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POULTRY FARMERS' KNOWLEDGE LEVEL OF CLIMATE CHANGE ADAPTATION STRATEGIES IN IMO STATE, NIGERIA

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Abstract
This study investigated poultry farmers' knowledge level of climate change adaptation strategies in Imo State, Nigeria. The specific objectives identified the various sources of agricultural information available to the farmers on climate change in the study area, examined the knowledge level of the poultry farmers on climate change adaptation strategies; ascertained various climate change adaptation strategies employed by poultry farmers in the area. A multi-staged sampling technique was employed in sampling 120 poultry farmers that took part in the survey. A set of questionnaires was used to get responses from farmers. Both descriptive and inferential statistics were used to analyze the data. Findings from the study showed that fellow farmers were the major source of information on agriculture for 90% of the poultry farmers. while good housing system (100%), adequate extensive poultry management system (100%) and immediate vaccination of birds (100%) ranked high on the table of climate change adaptation strategies that poultry farmers utilize. Also, with a grand mean of 2.52, above the benchmark mean of 2.00, the poultry producers demonstrated a high level of knowledge regarding measures for adapting to climate change. The hypothesis result indicated a strong relationship between the farmers' sources of information on strategies for adapting to climate change and their level of knowledge with these tactics. The study came to the conclusion that poultry farmers had a high level of knowledge about different climate change adaptation strategies, primarily from other farmers. As a result, it was recommended that the government increase the availability of extension services to poultry farmers so that they can obtain scientifically verified and tried-and-true information on adaptation strategies for increased and sustainable knowledge in the study area.
Keywords: Agriculture, Information, Livelihood, Livestock, Management practices

Introduction

Poultry production is very important in the development and improving standard of living in Nigeria and in Africa as a whole. According to Taruvinga *et al.*, (2019), Poultry production has various areas one can venture in, these include broilers production, layers production, and egg production, poultry feed formulation and hatchery. A lot of people in many developing Countries depend on poultry production for a living because it generates employment and income. Poultry dung serves as manure for farming, provide food and protein to feed the teaming population in addition to being a form of savings that farmers fall back to in times of need. Poultry farming can equally serve as a Collateral in doing business (Taruvinga *et al.*, 2019).

In broiler production, a lot of benefits accrue economically. Apart from birds been mainly reared for meat within a very short period of time (10-12 weeks), it is equally important for the provision of the essential nutrients needed for growth, replacement of worn-out tissues and generally keep one healthy and strong. According to Julian, (2019), poultry consumption has the capability to increase protein in the body in case of deficiency within a short while when compared to other livestock.

According to FAO (2019), climate change refers to changes to the average weather and weather variability of a region or the planet over time. It

is measured by changes in temperature, precipitation, wind, storms and sea level rise. Similarly, it is a long-term shift in the average weather conditions of a region, such as its typical temperature, rainfall, and windiness. It as well means that the range of conditions expected in many regions will change over the coming decades. This means that there will also be changes in extreme condition (Gaughan and Cawsell-Smith, 2019). The average surface temperature of the earth is the main climate change indicator that scientists use in research. For over fifty years, the world average temperature increased by 0.65°C.

Furthermore, Adesiji & Baba (2019) stated that climate change is related to a rise in world's temperature; and climate change influence the way egg and meat are produced. This is because birds drink more water during the time of high temperature and intense sunshine thereby reducing feed intake which result to low egg production and low feed conversion capabilities of the birds to meat. The threat to climate change is expected to affect both crops and livestock production, input supplies and other sources of livelihood (Okon, Agom, Ukpe & Amusa, 2018). Seo & Mendelsohn, (2020) observed that the level to which climate change affect the poultry sector is yet to be well researched despite the fact that poultry production hold too many prospects.

The major known direct impact of climate change on poultry production comes from the heat stress which increases the cost of production for farmers through reduction in meat production, reproduction and poultry health. Hence, an increase in air temperature, such as that predicted by various climate change models, could directly affect poultry performance. Also, this inefficient way of converting feed to meat leads to major losses, which affect animal health negatively, productivity and income of poultry farmers.

Another major problem in the poultry sector is inadequate extension services which would have been of immense help to poultry farmers in their quest to checkmate the effect of climate change on poultry production. Chah, Odo, Asadu, and Enwelu, (2013) also observed that most poultry farmers in Nigeria have limited access to extension services especially for obtaining verified update on climate change and the best way to adapt so as to enable them overcome the effects on their poultry business.

Thus it becomes imperative to assess the knowledge of these poultry farmers in the Imo State on climate change and subsequently ascertain the adaptation strategies they employ to curb its negative effects on their business. Specifically, the study identified the various sources of agricultural information available to the farmers on climate change in the study area, examined the knowledge level of the poultry farmers on climate change adaptation strategies and ascertained various climate change adaptation strategies employed by poultry farmers in the area.

This research will provide useful information to policymakers, scientists, and extension agents in Imo State and beyond about farm-level climate change adaptation issues among poultry farmers. Also, findings from this work will aid to develop the right policies and institutional frameworks that will help farmers to better cope to the challenges of climate change as well as help boost the poultry production business.

Methodology

Study Area

The study was carried out in Imo State, Nigeria. Imo State lies within latitudes $4^{O}45$`N and $7\ ^{O}15$`N and longitude $6\ ^{O}50$`E and 25`E with an area of about 5,100 sq km. The State is located within the tropical rainforest agro-ecological zone which allows for diverse weather conditions that lead to climate change. Imo State shares border with Abia State on the east, the River Niger and Delta State on the west, Anambra State to the North and Rivers State to the South.

Administratively, Imo State is divided into three Agricultural Zones namely: Okigwe, Owerri and Orlu zones. Owerri and Okigwe agricultural zones were selected for this study because poultry the farming supports the people's way of life in terms of occupation. In Okigwe Agricultural Zone, there are 10 extension blocks with 80 extension circles.

Imo State is endowed with natural resources such as crude oil, natural gas, lead, and zinc, economical exploitable flora like the Iroko, mahogany, Obeche, bamboo, rubber tree and oil palm. The rainy season begins in April and lasts until October with annual rainfall varying from 1,500mm to 2,200mm (NIMET, 2013). An average annual temperature above 20 C (68.0F) creates an annual relative humidity of 75% with humidity reaching 90% in the rainy season. There are two months of harmattan between December and February each year. However, the weather becomes intense between January and March.

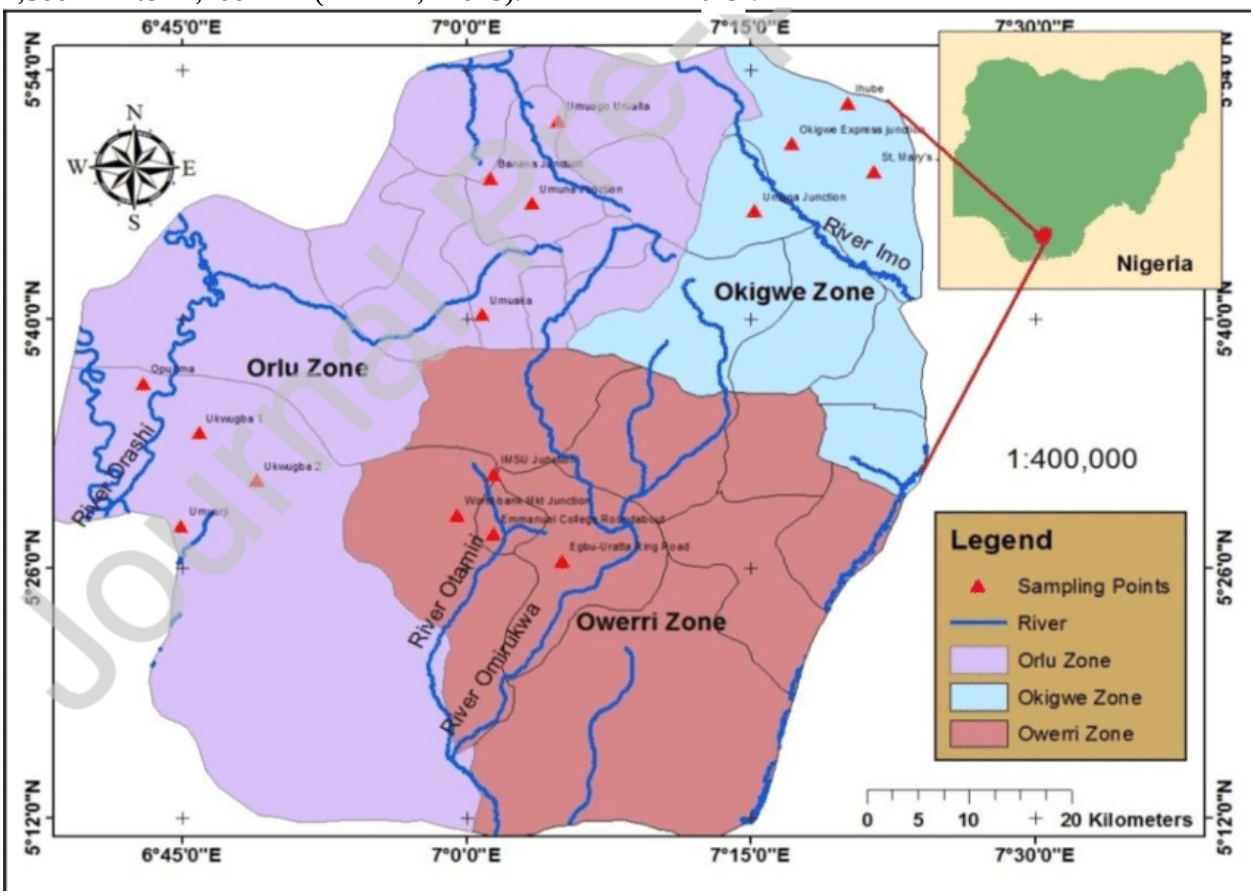

Fig. 1: Agricultural Zones (Owerri & Okigwe) under Study shown in Map of Imo State, Nigeria (IMSG, 2020)

Sampling and Sampling Procedure

The study employed multi-stage sampling technique in selecting the sample size for the study. In the first stage two (2) agricultural zones were purposively selected out of the three (3) zones in the study area due to proximity. In the second stage, two (2) blocks were selected from each of the selected zones randomly, making it four (4) blocks in all.

Then for the third stage, two (2) circles were selected from each of the selected blocks randomly making a total of eight (8) circles. Finally, fifteen poultry farmers were randomly selected from each of the circles giving a total of 120 farmers consisting of sixty farmers (60) from Owerri Zone and Sixty farmers (60) from Okigwe Zone in Imo State, Nigeria.

Method of Data Analysis

Both descriptive and inferential statistics were used to analyze the data collected. Specifically, the objectives were analyzed using descriptive statistics such as frequency counts, percentages, mean scores and a 3-point rating scale of High, Moderate and Low that were assigned scores of

3, 2 and 1, were used to analyze the knowledge level of poultry farmers. The mean cut off point was 2.00, that is 3+ 2 + 1 = (6/2)= 2.00 and any mean response below 2.00 was considered as low level of knowledge, at 2.00 was said to be moderate while any response above the benchmark mean indicated high level of knowledge of poultry farmers on climate change adaptation strategies.

Hypothesis

H0: there is no significant relationship between the farmers' sources of information on climate change and their knowledge level of the adaptation strategies. This was tested using correlation analysis.

The model is stated thus;

$$PPMC(r) = \frac{n\sum XY-(\sum X)(\sum Y)}{\sqrt{(n\sum X)^2-(\sum X^2)(n\sum Y^2)-(n\sum Y)^2}}$$

Where,

r = correlation coefficient

Y = Number of information sources

X = level of knowledge of the adaptation strategies (Mean)

N = sample size of farmers.

The correlation coefficient was further tested using this formula;

$$t = \frac{r \times \sqrt{n-2}}{t-r^2}$$

Where: t = test of significance

r = correlation coefficient

n = sample size

Results and Discussion

Various Sources of Agricultural Information available to the Farmers on Climate Change

The findings in Fig 2 (column chart) show that the variable 'fellow farmers' (90.00%) ranked highest with respect to sources of agricultural information for climate change while that of extension agents ranked lowest (27.5%) as a source of information available to farmers.

This implies that extension agents are not adequately providing necessary information to farmers on climate change adaptation strategies. This is in line with the findings of Chah *et al*, (2019), that there are poor extension services especially in the dissemination of information on climate change adaptation. However, this could be due to inadequate legislated policies in agricultural extension and unstable government policies in the sector as well as delayed release of fund for agricultural extension and research which is grossly inadequate.

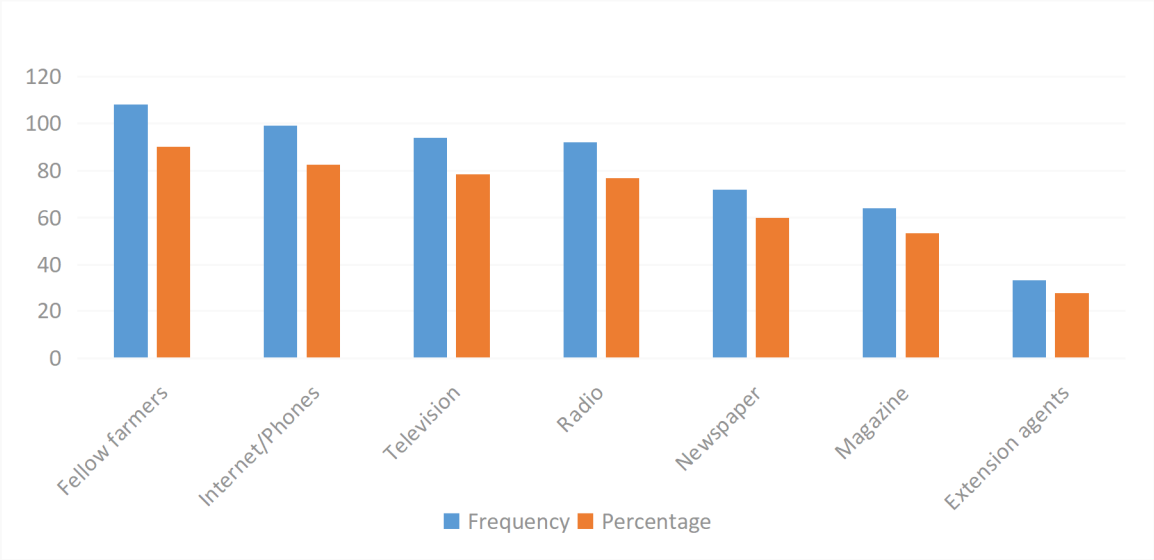

Fig. 2: sources of agricultural information available to the farmers on climate change
Source: Field Survey 2022

Level of Knowledge of the Poultry Farmers on Climate Change Adaptation Strategies

Entries in Table 1 reveal that good housing system ($\bar{x}$=2.86) and rearing early maturing bird ($\bar{x}$=2.86) ranked highest while Adequate feed formulation ($\bar{x}$=1.63) had the lowest mean score.

Furthermore, the results show that the knowledge level of the farmers is high with a grand mean of 2.52 which is higher than the benchmark mean of 2.00. This shows that the knowledge level of the farmers in various climate change adaptation strategies is high, may be due to the adequate use of various sources of information as presented in Fig. 2. However, Low knowledge level in adequate feed formulation may be because it requires more scientific and technical approach of which majority of the farmers lack the capacity.

Table 1: Farmers knowledge level of climate change adaptation strategies

Climate Change Adaptation Strategies	High	Moderate	Low	Mean
Good housing system	109(90.8)	5(4.2)	6(5.0)	2.86
Adequate feed formulation	26(21.7)	23(19.2)	71(59.2)	1.63
Appropriate stocking density	104(86.7)	7(5.8)	9(7.5)	2.79
Good source of water supply	105(87.5)	7(5.8)	8(6.7)	2.81
Adequate extensive poultry management	103(85.8)	7(5.8)	10(8.3)	2.78
Rearing other livestock	50(41.7)	21(17.5)	49(40.8)	2.01
Rearing early maturing bird	107(89.2)	9(7.5)	4(3.3)	2.86
Prompt vaccination	102(85.0)	16(13.3)	2(1.7)	2.83
Rearing of resistant poultry species	34(28.3)	74(61.7)	12(10.0)	2.18
Proper hygiene practices	70(58.3)	35(29.2)	15(12.5)	2.46
Grand Mean Score 25.21 = 2.521 ≈ 2.5				

Note: MS ≥ 2.0 = Acceptable; Ms less than 2.0 = Not Acceptable (Values in bracket are percentages (%)
Source: Field Survey, 2022

Various Climate Change Adaptation Strategies employed by Poultry Farmers in Imo State

The results in Fig 3 (Column chart) showed the various climate change adaptation strategies employed by poultry farmers in Imo State, where, good housing system, adequate extensive poultry management and prompt vaccination ranked highest ($\bar{x}$=100.0) which means that all the farmers interviewed employed the above strategies; however, adequate feed formulation is the least strategy ($\bar{x}$=49.2) being employed by the farmers. This could be due to the fact that majority of the farmers operate more on commercial feed which unarguably increased their cost of production. This finding agrees with that of Olajide, Kareem and Afolabi (2020) that most small-scale poultry farmers depend on commercial feeds due to time and resources to formulate their own feed.

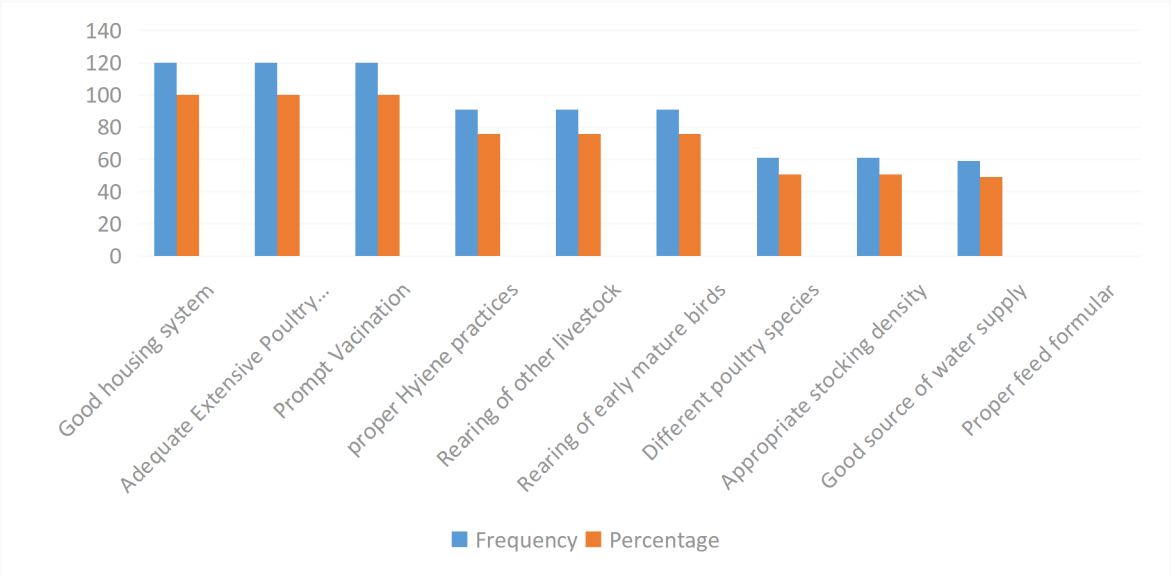

Fig 3: information on the various climate change adaptation strategies employed by farmers
Source: Field Survey, 2022

Test of Hypothesis

H0: there is no significant relationship between the farmers' sources of information on climate change and their knowledge level of the adaptation strategies was tested using correlation analysis. Entries in Table 2 indicate a strong positive significant relationship (0.914) at 1% level of probability between farmers' sources of information and their knowledge level of the adaptation strategies in the study area. The implication is that as number of information sources used by poultry farmers increases in Imo State, Nigeria, their knowledge level of adaptation strategies increases. Therefore, the null hypothesis is rejected.

Table 2: Correlation estimates of the relationship between farmers' sources of information on climate change and their level of knowledge of the adaptation strategies

		Sources of information	Knowledge of Adaptation strategies
Sources of information	Pearson Correlation	1	.914**
	Sig. (2-tailed)		.001
	N	120	120
Knowledge of Adaptation strategies	Pearson Correlation	.914**	1
	Sig. (2-tailed)	.001	
	N	120	120

Source: SPSS 20, 2022

Conclusion and Recommendations

This study concludes that the poultry farmers in Imo State, Nigeria, have high knowledge level of various climate change adaptation strategies. Most of the farmers got their agricultural information mainly from fellow farmers. The study therefore, recommends that government should make extension services more available to poultry farmers in order for them to have better access to well tested scientific information that have been proven on the climate change adaptation strategies. This will afford the poultry farmers an increased and sustainable knowledge

about climate change in the study area as well as boost poultry production in the area.

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