International Journal of Organic agricultural Research & Development
Volume 19 (3) (2024)

FACTORS INFLUENCING ADOPTION OF CLIMATE CHANGE ADAPTATION STRATEGIES AMONG SMALLHOLDER MAIZE FARMERS IN IKENNE AGRICULTURAL ZONE, OGUN STATE, NIGERIA

Ogunnaike, M. G.[1]*Olabode O.J[2]., Osinowo O.H,[1] Osunmakinde M.A.[1]and Ilori A.R[3]
[1] Department of Agricultural Economics and Farm Management, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria
[2] Department of Agricultural Education, Federal College of Education(sp) Oyo, Oyo State
[3]Department of Agricultural Extension and Rural Sociology, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria
* Corresponding Author: maria.ogunnaike@oouagoiwoye.edu.ng

ABSTRACT

Climate change is a worldwide issue, especially for the agriculture sector, which suffers from decreased crop yields, food insecurity, and financial losses. Therefore, it is crucial to understand the methods farmers employ to lessen the negative effects of climate change as well as the variables influencing the degree to which smallholder maize farmers in Ogun State, Nigeria, are implementing climate change adaptation strategies. 240 agricultural households provided primary data using structured questionnaires. In particular, the study used a Poisson regression model and descriptive statistics to determine the proportion of smallholder farmers that used each of the proposed indigenous and introduced adaptation options. According to the study smallholder farmers used a combination of adaptation techniques, including irrigation, cultivating resistant varieties, and agroforestry. However, the adoption of introduced climate adaptation measures was significantly influenced by factors such as farm income, years of formal education, marital status, access to extension services, and climatic information. Significant factors impacting the adoption of indigenous climate change adaptation techniques were years of formal education, farm size, credit availability, access to climatic knowledge, involvement in off-farm activities, farm revenue, and farm experience. As a result, the study recommends that government policies and investment plans concentrate on encouraging improved access to extension services, providing on-farm demonstration training, and disseminating information on measures for adapting to climate change, particularly for smallholder farmers in Nigeria. Also, information and communication technology must therefore be used by the government, stakeholders, and donor organizations to develop innovations that increase the agricultural extension system's capacity to address climate change.

Key Words: Adaptation strategies, climate change, intensity, poisson regression smallholders.

INTRODUCTION

A worldwide issue, climate change poses a serious threat to the modern world, especially to the agricultural sector, which suffers from decreased crop yields, food instability, and financial losses. Long-term changes in temperature and and unpredictable weather patterns are referred to as climate change. Because predicted temperatures and rainfall levels can no longer be relied upon, these erratic weather patterns can make it challenging to maintain and develop crops in areas like sub-Saharan Africa, particularly Nigeria, that depend on farming. However, rapid global climate change also affects agricultural production, which is essential to human life and progress (Monteleone *et al.*, 2022; Annie *et al.*, 2023; Wu *et al.*, 2023).

Global warming disrupts ecological equilibrium, affects crop disease and pest prevention and control, and increases the frequency of extreme weather events, uneven precipitation, droughts, and floods, all of which reduce crop yields (Eekhout *et al.*, 2022; Yang *et al.*, 2023). Furthermore, soil degradation and land resource scarcity brought on by climate change have an effect on the sustainable growth of agricultural production (Fuentes *et al.*, 2023). Strong international cooperation and creative solutions are desperately needed to address this issue which can lead to significant reductions in greenhouse gas emissions and the promotion of sustainable technology development.

However, on our rapidly changing and ecologically challenged planet, where issues like energy scarcity, drought, and global warming, among others, have a negative impact on common agricultural practices, climate adaptation with the goal of enhancing farming practices and agricultural methods with advanced technology, is becoming increasingly important. In essence, climate adaptation refers to any action that both builds long-term resilience to changing environmental conditions and shields an ecosystem or community from the effects of climate change. Nonetheless, rural farming communities have a significant role to play because many adaptation methods must be implemented locally. These actions include regenerative agriculture and the planting of drought-tolerant crop varieties, enhancing water use and storage, managing land to lower the danger of wildfires, and strengthening defenses against extreme weather events like heat waves and floods. According to UN estimates from the Food and Agriculture Organization (FAO), there will be an additional two billion people on the planet by 2050, placing additional strain on agricultural land and food production (Colizzi *et al*., 2020).

REVIEW OF THE LITERATURE

Climate change has changed climatic factors like temperature, precipitation, and wind speed, making agricultural output the backbone of human existence, especially vulnerable. Furthermore, it has affected agricultural growth cycles, the frequency of extreme weather events, and the patterns of pest and disease occurrence, all of which have had a direct or indirect effects on crop productivity and quality. Climate change has increased the frequency and severity of extreme weather events, which can result in crop loss or major agricultural damage (Sun *et al*., 2019). Severe weather events that disrupt agricultural infrastructure can significantly raise the cost of agricultural output (Newman and Noy, 2023).

Carvalho *et al.* (2020) found that extreme weather conditions such as droughts, hailstorms, and frosts have a major impact on agricultural production in Brazil after analyzing data on extreme weather events and crop loss. It has been discovered that droughts drastically lower agricultural output nationwide, especially in biological populations that are already at risk. This analysis reveals that the country's economy has suffered due to changes made to agriculture subsidies and financing programs, in addition to small-holder farmers and the local and international commodity markets. Schmitt *et al*. (2022) examined the effects of frost, heat waves, drought, and water logging on the yields of winter wheat, winter barley, winter rapeseed, and maize in German agriculture. The article claims that drought, pose a serious danger to agricultural production because they can result in significant produce losses as well as monetary losses. Lesk *et al*. (2022) investigated the global agricultural response to composite extreme weather events by identifying and elucidating three composite patterns of climate influence on crops, evaluating past and projected trends in composite extreme events, and analyzing their effects on crop yields. Based on these forecasts and hypotheses, scientists have put forth novel methods to reduce the dangers that crops and agriculture face from climate change and composite extreme events. Furthermore, research has shown that because food supply chains are interdependent, extreme weather events have a variety of effects, with the production of fruits, vegetables, and animals being the most negatively impacted. Transportation services and other non-food-producing industries are also affected (Malik *et al.,* 2022). As a result, improving the resilience and adaptability of agricultural production systems as well as fortifying the conservation and restoration of agricultural ecosystems have emerged as crucial areas of agricultural scientific study.

Kamuzora (2023) aimed to determine how smallholder farmers in Dodoma, Tanzania, were affected by climate change adaptation techniques in terms of maize productivity. Data was gathered from 274 randomly chosen respondents using a cross-sectional study approach. Data was gathered using a structured questionnaire, and the impacts of climate adaptation techniques on maize productivity were estimated using the Propensity Score Matching (PSM) technique. According to the results, smallholder farmers who used strategies for adapting to climate change produced more maize than those who did not. The use of drought-resistant maize varieties, intercropping, limited tillage, modified planting dates, fertilizers, irrigation, and short-duration maize varieties are also linked to higher maize yields, according to multiple linear regression results. Interestingly, crop rotation had no discernible impact on maize yield. In order to reduce losses and enhance the welfare of smallholder farmers, policy options include government funding to encourage the use of climate change adaption techniques.

Additionally, it is believed that using drought-resilient crops and investing in contemporary irrigation systems are essential for improving agricultural resistance to climate change.

RESEARCH METHODOLOGY

Description of the Study Area

The study was carried out in one of the six states in Nigeria's Southwest geopolitical zone, Ogun State. It is renowned for its agricultural traditions and is one of the country's oldest states. Ogun State, which has 103,261 residents and a total area of 16,980.55 km^2, is situated between latitudes 6°54.59'N and longitudes 3°15.50E (NPC, 2006)with average daily temperatures nearly year-round between 25°C and 29°C . It has a comparatively high humidity (Kindly provide the range). Over 1500 mm of rain falls on Ogun State each year (source?), and the LGA is dominated by south-westerly winds for the majority of the year. The local government area's environment makes it possible to grow crops including rice, maize, cassava, yam, and bananas.

Sampling Technique

A multistage sampling procedure was used to choose the sample respondents. At the initial step, the Ikenne agricultural zone was chosen from the state based on Ogun State Agricultural Development Programme (OGADEP) distribution of agricultural zones in Ogun State. Two blocks, Obafemi and Someke, were selected for the second stage based on their reputation for producing maize. In stage three, a total of 12 cells were created by randomly selecting six cells from each block. In the final stage, twenty maize farmers were randomly selected to make up the population of 240 respondents.

Method of Data Analysis

The data was analyzed using both descriptive and inferential statistics. The socioeconomic traits of maize farmers and the methods they employed to adapt to climate change were described using descriptive statistics including frequency counts, percentages, and averages. The Poisson regression model was used to analyze the degree of climate change adaption strategies used by smallholder maize farmers.

Factors influencing the adoption of climate change adaptation strategies among smallholder maize farmers

According to empirical research, household socio-demographic traits and other institutional elements may have influence on climate change adaptation techniques (Hitayezu *et al.*, 2017; Ojo and Baiyegunhi, 2020). However, because count data are non-normal, ordinary least squares (OLS) regression cannot reliably estimate them (Maddala, 2001). The most popular regression models for examining count data are the Poisson regression model, zero-inflated Poisson, zero-inflated negative binomial and negative binomial regression model. A Poisson model was used to determine the variables affecting the degree of climate change adaptation strategies because it is the most straightforward technique for modeling count data. The density function of the Poisson regression model, as shown in the equation below, is as follows:

$$\Pr(H=h)=\frac{e^{-\delta(h)}\delta_i(h^H)}{\varnothing(I+H)}$$

where;

$\delta i = \mathrm{Exp}(\Omega + Li\Psi)$

Hi = 0,1,..., i (number of climate change adaptation strategy)

L= vector of predictor variables.

Ω and Ψ = parameters to be estimated.

The study also reported the incidence-rate ratios exp (b_1) and exp (b_2) instead of the coefficients b_1 and b_2. This is interpreted in similar way to the odds ratio for logistic regression, which is approximately the relative risk given a predictor. The following are the independent variables: X_1 = Age (years) X_2 = househead's sex (1 = male, 0 otherwise) X_3 Years of formal schooling X_4=Years of farming experience, X_5= Marital status (1 = married, 0 otherwise) X_6 = Size of household (number of people), X_7 =Farm size (Ha), X_8=Farmers Association Membership (1 = member, 0 otherwise), X_9 = Extension Service Access (1 = affirmative, 0 otherwise) , X_{10} = Credit availability (1 = affirmative, 0 otherwise), X_{11} = Climate Change Awareness (1 = affirmative, 0 otherwise) X_{12}= Climate information accessibility (1 = affirmative, 0 otherwise), X_{13} = Off-farm Activities Participation (1 = affirmative, 0 otherwise), X_{14}=Farm Income (Naira), X_{15} = Farm-to-home distance (km).

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Household Heads

Although improvements in agricultural methods (agronomic practices) can increase farming productivity, these tasks frequently involve a high level of physical exertion. Farming has historically been perceived as a male-dominated occupation because of its arduous nature. As may be expected for physically demanding occupations, Table 1 showed that men made up 90% of the respondents, with women making up only 10%. This attests to the fact that men made up the majority of farmers in this area. The farmers had an average of seven years of education. Overall, the educational background points to the possibility of strategy adaptability. In the research area, households with four to six members made up the majority (74.2%). This is consistent with the observation that the majority of farmers are married and probably have kids.

According to the analysis of landholding size, the majority of farmers (47.5%) cultivate between 1 and 2 ha, a significant portion (44.2%) operate on plots smaller than 1 ha, and a much smaller group (8.3%) manage holdings exceeding 2 ha. A smaller portion (12.5%) has 1-3 members, while a minority (13.3%) has more than 6 members. This suggests that the average household size falls on 5 members, possibly because the farmers are older than 41, which might indicate established families. The study also indicates that the average farmer is 41 years old, so they are likely within the economically active age range.

The respondents' thought on their level of awareness regarding climate change. The majority of those surveyed (93.3%) are aware of climate change. The findings make it clear that a sizable portion of the respondents are cognizant of climate change, which relates to farmers' awareness and comprehension of the issue. It entails understanding the origins, dangers, and effects of climate change and global warming and serves as the cornerstone for practical solutions. The information obtained from respondents regarding their access to climate information is further displayed in the results. This encompasses the gathering and analysis of real-world weather and climate measurements as well as historical and projected climate models.

The majority of respondents (85.8%) indicated that they understood the reasons for the ongoing rise in global temperatures, how farming is impacted by the climate, and how to address this issue before it gets much worse.

Description of Climate Change Adaptation Strategies

Table 2 presents the adaptation measures employed by maize producers to lessen the impact of climate change. According to the findings, 80% of farmers embraced agroforestry, 91% cultivated resistant varieties, 56% used irrigation, 75% managed soil fertility, and 55% relied on weather forecasts. In addition, 67% of farmers said they change the dates of planting to various crops, 45% said they migrate to a different location, 89% said they diversify their crops, 100% said they add organic manure, and 80% said they mulch.

Factors influencing the intensity of Introduced Climate Change Adaptation strategies

The outcome shows that climate knowledge plays a significant role in determining how strongly farmers choose to implement climate change adaptation measures. When assessing the degree of climate change adoption by maize farmers, the coefficient of access to climate information is positive and statistically significant ($P<0.001$). Ethiopian farmers have been observed to invest more in adaption techniques when they have access to climate information (Asrat and Simane, 2018). A study conducted in Zimbabwe by Nhemachena *et al.* (2014) similarly demonstrated how important it is for farmers to have access to meteorological data in order to improve their understanding of climate change and, consequently, increase the likelihood that they will use adaption measures. According to Adeagbo *et al*. (2021), radio and other mass media can be used to disseminate information about climate change. Among the maize farmers in the research area, radio could be a trustworthy information source. The degree to which maize farmers in the study area are implementing climate change solutions is negatively and statistically significantly impacted by their participation in the farmers organization.

According to the negative coefficient, farmers who are not members of farmers associations are more inclined to pursue climate change adaptation strategies than farmers who are. This could be explained by the tendency of farmers' associations to prioritize contract agreements, input accessibility, and market integration (including attractive prices and incentives) attached to the members of the organization.

As a result, members of such organizations have a negative bias towards climate change adaptation and related concerns in their objectives and areas of attention. This study's findings are in line with those of two other studies by Ehiakpor *et al.* (2016) and Adeagbo *et al.* (2021), which found a negative correlation between membership in a maize farmers association and awareness of climate change, with ignorance likely to lessen the intensity of adoption of adaptation strategies.

Factors influencing the intensity of Indigenous Climate Change Adaptation strategies

Results on Table 4 showed that participation in off-farm activities ($p<0.01$), farm income ($p<0.01$), farm size ($p<0.01$), improved access to credit ($p<0.05$), access to climate information ($p<0.01$), and years of formal education ($p<0.01$) all increased the intensity of adopting indigenous adaptation strategies. The likelihood that maize farmers will implement climate change adaptation measures is positively and statistically significantly influenced by the availability to financing variable. This outcome is in line with other research showing that credit availability is a significant factor that frequently improves adaption behavior (Caviglia-Harris, 2003), which in turn improves climate change adaptation (Fosu-Mensah *et al.*, 2012).

Farmers' willingness to implement indigenous climate change adaptation measures is significantly influenced by their income and distance from the land. The outcome demonstrates that these factors' coefficients are both positive and statistically significant. This implies that the number of adaptation mechanisms used by maize farmers will probably increase with distance to maize farms and greater agricultural profitability. The findings suggested that maize farmers who engage in off-farm pursuits and have access to climate data are more likely to implement more locally based climate change adaptation techniques.

The coefficients of farm experience ($p<0.01$) and extension service access ($p<0.10$) were both negative and significant, suggesting that highly experienced farmers and those without access to extension services employed less indigenous adaptation options. Their limited access to information about these adaption mechanisms may be the cause of this.

CONCLUSION AND RECOMMENDATION

One of the most significant determinants of agricultural productivity is climate, which may have a direct or indirect impact on output due to its correlation with physiological processes. Therefore, it is crucial to comprehend the many methods farmers employ to lessen the negative effects of climate change as well as the variables influencing the intensity of adaptation strategies among smallholder maize farmers. According to the study, producers used a combination of adaptation techniques, including irrigation, producing resistant varieties, and agroforestry.

However, the adoption of proposed climate adaptation measures was significantly influenced by factors such as farm income, years of formal education, marital status, access to extension services, and climatic information. Significant factors impacting the adoption of indigenous climate change adaptation techniques were years of formal education, farm size, credit availability, access to climatic knowledge, involvement in off-farm activities, farm revenue, and farm experience. Therefore, the study suggests that in order to increase production and guarantee food security, farmers should be given access to improved maize varieties and irrigation supplies. Furthermore, the government's policies and investment plans are to be focused on promoting better extension services, offering demonstrative training on the farm, and educating the public about climate change adaption tactics, especially for Nigeria's smallholder farmers. Development requires funding for organizations like extension services, which may persuade farmers to implement suitable climate change adaptation measures. Information and communication technology must therefore be used by the government, stakeholders, and donor organizations to develop innovations that increase the agricultural extension system's capacity to address climate change.

REFERENCES

Adeagbo O.A., Ojo T.A. and Adetoro A.A (2021). Understanding the determinants of climate change adaptation strategies among smallholder maize farmers in South-west, Nigeria. *Heliyon* 7: 1-10 https://doi.org/10.1016/j.heliyon.2021.e06231

Annie, M.; Pal, R.K.; Gawai, A.S.; Sharma, A. (2023). Assessing the Impact of Climate Change on Agricultural Production Using Crop Simulation Model. *Int. J. Environ. Clim. Change*, 13, 538–550.

Asrat, P., Simane, B., (2018). Farmers' perception of climate change and adaptation strategies in the Dabus watershed, North-West Ethiopia. *Ecol. Proc.* 7 (1), 7.

Carvalho, A.L.; Santos, D.V.; Marengo, J.A.; Coutinho, S.M.V.; Maia, S.M.F.(2020) Impacts of extreme climate events on Brazilian agricultural production. Sustain. Debate 2020, 11, 197–224. Available online: https://periodicos.unb.br/index.php/sust/article/view/33814/28556

Caviglia-Harris, J.L. (2003). Sustainable agricultural practices in Rondonia, Brazil: do local farmer organizations affect adoption rates? *Econ. Dev. Cult. Change* 52 (1):23–49.

Eekhout, J.P.C.; De Vente, J. (2022). Global Impact of Climate Change on Soil Erosion and Potential for Adaptation through Soil Conservation. Earth-Sci. Rev. 2022, 226, 103921.

Fuentes, M.; Cárdenas, J.P.; Olivares, G.; Rasmussen, E.; Salazar, S.; Urbina, C.; Vidal, G.; Lawler, D. (2023) Global Digital Analysis for Science Diplomacy on Climate Change and Sustainable Development. *Sustainability* 2023, 15, 15747.

Lesk, C.; Anderson, W.; Rigden, A.; Coast, O.; Jägermeyr, J.; McDermid, S.; Davis, K.F.; Konar, M.(2022). Compound Heat and Moisture Extreme Impacts on Global Crop Yields under Climate Change. *Nat. Rev. Earth Environ*. 2022, 3, 872–889.

Kamuzora, A. N. (2023). Effects of Climate Change Adaptation Strategies on Maize Productivity among Smallholder Farmers in Dodoma, Tanzania. *East African Journal of Education and Social Sciences.* 4(6)141-153. Doi: https://doi.org/10.46606/eajess2023v04i6.0342.

Maddala, G., 2001. Econometrics. McGraw-Hill, New York.Malik, A.; Li, M.; Lenzen, M.; Fry, J.; Liyanapathirana, N.; Beyer, K.; Boylan, S.; Lee, A.; Raubenheimer, D.; Geschke, A.; et al.(2022): Impacts of Climate Change and Extreme Weather on Food Supply Chains Cascade across Sectors and Regions in Australia. Nat.Food 2022, 3, 631–643.

Monteleone, B.; Borzì, I.; Bonaccorso, B.; Martina, M. (2022). Quantifying Crop Vulnerability to Weather-Related Extreme Events and Climate Change through Vulnerability Curves. Nat. Hazards 2022, 116, 2761–2796.

Newman, R. and Noy, I.(2023). The Global Costs of Extreme Weather That Are Attributable to Climate Change. *Nat. Commun. 2023*, 14, 6103.

Nhemachena, C.; Hassan, R (2007). Micro-Level Analysis of Farmers Adaptaion to Climate Change in Southern Africa; Discussion Paper; International Food Policy Research Institute (IFPRI): Washington, DC, USA, 2007

Ojo, T.O., Baiyegunhi, L.J.S., (2020). Determinants of credit constraints and its impact on the adoption of climate change adaptation strategies among rice farmers in SouthWest Nigeria. *J. Econ. Str*. 9, 1–15.

Schmitt, J.; Offermann, F.; Söder, M.; Frühauf, C.; Finger, R. (2022). Extreme Weather Events Cause Significant Crop Yield Losses at the Farm Level in German Agriculture. Food Policy 2022, 112, 102359.

Sun, C.; Jiang, Z.; Li, W.; Hou, Q.; Li, L.(2019). Changes in Extreme Temperature over China When Global Warming Stabilized at 1.5 ◦C and 2.0 ◦C. Sci. Rep. 2019, 9, 14982.

Wu, Y.; Meng, S.; Liu, C.; Gao, W.; Liang, X.-Z.(2023): A Bibliometric Analysis of Research for Climate Impact on Agriculture. *Front. Sustain. Food Syst*. 2023, 7, 1191305.

Yang, Q.-L.; Du, T.; Li, N.; Liang, J.; Javed, T.; Wang, H.; Guo, J.; Liu, Y.(2023) Bibliometric Analysis on the Impact of Climate Change on Crop Pest and Disease. Agronomy 2023, 13, 920.

Table 1: Definitions and summary statistics of variables

Variables	Description of Variables	Mean	Standard Deviation
Dependent Variables			
Intensity of Introduced Climate change Adaptation Strategy	Numbers of Introduced climate change adaptation strategies adopted by the households	2.8	0.8
Intensity of Indigenous Climate change Adaptation Strategy	Numbers of Indigenous climate change adaptation strategies adopted by the households	6.5	1.1
Independent Variables			
Age	Age of the household head in years	41	5.6
Sex	1 if household head is male, 0 if female	0.90	0.30
Education Status	Years of formal education	7	4.04
Farming Experience	Years of household experience in maize production	12.4	8.4
Marital Status	1 if married, 0 if Otherwise	0.79	0.40
Household Size	Number of members in the household	5	1.44
Farm size	Total farm size cultivated for maize by household (hectares)	1.5	0.75
Access to Extension Service	1 if respondents has access to extension, 0 if otherwise	0.95	0.26
Awareness to climate change	1 if household head is aware of climate change, 0 if otherwise	0.93	0.25
Access to Climate Information	1 if household head has access to climate information, 0 if otherwise	0.85	0.35
Participation in off farm activities	1 if household head participate in off farm activities, 0 if otherwise	0.93	0.25
Farm Income	Income from farm activities(₦)	2,907,500.00	1,520,457.83
Distance	Distance from home to farm(Km)	7.5	2.9
Membership of Farmers Association	1 if household head is a member of farmers association, 0 if otherwise	0.90	0.30
Access to credit	1 if household head has access to credit, 0 if otherwise	0.96	0.20

Source: Field survey, 2024

Table 2: Climate Change Adaptation Strategies

Adaptation Strategies	Percent (Yes)	Percent (No)
Introduced Adaptation Strategies used by farmers		
Agroforestry	80.0	20.0
Resistant variety	91.0	9.0
Irrigation	56.0	44.0
Soil Fertility management	75.0	25.0
Weather forecast	55.0	45.0
Indigenous Strategies Used by Farmers		
Planting local varieties	45.0	55.0
Shifting planting dates	67.0	33.0
Moving to a different site	45.0	55.0
Crop diversification	89.0	11.0
Adding organic manure	100.0	0.0
Mulching	80.0	20.0
Change to livestock management	35.0	65.0
Change timing of farm operations	99.0	1.0
Engaging in extra income sources	100.0	0.0
Planting shade trees	56.0	44.0

Source: Field survey, 2024

Table 3: Factors influencing the Adoption of Introduced Climate Change Adaptation Strategies

Poisson				Negative Binomial	
Introduced Strategies	**Coef.**	**Z-Value**	**IRR**	**Coef.**	**Z-Value**
Age of household head	-0.00192	-0.57	0.99808	-0.00192	-0.57
Sex of household head	0.07745	0.85	1.08053	0.07745	0.85
Years of formal education	0.01148**	2.4	1.01155	0.01148**	2.4
Years of Farm Experience	0.00152	0.59	1.00152	0.00152	0.59
Marital Status	0.09050*	1.74	1.09472	0.09050*	1.74
Household size	-0.00295	-0.2	0.99705	-0.00295	-0.2
Farm size (ha)	-0.01864	-0.56	0.98153	-0.01864	-0.56
Membership of Maize farmers association	-0.33851***	-4.28	0.71283	-0.33851***	-4.28
Access to Extension Service	0.15767*	1.87	1.17078	0.15767*	1.87
Access to Credit	0.07591	0.46	1.07886	0.07591	0.46
Awareness to climate change	0.04257	0.23	1.04349	0.04257	0.23
Access to climate information	1.13615***	4.91	3.11475	1.13615***	4.91
Participation in off farm activities	0.10239	0.68	1.10781	0.10239	0.68
Farm Income	0.00000***	-5.05	1.00000	0.00000***	-5.05
Distance from home to farm	-0.01076	-1.27	0.98930	-0.01076	-1.27
Number of observations	240			/lnalpha	-38.148
Wald chi2(15)	133.67			alpha	2.71E-17
Prob>chi2	0				
Log pseudolikelihood	-371.379				
Pseudo R2	0.0252				

Source: Computation from field survey, 2024 *, ** & * Significant at 1%, 5% and 10% respectively**

Table 4: Factors Influencing the Adoption of Indigenous Climate Change Adaptation Strategies

	Poisson			Negative Binomial	
	Coef.	**Z**	**IRR**	**Coef.**	**Z**
Age of household head	0.00071	0.45	1.00071	0.00071	0.45
Sex of household head	-0.03064	-0.86	0.96982	-0.03064	-0.86
Years of formal education	0.00711***	2.78	1.00714	0.00711***	2.78
Years of Farm Experience	-0.00248***	-2.8	0.99752	-0.00248***	-2.8
Marital Status	-0.00953	-0.45	0.99052	-0.00953	-0.45
Household size	0.00107	0.19	1.00107	0.00107	0.19
Farm size (ha)	0.03906***	3.04	1.03984	0.03906***	3.04
Membership of Maize farmers association	0.02337	0.47	1.02364	0.02337	0.47
Access to Extension Service	-0.06833*	-1.66	0.93395	-0.06833*	-1.66
Access to Credit	0.33689**	2.13	1.40058	0.33689**	2.13
Awareness to climate change	0.01430	0.14	1.01440	0.01430	0.14
Access to climate information	1.19725***	8.29	3.31100	1.19725***	8.29
Participation in off farm activities	0.27161***	3.86	1.31207	0.27161***	3.86
Farm Income	0.00000***	-4.32	1.00000	0.00000***	-4.32
Distance from home to farm	0.01690***	5.87	1.01704	0.01690***	5.87
Number of observation	240			/lnalpha	-60.7207
Wald chi2(15)	235.87			alpha	4.26E-27
Prob>chi2	0				
Log pseudolikelihood	-458.412				
Pseudo R2	0.0257				

Source: Computation from field survey, 2024 *, ** & * Significant at 1%, 5% and 10% respectively**