% of the world population is directly employed in agriculture in 2019-2020 but just contributed 4% to global economic output (World Bank, 2020). It is recognized as an engine of growth at international levels as it has potential to improve food security of a country.

Gender disparities in agriculture are mainly characterized by unequal access to agricultural inputs (Kristjanson *et al.,* 2017). Pervasive inequality, especially over the ownership of agricultural land, continues to limit women's contribution to the household food baskets (Palacious-Lopez and Lopez, 2015). Most women do not have access to agricultural inputs, apart from their labour (Rufai *et al.,* 2018). Despite the pivotal role played by women in agriculture, very few women own and control productive resource. Such resources are land, credit, technical services, market outlets, information.

The current wave of increased crisis over land tenure between farmers and herders in Nigeria calls for serious concern, there is therefore the need for digital and sustainable technological advancement among gender while limiting ecological impact as suggested by Fatma *et al.,* (2018). Also, World Population Prospect (2012) proposed about 70 % increase in agricultural production through digitization. It can therefore be postulated that the advent of agricultural mechanization alone in Nigeria is no longer sustainable due to land degradation, pollution and loss of biodiversity, but incorporating digital innovations such as Artificial Intelligence (AI) and Machine Learning (ML) into agricultural mechanization has in no doubt brought about a paradigm shift that can lead to self-sufficiency Musa *et al.,* (2023).

Agricultural digitization has created a veritable opportunity for women to scale through modern day agricultural barriers, unlike in the past where there was no desired recognition despite their vital role in crop and livestock production in addition to their reproductive and community roles. It is against this background that we seek to assess the factors affecting gender participation in agriculture and agricultural digitization among farming households in Obi local government area of Nasarawa State, Nigeria.

## MATERIALS AND METHODS

### Study Area

Obi is a Local Government Area located in the southern part of Nasarawa State, Nigeria. It's headquarter is Obi town and has land area of 967 $km^2$ with a population of 148,874 (NPC, 2006). The inhabitants of Obi Local Government Area are predominantly farmers who are involved in the cultivation of food crops and rearing of livestock.

### Sample and sampling techniques

A multi-stage sampling technique was used for this study. Obi Local Government Area consists of ten (10) electoral wards. First, from these electoral wards, four (4) electoral wards were selected using simple random technique. In each electoral ward, 20 household were randomly selected for the study and one individual was randomly selected to represent the household. The total number of eighty (80) respondents was used to generate data for the research. Structured questionnaire was constructed and administered to the respondents; the researchers personally administered the questionnaires to the respondents in the study area.

### Validation and reliability of the research instrument

A test and re-test method was used to test for the reliability of the instrument. The gender involved in agricultural activities were randomly selected and questionnaire was administered to 10 (five male and five female) respondents through paper balloting from each of the ten (10) wards of the study area. Seventy (70) percent of pilot-test score was recorded, which shows that the result is positive and the questionnaire can be administered. The questionnaire was pilot tested, to show that the research instrument is reliable, that is, to guide the choice between alternative methods of collecting data, ordering the questions and wording. The ten (10) test-try respondents were not involved in the main study.

### Data Analysis

Simple descriptive statistics such as frequency counts and percentages was used to classify the respondents into their respective socio-economic groups. Participation index was constructed using a 3 point Likert-type scale. The 3 points scale was weighed in order of importance from= 1; Never involved = 2; rarely involved = 3; Always involved. The respondents were asked to indicate their level of participation in the agricultural production activities.

## RESULTS AND DISCUSSION

### Socio-economic characteristics of the respondents in the study area

Tables 1 revealed that majority (78.8%) of the household heads were male while (21.2%) were females similar to findings of Sa'aondo *et al.,* (2024). This finding implies that participation in agricultural operations in the study area is mostly carried out by the males. The result of the demographic characteristics was also similar to that of Rotowa *et al.,* (2022) who works in the same area in 2022 this finding show that most of the respondents were within the age bracket of 21 – 30. Furthermore, the two results followed a similar trend for other demographic characteristics such as education status, occupation and their income level.

**Table 1: Socio-economic characteristics of the respondents in the study area**

| | Variables | Frequency | Percentage |
|---|---|---|---|
| Sex | Male | 52 | 78.8 |
| | Female | 28 | 21.2 |
| | Total | 80 | 100 |
| Age | <20 | 3 | 3.8 |
| | 21-29 | 14 | 17.5 |
| | 30-38 | 28 | 35 |
| | 39-47 | 25 | 31.3 |
| | 48-56 | 8 | 10 |
| | 57-65 | 2 | 2.5 |
| | Total | 80 | 100 |
| Marital Status | Single | 30 | 37.5 |
| | Married | 46 | 57.5 |
| | Divorced | 3 | 3.75 |
| | Widow/widower | 1 | 1.25 |
| | Total | 80 | 100 |
| Educational Level | Non formal education | 14 | 17.5 |
| | Primary school | 2 | 2.5 |
| | Secondary school | 9 | 11.3 |
| | Diploma/NCE | 26 | 32.5 |
| | HND/Degree | 27 | 33.8 |
| | Others | 2 | 2.5 |
| | Total | 80 | 100 |

Source: (field survey, 2023)

### Agricultural activities in the study area

The result in Table 2. shows that greater percentage of the male gender was always involved in the agricultural activities (crops) more than their female counterparts. This result is contrary to the findings of Uzokwe *et al.,* (2017), except that of irrigational activities as recorded in the Table 2.

### Types of crops cultivated

The study revealed that most of the crops in the study area are cultivated by men except cowpea and millet which are mostly cultivated by female as shown in Table 3. This result is in line with the earlier report of Olakojo (2017) who reported that gender productivity gaps vary across selected crops and it is more pronounced in cassava, yam and maize production, while it is mild in other crops.

### Agricultural activities in the study area (animals)

The study revealed that greater percentage of the male respondents are involved in fencing, culling, taking sick animals to veterinary, marketing of animals, record taking, tethering, vaccination and castration against women who mostly involved in feeding, given drinking water and cleaning of cages/pens. It shows in the Table 4, that men are involved in the agricultural activities (animals) more than their female counterpart in the study area.

**Table 2: Agricultural activities in the study area (crop)**

| | **Male** | | | **Female** | | | |
|---|---|---|---|---|---|---|---|
| **Agricultural Activities (crop)** | **Never involved** | **Rarely involved** | **Always involved** | **Never involved** | **Rarely involved** | **Always involved** | **Total** |
| land clearing | 8(16.7) | 13(27.1) | 27(56.3) | 6(18.8) | 11(34.4) | 15(46.9) | 80(100) |
| Tillage | 9(18.4) | 9(18.4) | 31(63.3) | 7(22.6) | 9(29.0) | 15(48.4) | 80(100) |
| Planting | 5(8.8) | 10(17.5) | 42(73.7) | 4(17.4) | 8(34.8) | 11(47.8) | 80(100) |
| Weeding | 7(10.6) | 10(15.2) | 49(74.2) | 3(21.4) | 4(28.6) | 7(50.0) | 80(100) |
| Herbicide | 5(7.9) | 10(30.2) | 39(61.9) | 2(11.8) | 7(41.2) | 8(47.1) | 80(100) |
| Pesticides | 6(9.8) | 18(29.5) | 37(60.7) | 3(15.8) | 7(36.8) | 9(47.4) | 80(100) |
| Harvesting | 7(11.3) | 10(16.1) | 45(72.6) | 3(16.7) | 5(27.8) | 10(55.6) | 80(100) |
| Processing | 5(9.1) | 12(21.8) | 38(69.1) | 5(20.0) | 7(28.0) | 13(52.0) | 80(100) |
| Marketing | 8(14.3) | 13(23.2) | 35(62.5) | 4(16.7) | 6(25.0) | 14(58.3) | 80(100) |
| Irrigation | 17(29.8) | 13(22.8) | 27(47.4) | 6(26.1) | 5(21.7) | 12(52.2) | 80(100) |

Source: Field survey, (2023)

**Table 3: Types of cultivated crops**

| | Male | | Female | |
|---|---|---|---|---|
| Cultivated crop | Frequency | Percentage | Frequency | Percentage |
| Sesame | 25 | 5.77 | 17 | 3.93 |
| Maize | 40 | 9.25 | 37 | 8.54 |
| Rice | 43 | 9.93 | 33 | 7.62 |
| Cowpea | 12 | 2.77 | 21 | 4.85 |
| Cassava | 35 | 8.17 | 33 | 7.54 |
| Millet | 25 | 5.77 | 28 | 6.47 |
| Yam | 41 | 9.47 | 31 | 7.16 |
| Others | 5 | 1.15 | 7 | 1.62 |
| Total | 226 | 206.6 | 52 | 47.71 |

Source: Field survey, (2023)

**Table 4. Agricultural activities in the study area (animals)**

| | **Male** | | | **Female** | | | |
|---|---|---|---|---|---|---|---|
| **Activities** | **Not involved (%)** | **Rarely involved (%)** | **Always involved (%)** | **Not involved (%)** | **Rarely involved (%)** | **Always involved (%)** | **Total (%)** |
| Feeding | 4(5) | 5(6.25) | 19(23.75) | 7(8.75) | 4(5) | 41(51.25) | 80(100) |
| Watering | 7(8.75) | 9(11.25) | 23(28.75) | 3(3.75) | 6(7.5) | 32(40) | 80(100) |
| Fencing | 13(16.25) | 18(22.5) | 36(46) | 2(2.5) | 4(5) | 7(8.75) | 80(100) |
| Cleaning of cages | 8(10) | 16(20) | 8(10) | 6(7.5) | 3(3.75) | 39(48.75) | 80(100) |
| Culling | 14(17.5) | 21(26.25) | 29(36.25) | 1(1.25) | 5(6.25) | 10(12.5) | 80(100) |
| Taking sick animals to a vet | 14(17.5) | 18(22.5) | 31(38.75) | 0(0) | 3(3.75) | 14(17.5) | 80(100) |
| Marketing of the animals | 7(8.75) | 15(18.75) | 29(36.25) | 4(5) | 4(5) | 21(26.25) | 80(100) |
| Record taking | 11(13.75) | 14(17.5) | 35(43.75) | 3(3.75) | 4(5) | 15(18.75) | 80(100) |
| Tethering | 10(12.5) | 21(26.25) | 31(38.75) | 3(3.75) | 3(3.75) | 12(15) | 80(100) |
| Vaccination | 13(16.25) | 2(2.5) | 37(46.25) | 1(1.25) | 18(22.5) | 9(11.25) | 80(100) |
| Castration | 20(25) | 12(15) | 39(48.75) | 3(3.75) | 3(3.75) | 3(3.75) | 80(100) |

Source: Field survey, (2023)

**Level of Gender Participation (Participation Index) in agricultural activities**

Table 3 shows the distribution of respondents based on their participation in different agricultural activities. Both male and female respondents were involved in agricultural activities at different stages from land clearing to planting, culling to veterinary services, although the women were more into processing with the men leading in culling practice. It can therefore be concluded that men and women participated averagely in agricultural activities with the mean level of 2.48 and 2.43 respectively. This result agree with Keough (1998), participation in agricultural activities is a multidimensional dynamic process that takes varying forms as people will participate in any activity that will be beneficial to them.

**Table 3: Level of gender participation (participation Index) in agricultural activities**

| | **Male** | | | | **Female** | | | |
|---|---|---|---|---|---|---|---|---|
| **Agricultural Activities (Crop)** | **Never Involved** | **Rarely Involved** | **Always Involved** | **Mean** | **Never Involved** | **Rarely Involved** | **Always Involved** | **Mean** |
| Processing | 5 (8.8%) | 10 (20.0%) | 37 (71.3%) | 2.54 | 3 (9.8%) | 4 (14.6%) | 21 (75.6%) | 2.61 |
| Harvesting | 6 (11.3%) | 8 (16.3%) | 38 (72.5%) | 2.52 | 3 (11.5%) | 9 (30.8%) | 16 (57.7%) | 2.39 |
| Marketing | 8 (15.0%) | 11 (21.3%) | 33(63.7%) | 2.69 | 2 (7.4%) | 8 (29.6%) | 18 (63.0%) | 2.46 |
| Planting | 5(10.0%) | 10(18.8%) | 37(71.3%) | 2.75 | 5 (17.5%) | 6 (20.0%) | 18 (62.5%) | 2.68 |
| Weeding | 6(11.3%) | 8(15.0%) | 38(61.1%) | 2.30 | 5 (16.7%) | 6 (22.2%) | 17 (73.8%) | 2.50 |
| Tillage | 9(17.5%) | 9(17.5%) | 34(65.0%) | 2.52 | 2 (7.9%) | 6 (21.1%) | 20 (71.1%) | 2.46 |
| land clearing | 8(15.0%) | 14(27.5%) | 30(57.5%) | 2.67 | 2 (7.9%) | 3 (10.5%) | 23 (81.6%) | 2.50 |
| Herbicide | 5(8.8%) | 16(30.0%) | 32(61.3%) | 2.60 | 4 (15.2%) | 8 (27.3%) | 16 (57.6%) | 2.39 |
| Pesticides | 5(10.0%) | 16(30.0%) | 31(60.0%) | 2.42 | 9 (33.3%) | 6 (20.8%) | 13 (45.8%) | 2.21 |
| Irrigation | 16(30.0%) | 12(23.8%) | 24(46.3%) | 2.10 | 3 (11.9%) | 6 (21.4%) | 19 66.7%) | 2.29 |
| Vaccination | 5(7.5%) | 11(12.5%) | 36(31.25%) | 2.27 | 3 (10.0%) | 7 (12.5%) | 18 (26.3%) | 2.36 |
| Culling | 4(7.5%) | 10(18.75%) | 38(31.25%) | 2.42 | 3 (11.3%) | 4 (13.8%) | 21 (17.5%) | 2.36 |
| Mean level | | | | 2.48 | | | | 2.43 |

**Farmers level of adoption and use of agricultural digitization in the study area**

Figure 1 shows that 46.25% of the males and 26.25% of the female respondents have no access to internet while 11.25% of males and 3.75% of females who have access to internet. This means that majority of the respondents cannot access and adopt new technologies through the use of Internet of Things (IoT) including smart phones. This result implies that majority of the respondents do not have access to smart phone and therefore, cannot use it to adopt new innovations thereby hindering the performance development of agricultural activities. This result agrees with the findings of MMPR (2019) who reported that the absence of digital innovation hubs and other ICT public access spaces in rural areas is a major challenge of digitalization in many developing countries.

**Digital tools used by the respondents in the study area**

The study showed that few of the male (14.6 %) and also 8.4 % of the female respondents were always using digital tools in getting new information on improved farming techniques while 28.6 % of male and 15.8 % of female were not. This implies that digital tools are not yet available and accessible to the respondents in the study area, thereby hampering the digitization of agricultural development.

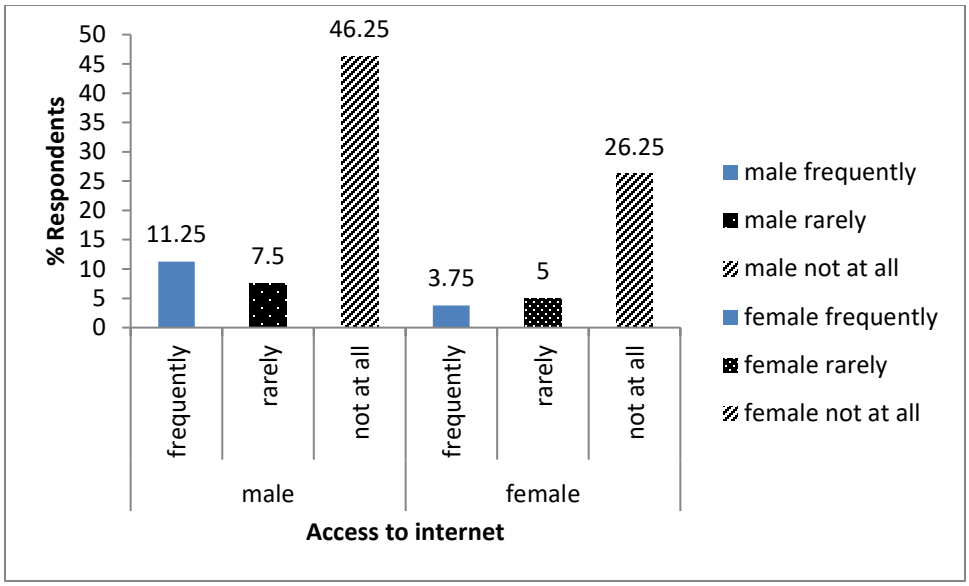


**Figure 1: Percentage of respondents with access to Internet facilities**

**Table 4: Digital tools used by the respondents in the study area**

| Variables | Male | | | Female | | |
|---|---|---|---|---|---|---|
| | **Not involved (%)** | **Rarely involved (%)** | **Always involved (%)** | **Not involved (%)** | **Rarely involved (%)** | **Always involved (%)** |
| Weather | 38(73.08) | 9(17.31) | 5(9.62) | 21(75) | 4(14.29) | 3(10.71) |
| New farming update | 29(55.77) | 11(21.15) | 12(23.08) | 18(64.29) | 3(10.71) | 7(25.0) |
| Communication with extension agent | 41(78.85) | 7(13.46) | 4(7.69) | 20(71.43) | 5(17.86) | 3(10.71) |
| Skills upgrade and training | 32(61.54) | 12(23.08) | 8(15.38) | 19(67.86) | 4(14.29) | 5(17.86) |
| Use of Radio | 3(5.77) | 5(9.62) | 44(84.62) | 1(3.57) | 3(10.71) | 24(85.71) |
| **Mean** | **28.6** | **8.8** | **14.6** | **15.8** | **3.8** | **8.4** |

Source: Field survey, 2023

**Constraints to gender participation in Agricultural Activities**

The figure below shows that (98.1%) of the male respondents had the challenge of high cost of animal feed while that of female is (100%). Grazing route for animals, (94.2%) of the male respondents had the challenge while the female gender is (100%). In the same vein, (80.8%) of the male respondents had the challenge of encroachment by animals while it is (100%) for the female respondents. (90.4%) of male respondents had the constraint of space for rearing of animals while female (89.3%). On the whole, the male gender total mean percentage of challenge faced was (69.8%) while that of female counterpart was (88.29%) showing that the female gender face more challenges that hinder them from participating in agricultural activities in Obi Local Government Area of Nasarawa state, Nigeria, compared to male gender.

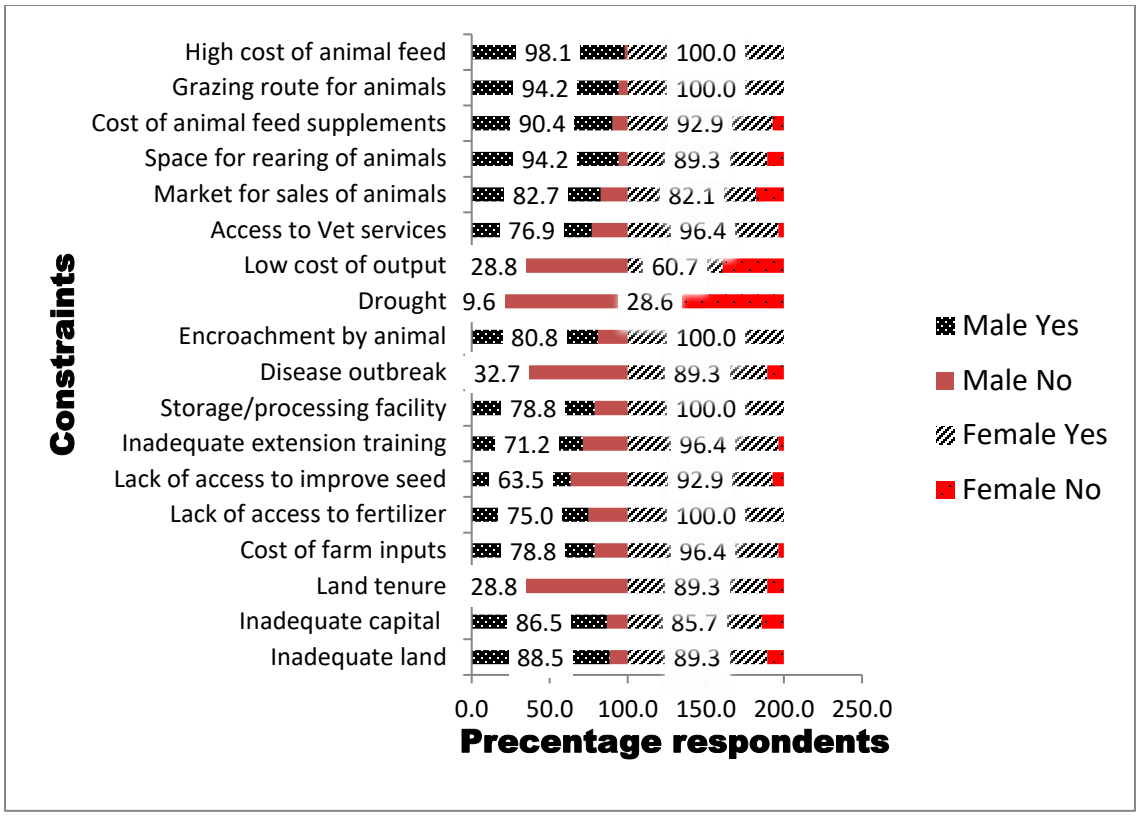


**Figure 2: Constraints to Gender participation in Agricultural Activities. Field Survey 2023**

## CONCLUSION AND RECOMMENDATION

Based on the findings of this research, it was concluded that in terms of gender participation among farming households in the study area, the males were dominating in most of the agricultural activities than the females. However, the level of agricultural digitization among both gender is still low. Based on the findings of the study, it is recommended that strategies and approaches promoting gender equality in agriculture enhancing technology and access to productive resources (land, labour and capital) and economic opportunities should be devised and adopted among the community members.

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