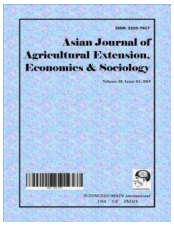

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Indigenous Mitigation and Adaptation to Climate Change among Small Holder Farmers in Arochukwu Area of Abia State, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author SOE designed the study, wrote the protocol and supervised the work. Authors SOE and EEO carried out all data collection and performed the statistical analysis. Author SOE managed the analyses of the study. Author EEO wrote the first draft of the manuscript. Author SOE managed the literature searches and edited the manuscript. Both authors read and approved the final manuscript.

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ABSTRACT

The study investigated indigenous mitigation and adaptation to climate change among small holder farmers in Arochukwu area of Abia state, Nigeria. The study described the socio-economic characteristics of farmers, ascertained their indigenous mitigation and adaptation to climate change and determined constraints to indigenous mitigation and adaptation to climate change in the study area. A total of 160 farmers randomly selected constituted the sample size, while structured interview guide was employed in data collection. Analytical tools such as frequencies, percentages, mean rating and factor analysis techniques were adopted. The results show that majority (57.5%) of the farmers were within the ages of 31-50 years and large (50.6%) numbers of them had secondary school qualifications. Majority (63.8%) of farmers had 6-15 years of farming experience, while 61.3 percent had estimated annual income of N51, 000.00.- N150,000.00. The farmers

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reported indigenous mitigation such as cover cropping (M=4.1) and controlled burning (M=3.8) and indigenous adaptation as adjustment in planting dates (M=4.5) and use of organic manure (M=4.4). The study revealed inadequate planning, scarcity of inputs, lack of basic infrastructure and poor institutional support as principal factors and constraints to indigenous mitigation and adaptation to climate change in the study area. Effectiveness in indigenous mitigation and adaptation to climate change depends on the extent indigenous issues raised and constraints identified can be addressed and sustained. The study recommends extension training for group farmers on indigenous practices, participatory approach to inputs procurement and provision of infrastructure as well as improved government policy on indigenous process.

Keywords: Indigenous mitigation; adaptation; climate change; small holder farmers; Nigeria.

1. INTRODUCTION

Climate change is assuming diverse and overwhelming dimensions in Nigeria. Climate change indicates deviation from mean expectation of weather at a given period which includes the totality of weather extremes and deviations from average weather conditions. Climate change is the most serious environmental threat facing mankind in his fight against hunger, malnutrition, disease and poverty with its most devastating effects on Agricultural productivity in Africa and worldwide [1]. According to IPCC [2,3], UNFCC [4] and Zoellick [5], extremities in floods, rise in temperature, forest fire and tragic crop failure are manifestations of climate change which contribute to worsening food insecurity, malnutrition and diseases worldwide. The World Health Organization (WHO) [6] has reported skin eruptions, skin infections, heat cramp, fatigue and exhaustion as well as heat stroke as illnesses which are resultant from climate change. Both Urama and Ozor [7] blamed effects of climate change on decrease in land, length of the growing season and yield potentials and advocated for Agricultural innovations for climate change adaptation and food security in Africa.

Climate change impacts are felt on Agricultural production, health, biodiversities, social and economic activities as well as environmental conditions [8]. The scenario of shifts in rainfall patterns, incidences of high temperature and extreme drought has been emerging with negative effects on Agricultural activities of the farmers in Arochukwu area of Abia state, Nigeria. In the study area, these devastating effects of climate change could be addressed by two major but somewhat related ways which are mitigation and adaptation. According to Ozor and Nnaji [9], mitigation and adaptation remain the crucial options to manage the effects of climate change on Agriculture in the world today. Mitigation is viewed as a response strategy aimed at reducing the amount of emissions and a measure to enhance the absorption capacity of greenhouse gases [10]. According to Smith and Skinner [11], adaptation is a strategy employed to adjust in human practices, ecological or physical system in response to perceived vulnerability within the context of climate change.

A fundamental challenge in mitigation and adaptation to climate change is issue of gap between expected practices and existing knowledge and practices among farmers. According to UNFCC [12], indigenous adaptation is a knowledge base for promoting understanding of the impacts of climate change. Anselem et al. [13], blamed the soaring ignorance among the teeming population of small holder farmers in some parts of sub-Saharan Africa on unprecedented neglect of indigenous process in investigating climate change problems, impacts, mitigation and adaptation strategies. Much of climate change research has concentrated on assessing effects on the various crop systems either in crop/livestock combination, yields, pests, disease and bio-physical aspects of food production with little or no regard to the socio-economic background of farmers as primary stakeholders in the food production process. To what extent can the socio-economic characteristics of farmers, influence their meaningful use of indigenous mitigation and adaptation strategies in Arochukwu Area of Abia State, Nigeria? Moreover, the partial assessments most often consider climatic change somewhat on the surface without regard for meaningful mitigation and adaptation from stand point of what the farmers know as critical stake holders.

According to Wisner et al. [14], the vulnerability of Agriculture is not determined by the nature and magnitude of environmental stress like climate change per se, but by the combination of

the societal capacity to mitigate, cope with or recover from environmental changes more or less regarded as climate change. In Africa up to 50% of crop yield is lost due to climate change effects [15]. Anselem et al. [13] added that Nigeria is predominant in the foregoing scenario because the South east within which Arochukwu area is located depends on vagaries of weather. To better address the food security challenges that are central to Millennium Development Goal (MDGs) and Agricultural transformation agenda, it is desirable to address climate change on food production from the perspective of indigenous process. The IPCC [3] under 4th assessment reported that between 75 and 250 million people will suffer from increased water stress, environmental degradation and hunger due to adverse effects of climate change by 2020 in Africa. According to MDG [16], more than 1.2 billion lived in extreme poverty in the developing world as of 1990. This scenario can worsen human livelihood due to adverse effects of climate change in Nigeria. Effective mitigation methods or adaptation strategies requires orientation towards indigenous processes with emphasis on how to address existing effects using existing practices and what farmers know well on their own volition. The existing practices are synonymous to indigenous and traditional knowledge (ITK) required for focusing experiences relating to observation, assessment, planning and implementation towards meaningful indigenous mitigation and adaptation to climate change [12]. Against this backdrop, there seems to be a paucity of information on indigenous mitigation and adaptation to climate change among the small holder farmers who constitute major apostles in the food production chain in Arochukwu Area of Abia State, Nigeria. With the creation of Arochukwu Area since 1991, there is need for Government, Non-Governmental organizations and the entire population to build on the experiences of indigenous practices and guarantee effective mitigation and adaptation to climate change. Moreover, the demands of the Agricultural transformation and food security among the teeming population in the study area require pertinent questions to address emerging climate change. What are the indigenous mitigation methods and adaptation strategies employed by small holder farmers in the study area? What specific issues constitute constraints to farmers' use of indigenous mitigation and adaptation to climate change in Arochukwu Area of Abia State, Nigeria?

The purpose of this study was to investigate indigenous mitigation and adaptation to climate change among small holder farmers in Arochukwu Area of Abia State, Nigeria. Specifically, the study described the socio-economic characteristics of the farmers, ascertained indigenous mitigation methods and adaptation strategies and determined constraints to climate change among the small holder farmers in the study area.

2. MATERIALS AND METHODS

This study was carried out in Arochukwu Area of Abia State, Nigeria made up of seven (7) autonomous communities namely; Ohafor, Ohaeke, Ovukwu, Ihechiowa, Arochukwu, Ututu and Isu (Fig. 1). The study area is located within the tropical region between Latitude 5º23''N and 55º7''S, and Longitude 5.383ºN and 7.197ºE with estimated land area of 524 Km^2 and annual rainfall range 200 mm and 240 mm. The major occupations of the people of Arochukwu Area include farming, fishing, trading, Artisan and civil service with estimated household size of 169,339 people [17].

Both males and females who engage in farming and non-farming activities within the Arochukwu geographical area covered by the study constituted the population. Purposive, multistage and random sampling techniques were employed. Four autonomous communities namely; Ohafor, Ovukwu, Ihechiowa and Arochukwu were purposively selected basically because of their proximity to one another and intensity of farming activities as well as enormous effects of climatic change in the autonomous communities. At the second stage, four villages each from the autonomous communities involved were randomly selected, while the third stage involved homogeneity sampling in random selection of ten farmers from each of the villages selected. This is basically because of the consistency of climate change effects in the villages. Thus a total of 160 farmers randomly selected constituted the sample size for the study.

Data for this study were mainly from primary source collected through the use of structured interview guide organized in sections to reflect the specific objectives. Secondary data were also sourced from previous research work, textbooks and journals and they were acknowledged and employed to amplify the primary data. Analytical

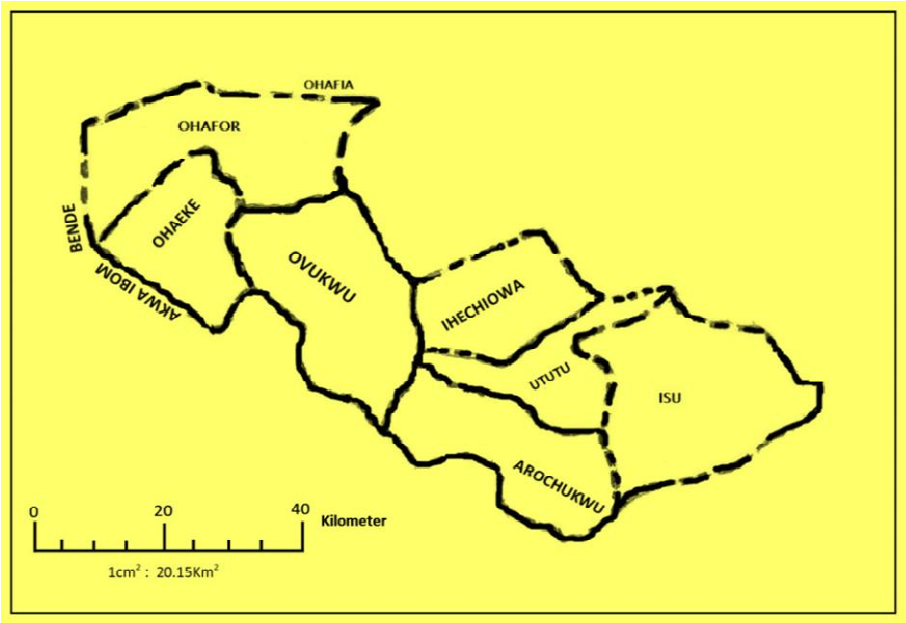

Fig. 1. Map of Arochukwu area State Nigeria, showing seven autonomous communities
Source: Arochukwu Local Government Council Department of Works and planning, 2013

tools such as frequencies, percentages, mean rating and factor analysis techniques were adopted. The exploratory factor analysis technique using the principal factor model with interaction and varimax rotation was adopted. The factor loading under each constraint (beta weight) represents a correlation of the variables (constraint areas) to the identified constraint factors and has the same interpretation as any correlation coefficient. Kaiser's criterion using factor loading of 0.30 and above in naming and interpreting the factors and constraint variables was adopted [18,19].

3. RESULTS AND DISCUSSION

Data in Table 1 show that majority (58.1%) of the small holder farmers in Arochukwu Area of Abia state, Nigeria were females, while 57.5 percent of them were within the ages of 31-50 years. The results indicate that more females compared to their male counterparts were involved in Agricultural production activities in Arochukwu area of Abia state, Nigeria. The results indicate that the farmers were within the adult groups and active ages. This study therefore, disagrees with that of Sangotegbe et al. [20], who reported that more men compared to their women counterparts are engaged in Agricultural food production activities in Nigeria. However, the scenario suggested that women as great apostles for household food needs were more concerned with indigenous mitigation and adaptation to climate change as a critical measure to safe guide the Agricultural production activities in Arochukwu Area of Abia state, Nigeria. The limited involvement of youth in Agricultural activities as indicated by this study could constitute a serious threat to sustainable involvement of indigenous process in mitigation and adaptation to climate change and food security in Abia state, Nigeria.

Majority (59.4%) of the small holder farmers in the study area was married, while majority (50.6%) of them had at least secondary school qualifications. The results indicate that most farmers in the study area have basic education to enhance effective use of indigenous process in mitigation and adaptation to climate change and comprehend best practices in Agricultural production. Both Blum [21] and Madukwe [22] have reported education as a facilitating factor in any extension practice for viable Agricultural production. Eze et al. [23] added that basic education could be employed by a viable extension practice to facilitate agricultural transformation and sustainable food security. Furthermore, majority (53.1%) of farmers in Arochukwu area had household sizes of 6 – 10 members, while 55.0 percent of them had farm sizes of 0.6 – 2.0 hectares and majority (63.8%)

had 6 – 15 years of farming experience. The scenario of high farming population with small farm sizes coupled with large family sizes revealed by this study indicated that the study area is rural and the farmers were indeed small holders. However, the farmers had sufficient farming experience which could bolster their knowledge of mitigation and adaptation to climate change for proficiency in Agricultural production activities.

Table 1 indicates that majority (75.9%) of the farmers in Arochukwu area of Abia state were either members of co-operatives or kindred groups, while 66.9% of them practiced mixed cropping. About 53.8% of the farmers employed hired labour in Agricultural production activities, while majority (61.3%) of them reported estimated annual income of N 51,000.00 – N150, 000.00. Membership of rural organizations such as co-operatives or kindred groups could serve as useful channels for group communication [24]. Thus membership of organizations such as cooperatives and kindred groups would serve as a viable opportunity to enhance farmers' knowledge on mitigation and adaptation to climate change.

Furthermore, mixed farming among the small holder farmers as revealed by the study indicates necessary adjustment in farm practice to contend with emerging effects of climate change in Arochukwu Area of Abia state, Nigeria. According to Brussel [25], adjustment in human farm activities serves as useful adaptation measure to climate change. Again, estimated annual income in any farm enterprise indicates farmers' income earned from the output over cost as the excess revenue and value of household consumption [26]. Examined against the backdrop of enormous financial and related demands for mitigation and adaptation to climate change in Agricultural production activities, the small holder farmers in Arochukwu Area of Abia state, Nigeria have inadequate income for rapid agricultural transformation.

3.1 Small Holder Farmers' Perceived Indigenous Mitigation and Adaptation to Climate Change

Data in Table 2 show indigenous mitigation reported by the farmers as; use of improved crop varieties (M=4.3), cover cropping (M=4.1), improved organic manure application (M=4.0), improved cultivation techniques (M=3.8). Both application of organic manure and cover cropping will prevent abrupt effects of climate change and provide avenue for effective mitigation of climate change. This study corroborates with Urama and Ozor [7] who reported that mitigation to climate change will be more effective if it is used on practical measures to reduce vulnerability. Other indigenous mitigation measures reported include; abstinence from burning crop residues / wild fire (M=3.7) and integrated crops / livestock systems (M=3.6). This study therefore, agrees with Igbokwe and Mkpado [27] who advocated use of improved crop varieties and improvement in agronomic research with crops and soil specific manure application to mitigate socio-economic impacts of climate change in Africa. These climate change mitigation strategies demand indigenous process of the farmers for desirable results in the study area.

Table 2 shows specific indigenous adaptation strategies as; adjustment of planting dates (M=4.4), mixed cropping (M=4.3), erosion control (M=4.2), mixed farming (M=4.0), control of wild life (M=3.8) and early planting (M=3.6). This result corroborates Farauta, et al. [8], Sangotegbe et al. [20], Nwalieji and Onwubuya [28] who reported multiple cropping, mixed farming, adjustment in planting dates and intensive manure application as useful adaptation strategies to climate change in Agriculture. However, the results indicated recycling and waste minimization (M=2.8), planting of legumes amidst crop rotation (M=2.7), use of low energy production systems (M=2.6), conservation tillage (M=2.4) and composting of organic waste (M=2.2) as minor indigenous mitigation methods. Other measures such as use of organic mulching (M=2.5), forestation /tree planting (M=2.5) and construction of drainage channels (M=2.4) were reported as minor adaptation strategies. This corroborates with Igbokwe and Mkpado [27] who acknowledge agricultural innovations such as the foregoing strategies but concluded that the innovations have not experienced same success in Africa like other continents of the world. These agricultural innovations regarded as minor mitigation and adaptation measures could be blamed on critical issues related to levels of awareness and knowledge among small holder farmers possibly because of limited extension services on mitigation and adaptation to climate change in the study area. Earlier research reports by ADB [29] and Igbokwe and Ozor [30] blamed lack of innovation on high dissemination costs. This scenario could be aggravated partly due to low

population density in rural areas such as Arochukwu Area of Abia State and lack of effective demands for technical information among the small holder farmers.

Table 1. Socio-economic characteristics of small holder farmers in Arochukwu area of Abia state, Nigeria

Variables	Categories	Frequency (n = 160)	Percentage (%)
Sex	Male	67	41.9
	Female	93	58.1
Age(yrs)	≤ 20	13	8.1
	21 - 30	19	11.9
	31 - 40	63	39.4
	41 - 50	40	18.1
	51 years and above	25	15.6
Marital status	Single	36	22.5
	Married	95	59.4
	Widowed	29	18.1
Levels of educational attainment	Informal School	09	5.7
	Primary	13	8.1
	Secondary	81	50.6
	College/High School	24	15.0
	Tertiary School	20	12.5
	University	13	8.1
Household size(no)	≤ 5	37	23.1
	6 - 10	85	53.1
	11 - 15	20	12.5
	16 and above	18	11.3
Farm size(Ha)	≤ 0.5	29	18.1
	0.6 - 1.0	48	30.0
	1.5 - 2.0	40	25.0
	2.5 - 3.0	26	16.3
	3.5 and above	17	10.6
Farming experience(yrs)	≤ 5	15	9.4
	6 - 10	32	20.0
	11 - 15	70	43.8
	16 - 20	26	16.3
	21 years and above	17	10.6
Membership of rural organization	Co-operatives	55	34.4
	Kindred groups	67	41.5
	Thrift organizations	38	23.8
Type of farming	Sole cropping	23	14.4
	Mixed cropping	107	66.9
	Mixed farming	30	18.8
Preferred source of labour	Hired labour	86	53.8
	Family labour	53	33.1
	Communal/group efforts	21	13.1
Estimated annual income	< 50,000.00	20	12.5
	51,000.00 - 100,000.00	60	37.5
	101,000.00 - 150,000.00	38	23.8
	151,000.00 - 200,000.00	30	18.8
	201,000.00 and above	12	7.5

Source: Field Survey, 2013

3.2 Small Holder Farmers' Perceived Constraints to Indigenous Mitigation and Adaptation to Climate Change in Arochukwu Area of Abia State, Nigeria

Data in Table 3 show the varimax rotated factor matrix perceived by small holder farmers as constraints to the use of indigenous mitigation and adaptation to climate change in Arochukwu Area of Abia State, Nigeria. Based on specific items loading, four major factors were extracted namely; Factor 1: Inadequate planning; Factor 2: Scarcity of inputs; Factor 3: Lack of infrastructure and Factor 4: Poor institutional support. Specific issues which loaded high and amplified inadequate planning include; inadequate planning structure (0.50), lack of proper weeding (0.48), inadequate farm labour (0.42) and inadequate spacing (0.41). Proficiency in planning hinge on appropriate planning structure. Appropriate planning structure indicates the act of arrangement of critical component parts of a plan to show relationships towards desirable goals. Inadequate planning structure revealed by this study indicates deficiencies in the organization of the critical activities as components directed towards mitigation and adaptation goals among the small holder farmers in the study area.

The scenario demands the processes of involving the indigenous methods and strategies to achieve meaningful mitigation and adaptation goals for desirable agricultural production and food security. Basic modifications are necessary in mitigation and adaptation to climate change in Agricultural production. The necessary modifications involves diversification which includes engaging crop varieties or a combination of crop and livestock system that are drought tolerant and resistant to temperature stresses with full advantage of prevailing water and other climatic conditions. Proficiency in indigenous mitigation and adaptation in Agricultural production demands proper planning to ameliorate severe effects of climatic elements of light, water and nutrients from the soil. Evidently, inadequate planning structure contributes to inadequate farm labour, while lack of proper weeding is blamable on inadequate spacing which aggravates inadequate planning as a factor in mitigation and adaptation to climate change among small holder farmers. Moreover, proper spacing makes weeding between plants easier. Thus, inadequate spacing results to lack of proper weeding and these factors are blamable on inadequate diversifications in farming activities due to inadequate planning structure. This is capable of jeopardizing all efforts towards efficiency in indigenous mitigation and adaptation to climate change in Agricultural activities.

Table 3 reveals scarcity of inputs as constraint to indigenous mitigation and adaptation to climate change in Arochukwu area of Abia state, Nigeria. Specific issues which amplify scarcity of inputs include; lack of weather stations to provide weather records (0.62), rapid increases in population drift to urban centers (0.42), high cost of farm labour (0.40) and high cost of organic manure (0.31). When the rural farmers lack access to knowledge and information about weather conditions due to absence of weather stations to provide weather records, they will be forced to grope in the dark concerning climate change. The rapid increase in rural-urban population drift brings about the high cost of farm labour and this is worsened by high cost of organic manure needed to mitigate effects of climate change.

Table 2. Mean rating of indigenous mitigation and adaptation to climate change among small holder farmers in Arochukwu Area of Abia State, Nigeria

Variables	Mean (M) (Max=5)
Indigenous mitigation	
Improved crop varieties	4.3
Composting of organic waste	2.2
Recycling and waste minimization	2.8
Improved cultivation techniques	3.8
Improved organic manure application	4.0
Conservation tillage	2.4
Cover cropping	4.1
Planting of legumes amidst others in crop rotation	2.7
Integrated crops/livestock systems	3.6
Use of low energy production systems	2.6

Variables	Mean (M) (Max=5)
Avoiding burning of crop residues/wild fire	3.7
Indigenous adaptation	
Watering of fields	2.0
Adjustment of planting dates	4.4
Erosion control	4.2
Organic mulching	2.5
Early planting	3.6
Mixed cropping	4.3
Construction of water drainage channels	2.4
Construction of water collection points and distribution	3.6
Afforestation/tree planting	2.5
Mixed farming	4.0
Control of wild life	3.8

Source: Field survey 2013

Table 3. Varimax rotated factor matrix on constraints to the use of indigenous mitigation and adaptation methods among the small holder farmers to address climate change

Constraint issues	Factor 1 inadequate planning	Factor 2 scarcity of inputs	Factor 3 lack of infrastructure	Factor 4 poor institutional support
Lack of financial resources	0.07	.0.10	0.28	0.50
Poor extension services	0.02	0.16	0.09	0.49
High cost of farm labour	-0.19	0.40	-0.01	0.26
Inadequate knowledge on climate change	-0.11	0.28	0.14	0.51
Inadequate farm labour	0.42	0.03	0.02	-0.86
Lack of proper weeding	0.48	0.30	0.12	0.24
Inadequate planning structure	0.50	-0.07	0.02	-0.01
Inadequate spacing	0.41	-0.11	0.13	0.03
Lack of drought resistant varieties	0.08	0.21	0.46	-0.06
Inadequate diversification in farming activities	0.05	-0.04	0.26	-0.13
Strict adherence to local varieties	-0.03	-0.05	0.11	0.23
Lack of credit support	0.07	-0.02	0.48	0.12
Lack of weather stations to provide weather records	0.09	0.62	0.15	-0.13
High cost of organic manure	-0.33	0.31	-0.25	0.15
Lack of access to improved technology	0.01	0.04	0.58	-0.06
High level of pest and disease manifestation	0.18	0.06	0.02	0.57
Rapid increase in population drift to urban centers	-0.48	0.42	-0.33	-0.15
Lack of weather forecasting techniques	0.06	0.22	0.66	-0.04

Source: Field Survey, 2013

Similarly, the scenario of high cost of labour due to population drift to urban areas will contribute to increases in farm labour cost against the backdrop of huge demands of labour force in agricultural food production activities. Evidently, the drift of population out of the study area coupled with high cost of organic manure as reported by the study could further affect negatively indigenous mitigation and adaptation to climate change with overall drop in farm production output.

Lack of infrastructure indicates limited facilities needed to enhance indigenous mitigation and adaptation among the farmers. Specific issues which loaded high under lack of infrastructure include; lack of weather forecasting techniques (0.66), lack of access to improved technologies

(0.58), lack of credit support (0.48) and lack of drought resistant varieties (0.46). The study indicates that lack of credit support affects negatively the needed access to improved technology and drought resistant varieties of crop. The lack of these critical agricultural production enhancing issues as revealed by this study are worsened by lack of weather forecasting facility which amplify lack of basic infrastructure in limiting the use of indigenous mitigation and adaptation to climate change among small holder farmers in the study area. Accessibility to credit can help small holder farmers to source drought resistant varieties of crops and associated improved technology to counter bad weather and environmental degradation as a result of climate change. This lack of access to credit reported in the results could constitute a serious obstacle to indigenous mitigation and adaptation to climate change and agricultural production expansion in Arochukwu Area of Abia state, Nigeria. FAO [31] added that about 90% of Nigerian food is produced by small holder farmers who depend on rainfall as a result of their poor knowledge base, limited access to basic infrastructure and poor financing.

Factor four revealed poor institutional support as constraint to indigenous mitigation and adaptation to climate change among small holder farmers in the study area. Specific poor institutional support issues include; high level of pest and disease manifestation (0.57), inadequate knowledge of climate change (0.51), lack of financial resources (0.50) and poor extension services (0.49). Climate change brings with it proliferation of pest and diseases. This result also corroborates with Agwu et al. [32] who reported that the impacts of climate change leads to a preponderance of pests and disease outbreaks in crops, livestock and stored farm produce. The possible increases in pest infestation and livestock diseases may bring about greater use of agro-chemicals/pesticides which aggravates climate change in the farms. Inadequate knowledge on climate change can be blamable on poor extension services. Blait et al. [33] had pointed out that the least expensive input for improved rural agricultural development is adequate access to knowledge and information in area of new agricultural seedlings, fertilizer, credit and market prices. Against the backdrop of the above crucial roles of extension services, there has been a shortcoming of extension agents in Nigeria necessary for providing agricultural information to farmers who are relatively illiterate and remote from formal sources of information. This result also corroborates with IFAD [34] who confirmed lack of education, information and training as a key limiting factor to small holder development. Similarly, high level of pest and disease manifestation results from lack of financial resources to enable the small holder farmers embark on best cultural practices under indigenous mitigation and adaptation to climate change. The limited number of credit facilities is blamable on the cumbersome procedures and to the lack of collateral among the farmers in this regard. Only few farmers in the study area benefit from credit facilities as most of them cannot meet these requirements for accessing the credit for indigenous mitigation methods and adaptation strategies in any Agricultural production enterprise.

4. CONCLUSION

This study investigated indigenous mitigation and adaptation to climate change among small holder farmers in Arochukwu area of Abia state, Nigeria. The study was based on the premise that indigenous process is fundamental for sustainable mitigation and adaptation to climate change in agricultural production and food security. The study described the socio-economic characteristics of the farmers, ascertained indigenous mitigation and adaptation to climate change and determined constraints to use of indigenous mitigation and adaptation to climate change among small holder farmers in the study area. Results of this study indicate that poor performance in the agricultural production activities in the study area hinge on neglect of indigenous process in mitigation and adaptation to climate change. Critical factors identified as constraints to indigenous mitigation and adaptation to climate change among small holder farmers in the study area include; inadequate planning, scarcity of inputs, lack of basic infrastructure and poor institutional support. Effectiveness in indigenous mitigation and adaptation to climate change among small holder farmers in Arochukwu area of Abia state, Nigeria depends on the extent issues raised and constraints identified can be addressed and sustained. The study recommends improved extension training for farmer's groups on indigenous process, participatory approach to input procurement and provision of infrastructure as well as improved government policy on indigenous process.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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