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# COMPOUND FARMING UNDER A CHANGING CLIMATE: EVIDENCE FROM EMOHUA LOCAL GOVERNMENT AREA OF RIVERS STATE

**Obasi, E.U., Ifeanyi-Obi, C.C and Wigwe, C.C**

Department of Agricultural Economics and Extension, University of Port Harcourt, Rivers State, Nigeria

Corresponding author's Email: clara.ifeanyi-obi@uniport.edu.ng

## ABSTRACT

*The study assessed effects of climate change on compound farming in Emohua Local Government Area of Rivers state, A two-stage sampling techniques was used to select 120 respondents for the study. Data for the study was collected with the aid of questionnaire complemented with interview schedule and analysed using descriptive statistics namely percentages, frequency and mean. The result of the study showed that females (57%) engaged in compound farming more than their male counterparts with an average age of 48years and household size of mainly 2 to 5 persons. Majority of the compound farmers had no formal education (44%). Crop production (81%) was the major farming activity engaged in by the compound farmers with cassava (80%) as the major crop cultivated. Result showed that the compound farmers perceive climate change to be increase in atmospheric temperature (*Mean=*3.5), increase in rainfall (*Mean=*3.4) and fluctuation in rainfall pattern (*Mean=*3.2). The major effects of climate change on compound farming in the study area include reduction in crop yield (95%), decrease in overall family income (95%), unpredictable planting time/season (100%), increase weed infestation (100%) and unusual crop pest and disease infestation (97%). More Extension coverage and provision of improved seedlings will help strengthen farmers capacity to overcome the effects of the change in climate. Formation of farmers association will immensely contribute in building the capacity of compound farmers in climate change hence overcome the effects more effectively.*

**Keywords:** Compound farming, effects, Climate change, crop production

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## INTRODUCTION

Agriculture remains pivotal to Nigeria both as a source of food for her increasing population and as a prime employer of labour. Despite the significance of agriculture, it is threatened by the challenges of adapting to present and potential climatic conditions and the impending challenge of increased food production for the increasing population (African climate policy centre (ACPC), 2011). Madu (2012) explained that the impacts of climate change are spatially diverse and it is held that developing countries like Nigeria will be more in jeopardy

than developed countries due to their reliance on climate-sensitive sectors. Nigerian agriculture is a key sector in the economy contributing about 41% of the nation's GDP (Aye & Ater, 2012). Hence, any change in climate patterns in the country would have a great impact on both the agriculture and economy of the nation.

Climate can be defined as the statistical description in terms of mean and variability of relevant quantities over a period ranging from months to thousands or millions of years (Intergovernmental Panel on Climate Change (IPCC), 2014). According to World Meteorological Organization the classical period is 30 years, these quantities are most often surface variables such as temperature, precipitation, and wind. Climate change, a major driver of natural hazards, is a global threat to human and economic development. It is a shift from the average weather conditions over a period of time, which leads to unpredictable patterns and an increased occurrence of climate-related events. Current climate changes reveal rising temperatures, higher evaporation rates, and altered rainfall patterns (Settele, Robert, Richard, Betts…., *et al* 2015). Climate change risks are unevenly distributed and are generally greater for disadvantaged people and rural communities in developing countries (IPCC, 2014).

Compound farms are intensively cultivated fields found around or close to home or compound houses and they are normally under permanent cultivation. Compound farmers are those individuals who cultivate or plant crops behind their houses or close to their houses. This is why it is sometimes called backyard farming. Compound farm can be regarded as the farm located around the homestead for the production and rearing of varieties of food crops and livestock for consumption, income generation and environmental sustainability. Compound farm/homestead farm requires little capital, low risk, utilization of waste, and it is easy to manage. A well-developed compound farm contributes significantly to daily household food needs. It can also supply households with nearly all non-staple food they need, such as fruits, vegetables, legumes, coconut, flowers for ornamental purposes or for sale. Food security is said to depend on the availability, accessibility, adequacy and acceptability of food at all time. Developing acompound farm for food production could be a possible way of making food available and accessible at all times hence contributing to achieving food security goals. Interestingly, Sanchez and Swaminathan, (2005) noted that Compound farmers are estimated to represent half of the hungry worldwide and probablythree-quarters of the hungry in Africa. This buttress more the crucial need of enhancing compound farming as the livelihood of huge proportion of the rural poor will be improved through this. Furthermore, Compound farming could play an important role in

helping to reduce greenhouse gas (GHG) emissions that contribute to climate change because it ensures green vegetation in thecompound that facilitate absorption of Green House Gases (Ifeanyi-Obi, Angba, Aja, Abuta.. *et al*., 2019)

Unfortunately, the benefits of compound farming are not being optimally exploited because most of the rural farmers are not aware of the potentials of compound farming (Zerihun, Weyessa & Adugna, 2011). In addition, the predominance of rain-fed agriculture in Nigeria exposes local farmers for instance compound farmers in Emohua LGA to the adverse consequences of climate change. Under rain-fed circumstances, increased variability and abnormality in rainfall are key factors of crop failure (ACPC, 2011). This drastically affects the efforts made by rural households to effectively engage in compound farming. In order to properly help the rural household in addressing climate risks on their compound farming activities, it is important to have sound understanding of how climate change is affecting them. This research seeks to address this gap. The broad objective of the study was to examine the effects of climate change on compound farming in Emohua Local Government Areas of Rivers State.

Specifically, the study described the socio-economic characteristics of compound farmers in the study area, assessed compound farmer's perception of climate change and the perceived effects of climate change on compound farming in the study area.

## MATERIALS AND METHODS

The research was conducted in Emohua Local Government Area of Rivers State. Rivers State is one of the 36 state of Nigeria. Rivers state according to 2016 population projection has a population of 7,303,924 (National Bureau of statistics, 2017) with a total area of 11,077 $km^2$, 4,277 $mi^2$ and geographical coordinates are 4º53'2" North and 6º51'39" East. The state is surrounded by Imo, Abia and Anambra State to the north, Akwa Ibom to the east, Bayelsa to the west and bounded by Atlantic Ocean on the south. Emohua is a Local Government Area in Rivers State, Nigeria. Its headquarters are in the town of Emohua. Emohua consist of fourteen political wards and their predominant occupation is farming with majority of them farming at subsistence level. Observation shows that almost every family engages in compound farming.

The population of the study comprised of all households that are involved in compound farming in the study area. A two-staged sampling procedure was used to select sample for the

study. The first stage was the random selection of six (6) communities from the 10 communities in the local government, which includes Emohua, Ali mini, Rumuji, Obella-Ibaa, Odouha and Ndele. In the second stage Snow ball sampling techniques was used to develop the list of all Compound farmers in the selected six communities and from this list, 20 households were randomly selected from each of the 6 communities selected for the study giving a total of 120 households for the study. Data were collected using structured questionnaires and interview schedule was used for illiterate farmers. Socio-economic characteristics of compound farmers were analysed with frequency count, percentages and mean while compound farmers perception and effects of climate change were captured with four-point and three-point Likert type scale respectively. The four Point Likert type scale was assigned weights of 4 (strongly agree), 3 (agree), 2 (disagree) and 1(strongly disagree) while the three points Likert type scale was assigned weights of 3 (sever effect), 2 (mild effect) and 1 (effect) with midpoint of 2.5 and 2.0 respectively. Decision rule was that mean equal to and greater than 2.5 means agreement with the statement while those with mean less than 2.5 means disagreement. For the 3-pointLikert type scale, decision rule was that mean equal to or greater than 2.0 means severe effect while those less than 2.0 means not severe effect.

## RESULT AND DISCUSION

### Socio-economic characteristics of compound farmers

Table 1 showed the socio-economic characteristics of compound farmers. It was found that women (57%) participate more in compound farming than the male (43%). Approximately 6 in every 10 persons used for the study were married with household size of mainly (78%) between 2 to 5persons. The average age of the compound farmers in the study area was found to be 48 years which is similar to the findings of Onyegbula and Oladeji (2017) who found the average age of rice farmers in the three rice producing states of Nigeria to be 45years.As regards educational qualification, 44% of the respondents do not have any formal education, only 29% have First school leaving certificate and 21% had the senior school leaving certificate. This shows that literacy level in the area is quite poor and may have negative effect on their understanding of climate change as well as their readiness to adopt effective climate change adaptation strategies. Ifeanyi-obi, Togun, Lamboll and Arokoyu, (2017) in their assessment of socio-economic determinants of cocoyam farmer's strategies for climate change adaptation in Southeast Nigeria found that cocoyam farmer's readiness to adopt different adaptation strategies was influenced by their educational level. Result further

showed that the major farming enterprise engaged by compound farmers in the study area is crop production (81%) with cassava (80%), corn and cucumber (38%) as the major crops produced. None of the farmers engaged only in animal production, the low participation in animal production in the area may be as a result of constant stealing of animals by cult boys in the area deterring households from going into animal production as the animals are always stolen. The major aim of production among the compound farmers was found to be both consumption and sale (69%). The result of the socio-economic variables of this study agrees with Nzeh and Eboh (2011) which reported that mostly females engage in farming activities, poorly educated and cultivating to feed their families and sell off excess.

**Compound farmer's perception of climate change**

Result in Table 2 showed that out of eight variables used to capture farmer's perception of climate change on compound farming, farmers consented to all. Farmers majorly perceive climate change to be increase in rainfall (Mean =3.4), increase atmospheric temperature (Mean=3.5) and fluctuation in rainfall pattern ( Mean =3.2). This result agrees with Sofoluwe, Tijani, and Baruwa (2010) which found that farmers perceive climate change to be increase in temperature and rainfall. Similarly, Anselm, Ignatius, Josephat, Anthony…*et al,* (2011) reported that farmers perceived climate change to be erratic rainfall, delay in the onset of rain, long period of dry season and heavy wind with intense heat wave on the increase while Obafemi, Maren and John (2017) in their own study reported that majority of farmers perceived a recent prolonged dry spell and recurrence of drought and almost all the farmers consented that onset of rainfall is much delayed in the last ten years than in the last 20 years. In same vein, Tarfa, Ayuba, Onyeneke, Nwajiuba and Igbere (2019) in their work found that smallholder farmers perceived that there is long term increase in the temperature and rainfall is increasing in aggregate volume while Babatunde *et al* (2011) and Anuforum (2010) reported that there is significant and steady increase in temperature. A critical look at these findings revealed that temperature and rainfall variables were constant in farmers perception of climate change and could imply that these two variables are major climate variables affecting farming activities in Nigeria.

**Effects of climate change on compound farming in the study area**

Table 3 showed that the major effects of climate change on compound farming were increase weed infestation (Mean =2.6), incidence of unusual crop and disease (Mean = 2.3),

unpredictable planting time/season (Mean =2.2), reduction in crop yield (Mean =2.0), increase rate and intensity of flooding (Mean = 2.0), decrease in overall family income (Mean = 2.0), reduction of available food in the house (Mean = 2.0) and increases poverty rate (Mean= 2.0). The finding shares same views with earlier research (Tologbonse, Auta, Bidoli, Jaliya, Onu & Issa, 2010; Chikezie, Ibekwe, Ohajianya, Orebiyi, Henri-Ukoha, Osuji & Gbolagun, 2016) which reported the major effects of climate change on farmers are reduction in crop yield, unpredictable planting time and season, increase in flooding. Similarly, Ozor, Umunakwe, Ani and Nnadi (2015) in their work on perceived impact of climate change among rural farmers in Imo State showed that a greater proportion of the respondents perceived declining of crop yield and soil fertility as the major effects of climate change on these farmers.

## CONCLUSION

Based on the findings of the study, it was concluded that farmers in the study area are experiencing change in climate which is affecting their compound farming activities. They agreed that climate change has affected them in the following ways; reduction in crop yield, increase weed infestation, and increase rate and intensity of flooding which reduces available land for compound farming.

Based on the findings of this study and bearing in mind the benefits of compound farming to the livelihoods of rural households, it is important to for the Agricultural Development Programme (ADP) to increase the extension services delivered to compound farmers in the study area. This will help to enhance farmers capacity to adapt to the effects of climate change already felt by these farmers. Provision of improved crop varieties by government and NGO's is of paramount importance as this will help strengthen them to overcome the effects of climate change hence increased productivity. Organizing training workshop and seminars by either government or private agencies for the farmers and youth in the study area will help to educate them on how to better understand climate change and adapt more effectively to the effects.

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Journal of Agriculture and Food Sciences
Volume 19 Number 1, April 2021 pp 179-188


**APPENDICES**

**Table 1. Socio-economic characteristic of compound farmers**

| Socio-economic characteristics | Frequency | Percentage | Mean |
|---|---|---|---|
| **Gender** | | | |
| Male | 48 | 42.9 | |
| Female | 64 | 57.1 | |
| **Marital status** | | | |
| Single | 25 | 22.3 | |
| Married | 68 | 60.7 | |
| Divorced | 1 | 0.9 | |
| Separated | 18 | 16.1 | |
| **Number of persons living in your households** | | | |
| 2-5 | 87 | 78 | |
| 6-10 | 24 | 21 | |
| Above 10 persons | 1 | 1 | |
| **Farmers age** | | | |
| 26-33 | 14 | 12.5 | |
| 34-41 | 20 | 17.9 | |
| 42-49 | 24 | 21.5 | |
| 50-57 | 30 | 26.9 | |
| 58-65 | 23 | 20.3 | |
| 66-73 | 1 | 0.9 | 48 |
| **Educational level** | | | |
| No formal education | 50 | 44.7 | |
| First school living certificate | 32 | 28.6 | |
| SSCE | 23 | 20.5 | |
| OND | 3 | 2.7 | |
| HND | 0 | 0 | |
| BSC | 4 | 3.6 | |
| Post graduate | 0 | 0 | |
| **Area of specialization** | | | |
| Crop production | 91 | 81.3 | |
| Animal production | 0 | 0 | |
| Both | 21 | 18.8 | |
| **Types of crop produced** | | | |
| Vegetable | 42 | 37.5 | |
| Cassava | 90 | 80.4 | |
| Yam | 25 | 22.3 | |
| Corn and Cucumber | 43 | 38.4 | |
| Plantain | 40 | 34.8 | |
| Others (pepper, okra, groundnut, melon, sugar-cane) | 21 | 18.8 | |
| **Types of animal reared** | | | |
| Goat | 14 | 12.5 | |
| Poultry | 6 | 5.4 | |
| Sheep | 0 | 0 | |
| Others (pig and dock foul) | 2 | 18 | |
| **What are your major aim for compound farming** | | | |
| Consumption | 17 | 15.2 | |
| Sale | 18 | 16.1 | |
| Both | 77 | 68.8 | |

**Source: Field survey, 2019**

Journal of Agriculture and Food Sciences
Volume 19 Number 1, April 2021 pp 179-188


**Table 2. Compound farmer's perception of climate change**

| Compound farmer's perception of climate change | SA | A | D | SD | MEAN |
|---|---|---|---|---|---|
| There is increase in atmospheric temperature | 74(66.1) | 30(26.8) | 1(0.9) | 7(6.3) | 3.5* |
| There is decrease in atmospheric temperature | 31(27.7) | 28(25.0) | 30(26.8) | 23(20.5) | 2.5* |
| There is increase in rainfall | 57(50.9) | 53(47.3) | 1(0.9) | 1(0.9) | 3.4* |
| There is decrease in rainfall | 30(26.8) | 40(35.7) | 22(19.6) | 20(17.9) | 2.7* |
| Fluctuation in rainfall pattern has increased | 52(46.4) | 42(37.5) | 7(6.8) | 11(9.8) | 3.2* |
| There is generally undefined weather condition | 44(39.3) | 39(34.8) | 10(8.9) | 19(17.0) | 2.9* |
| Occurrence of extreme weather condition has increased | 55(49.1) | 26(23.2) | 9(8.0) | 22(19.6) | 3.0* |
| Solar radiation (sunshine) has increased much | 47(42.0) | 39(34.8) | 10(8.9) | 16(14.3) | 3.0* |

**Source: Field survey, 2019: *agreement with the statement, ** Disagreement**

**Table 3. Effects of climate change on compound farming**

| Effects | E | ME | SE | MEAN |
|---|---|---|---|---|
| Reduction in crop yield | 19 (17.0) | 66(58.9) | 23(20.5) | 2.0* |
| Increased seed dormancy | 37 (33.0) | 39(34.8) | 19(17) | 1.6** |
| Incidence of unusual crop pest and disease infestation | 14 (12.5) | 44(39.3) | 52(46.4) | 2.3* |
| Unpredictable planting time/season | 23 (20.5) | 42(37.5) | 47(42.0) | 2.2* |
| Increase rate of crop withering | 20 (17.9) | 38(33.9) | 44(39.3) | 1.6** |
| Increase rate and intensity of flooding which reduced yield | 17 (15.2) | 63(52.6) | 21(18.8) | 2.0* |
| Increase in erosion rate that reduce soil fertility | 39 (34.8) | 41(36.6) | 14(12.5) | 1.4** |
| Decrease in overall family income | 22 (19.6) | 46(41.1) | 40(35.7) | 2.0* |
| Limited ability to practice integrated/missed farming | 10 (8.9) | 39(34.8) | 40(35.7) | 1.8** |
| Ineffectiveness of some agro-chemicals due to weather fluctuation | 8 (7.1) | 3(2.7) | 0 | 0.1** |
| Increase heat stress on crops leading to crop failure | 26 (23.2) | 55(49.1) | 19(17.0) | 1.7** |
| Reduces food availability in the house due to high crop failure | 22 (19.6) | 55(49.1) | 30(26.8) | 2.0* |
| Contribute to increased poverty | 24 (21.4) | 46(41.1) | 34(30.4) | 2.0* |
| Increases cost of production generally due to repeated farm procedures | 7 (6.2) | 56(50.0) | 43(38.4) | 2.2* |
| Increases weed infestation | 5(4.5) | 24(21.4) | 81(72.3) | 2.6* |
| Increases heat stress on livestock/animals | 5(4.5) | 12(10.7) | 3(2.7) | 0.3** |
| Reduces potency, fertility and productivity of some animal species | 6(5.4) | 6(5.4) | 4(3.6) | 0.2** |
| Increases diseases incidence in livestock's | 2(1.8) | 10(8.9) | 7(6.2) | 0.3** |
| Mortality rate of livestock's have generally increased | 3(2.7) | 6(5.4) | 10(8.9) | 0.4** |
| Led to scarcity of pasture for livestock's | 3(2.7) | 11(9.8) | 2(1.8) | 0.2** |
| Increased resistance to indigenous remedies for livestock's illnesses | 5(4.5) | 12(10.7) | 5(4.5) | 0.3** |

**Source: Field survey, 2019: *severe effect, **not severe effect**