

FACTORS INFLUENCING POULTRY EGG FARMERS' CHOICE OF CLIMATE CHANGE COPING STRATEGIES IN KANO STATE, NIGERIA

Beli, A. S.^{1*}, Aminu, A.², Muhammad, A. B.², Musa, J.¹ and Yusuf, A.³

¹Department of Agricultural Economics, Federal University, Dutsin-Ma

²Department of Agricultural Economics, Bayero University, Kano

³Department of Animal Science, Federal University, Dutsin-Ma

*Corresponding author's e-mail: belisanusi@gmail.com, gsm: +2347060598029]

ABSTRACT

The study examined the factors that influenced poultry egg farmers' choice of climate change coping strategies in Kano State. Structured questionnaires were used to collect data from 304 registered poultry egg farmers. The data were analysed using descriptive statistics and multinomial logit regression model. The farmers adopt various coping strategies such as planting of tree crops, adjusting of stocking time, use of grass straw to reduce heat and use of ice blocks to cope with the negative effects of climate change. Some factors such as gender, experience, education, extension contacts, etc. significantly influenced poultry egg farmers' choice of climate change coping strategies. It is recommended that the farmers should be provided with more loans and training to enable them adopt climate change coping strategies.

Key words: Climate change, poultry egg, coping strategies

INTRODUCTION

Climate change refers to a change in climate which is attributed directly or indirectly to human activities and natural variability that alters the composition of the global atmosphere over a long period of time (Intergovernmental Panel on Climate Change [IPCC], 2007). The variations in climate parameters affect different sectors of the economy such as agriculture, health, water resources, energy etc. According to IPCC (2007), Africa is one of the most vulnerable continents to climate change and climatic variability.

Poultry egg farming is one of the livestock sub-sectors that play important role in the Nigerian economy. In Nigeria, production of eggs and poultry birds occupies a prime position for improving animal protein consumption of both rural and urban households (Ologbon and Ambali, 2012). Though, the producers have been trying their best in ensuring that they produce as much eggs as possible to meet the escalating demand of egg. However, if left without taking appropriate actions, climate change could make the poultry egg farmers less productive, which could in turn render the enterprise unprofitable. Thus, it is vital to find out the factors influencing the poultry egg producers' choice of climate change coping strategies. This could help in finding out the producers' strong and weak points in coping with effects of climate change, which could in turn help in finding areas where the producers need urgent assistance in order to take appropriate actions.

METHODOLOGY

Study Area

Kano State of Nigeria which consists of 44 Local Government Areas (LGAs), covers a land area of 2131km² and a total population of 9,383,682 based on annual population growth index of 3.2% (National Population Commission [NPC], 2006). It lies on latitude 11°59'47"N and longitude 8°31'0"E. It shares border with Katsina, Jigawa, Bauchi and Kaduna States to the Northwest, Northeast, South and Southwest, respectively.

Majority of the people in the state are Hausa and Fulani, and engaged in different types of farming activities such as growing of food and cash crops, livestock keeping, as well as different types of trades.

Sampling Techniques

Multistage sampling procedure was used to sample the poultry egg farmers. First, two (Rano and Danbatta) agricultural zones were purposively selected due to their prominence in poultry egg production. Secondly, three LGAs were purposively selected from each zone based on their preponderance in poultry egg production. Thus, Kumbotso, D/Kudu and Bunkure were selected from

Rano zone; and Dawakintofa, Tofa, and Bichi from Danbatta zone. Thirdly, two communities from the LGAs were selected based on their number of poultry egg producers. The last stage involved proportionate and random selection of 316 farmers from the list of 1520 registered farmers in the communities, but only 304 questionnaires were found suitable for the analysis due to incomplete responses. The list was obtained from Poultry Association of Nigeria (PAN), Kano State Chapter. The sample size was determined by application of Yamane, (2001) formula as specified below.

$$n = \frac{N}{1 + N(e)^2} \dots \dots \dots (i)$$

Where: n = sample size; N = population size; and e = level of precision (5%)

Method of Data Collection

Structured questionnaires were used to collect primary data from the respondents (having minimum experience of five years) with the help of trained enumerators, while secondary data (list of registered poultry egg producers) was obtained from PAN Kano State Chapter.

Data Analysis

The data collected were analysed using descriptive statistics such as frequencies, percentage and tables) and multinomial logit regression model. The model is specified as:

$$P\left(Y = \frac{j}{x}\right) = \frac{\exp(e\beta_j)}{1 + \sum_{k=1}^j \exp(x\beta_k)} \dots \dots \dots (ii)$$

Where:

Y = response variable (number of coping strategies chosen by poultry egg farmer)

x= vector of predictor variables (climate attributes, socioeconomic characteristics, etc.)

p(y=j/x) = response probabilities where j= 0, 1...J

βk = a vector of weights/regression coefficients corresponding to outcome k

βj = a vector of responses corresponding to choices j.

RESULTS AND DISCUSSION

Climate Change Coping Strategies Adopted by the Farmers

Kano State poultry egg farmers had adopted various adaptation practices to cope with climate change. Table 1 shows that 90%, 67% and 54% of the farmers used tree cover, adjustment of stocking time and ice block in water to reduce the effect of high temperature on poultry egg birds, respectively. It can also be noticed that 77% and 70% of the farmers had engaged in other on-farm and off-farm activities to serve as a guide against the poultry failure, respectively.

Table 1: Distribution of poultry egg farmers based on coping strategies they adopted

Coping strategies	Frequency*	Percentage
Use of tree cover	275	90
Use of heat tolerant breed	166	55
Provide enough space	220	72
Use of ice block in water	163	54
Use grass straw	265	87
Stocking time adjustment	204	67
Provision of ventilated housing	218	72
Early feeding	239	79
Late feeding	181	60
Heat control	186	61
Night lightening	272	89
Other on-farm activities	234	77
Off-farm activities	212	70

Source: Field survey, 2019. *("Multiple responses allowed")

Poultry egg farmers of Kano State had chosen a number of climate change coping strategies based on their needs and understanding of effects of the climate change. The coping strategies adapted by the

farmers were classified into three namely management practices, temperature control and diversification strategies.

The choices were influenced by various socio-economic characteristics and other factors. Table 2 showed the factors influencing the poultry egg farmers' choice of climate change coping strategies. The Multinomial Regression model was tested for multi-collinearity using the variance inflation factor (VIF), which was less than 10 (1.06 to 1.89) for all the variables. The chi-square results show that the likelihood ratio statistics are highly significant, suggesting that the model has strong explanatory power.

It can be seen in Table 2 that household size (HH size) and extension contacts were both positive and highly significant (1% level) in influencing Kano State poultry egg farmers' choices of coping strategies at management, temperature change and diversification levels. This means that as these variables increased there would be significant increase in the farmers' choice of strategies to cope with climate change for all the scale of operations. The implication is that household size contributes in getting information about climate change due to the size of the household; farmers who have access to extension services are more likely to be aware of changing climatic conditions and to have knowledge of the various management practices that they can use to adapt to changes in climatic conditions. This corroborates the findings of Deressa, Hassan and Ringler (2010).

Experience is also positive in influencing the farmers' choices of coping strategies at all levels, and is significant at 1% level in adopting both management and change in temperature coping strategies, and 10% level for diversification strategies. This is in line with the assertion that the more the experience, the better the knowledge and information on climate change, as well as adaptation to coping strategies (Nhemachen and Hassan, 2007; Deressa *et al.*, 2010).

Table 2: Factors Influencing Choice of Coping Strategies

	Management strategy			Temperature Change strategy			Control	Diversification strategy		
Variable	Coef	S.E	P-value	Coef	S.E	P-value	Coef	S.E	P-value	
Gender	-.0290	0.0559	0.618	.1039	.0593	0.067*	.0353	.0508	0.488	
Household size	.0158	0.0029	0.000***	.0235	.0041	0.000***	.0152	.0042	0.000***	
Education	-.0000	0.0041	0.996	-.0080	.0043	0.067*	-.0043	.0039	0.267	
Experience	.0149	0.0034	0.001***	.0235	.0044	0.000***	.0090	.0049	0.070*	
Flock size	-.0009	-0.0020	0.000***	-.0009	.0000	0.000***	-.0013	.0001	0.000***	
Extension	1.0548	0.1974	0.000***	.2821	.0634	0.000***	.3034	.0549	0.000***	
Income/year	-.0009	-0.0004	0.000***	-6.990	-1.2800	0.000***	-7.8500	2.100	0.000***	
Observations	304									
LR Chi ²	638.45***									
Pseudo R ²	1.060									
Log likelihood	18.28									

Source: Field Survey, 2017

Note: $p < 0.01$ ***, $p < 0.05$ **, and $p < 0.1$ * referred to 1, 5 and 10 % significant levels, respectively.

Flock size and annual income as seen in Table 2 were both negative and highly significant in influencing the farmers' choice of climate change coping strategies for all the scale of operations, which means that as these variables increased the farmers' choices of the strategies would decrease at every points of operations. The implication is that if the flock size increased, the number of the coping strategies used by the farmer might decrease due to usage of more sophisticated strategy that can take care of a number of coping strategies e.g. usage of air conditioner can take care of using ice block in water, use of heat tolerant breeds, provision of more space, etc. On the other hand, farmers with higher income have high probability of affording more coping strategies that take care of two or more strategies than those with lower income.

Table 2 also indicates that gender was positive and significant at 10% level in influencing farmers' choice of temperature change coping strategies. This implies that the sex of the poultry egg farmer influences his choice of climate change coping strategies. The possible reason is that male headed

households have a higher probability of acquiring information than female headed households. Nhemachena and Hassan (2007) asserted that this is because, males are in most cases had more chance to move to the urban areas where they can get information about agricultural innovations.

It can also be seen in Table 2 that education was negative and significant at 10% level in influencing the farmers' choice of temperature change coping strategies. This means as the education of the farmers increases their choice of climate change coping strategies decreases. This contradicts literatures Maddison (2006) that state that education positively influenced farmers' adaptation strategies. This might be that the more a farmer divert his/her attention to education, the less he/she pays attention to poultry egg production, which might negatively affect their choice of temperature change coping strategies, or this might be that the educated farmers used modern technologies (e.g. air conditioner) that can take care of two or more strategies.

CONCLUSION AND RECOMMENDATION

Poultry egg farmers in Kano State used a number of climate change coping strategies in order to cope with the negative change. A lot of factors influenced the farmers' choice of the strategies.

It is recommended that;

- Poultry egg farmers should be given trainings on modern coping technologies to tackle the adverse effect of climate change in poultry egg production.
- Considering the high cost of adopting the coping strategies government should provide farmers with interest free loans to ease the cost of implementing the coping strategies.

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