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EFFECTS OF HOUSEHOLD ATTRIBUTES ON CLIMATE CHANGE MITIGATION PRACTICES: EMPIRICAL EVIDENCE FROM ENUGU STATE, NIGERIA

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ABSTRACT

The study assessed the effects of household attributes on climate change mitigation practices based on empirical evidence from Enugu state, Nigeria. the study was carried out in Enugu state, Nigeria. semi-structured questionnaires were used to collect quantitative data from household surveys from 120 household heads, along with context-specific qualitative data. results of binomial logit regression analysis revealed that household attributes had a significant impact on seven out of ten mitigation strategies. these strategies corresponded to the two main mitigation measures of adopting renewable energy sources and energy efficiency throughout the economy. the odds of using most mitigation strategies were positively correlated with education (use of energy saving devices at 5% level of significance); employment as a public servant (use of renewable energy sources at 1% level of significance), and social group membership (printing only when it is necessary at 10% level of significance). however, the odds were negatively correlated with increasing household size (switching off lights and devices when not in use at 10% level of significance). the study recommends among other things that education as a household socio-economic attribute should be enhanced through incorporating a vast array of educational resources and informational campaigns aimed at expediting household awareness of climate change and its mitigating actions.

Key words: gas emission, mitigation strategies, household behaviour, climate policy

INTRODUCTION

Nigeria's Nationally Determined Contribution (NDC) demonstrates her commitment to building a sustainable economy and fulfilling the objectives of the Kyoto Protocol. This effort aims to address six major mitigating strategies. Through an evaluation of the routine household activities that help reduce carbon footprints, this paper contributes to these efforts. A number of academics, researchers, and development organisations have expressed interest in the relationship between household behaviours and climate change in recent times. A wealth of information on the main ideas, empirical data, and broader context regarding the effects of climate change on people and households can be found in the literature (Deressa 2007; IPCC, 2007; Crosson, 2017). Numerous scholars have distinguished and interpreted a broad range of central ideas in the literature on climate change. On the other hand, mitigation and household behaviour are the two main topics of this study. Understanding the connections between the characteristics of the household, climate change, and policies, as well as how these relationships impact mitigation efforts, requires concentrating on these two ideas.

Scholars have acknowledged that mitigation is a promising strategy that can be used to positively impact greenhouse gas emissions, thereby reducing the vulnerability of ecosystems and humans to climate change (Rockefeller Foundation, 2008). Research has demonstrated that both individual and household activities play a significant role in contributing to environmental degradation and greenhouse gas emissions. Nevertheless, households potentially can reverse the effects of these activities on the environment by implementing mitigation practices that reduce the amount of greenhouse gases that they generate. The possible contribution of household mitigation and technologies to slowing down climate change is highlighted in this paper. It seeks to provide guidance for institutional and policy reforms that are required to encourage more households in developing nations to adopt climate change mitigation practices and technologies.

The Kyoto Protocol aims to control global warming to stay below 2°C, over the benchmark set in 1990.While adaptation is the main focus of developing countries, when it comes to mitigating, their efforts to reduce domestic emissions seem to have been overlooked because their historical

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greenhouse gas contribution has been determined to be very low. Furthermore, Riahi *et al*. (2017) asserts that the existing models for quantitative evaluations of climate policies place less or no emphasis on behavioural changes and more emphasis on technical mitigation measures. Scholars studying climate change (Tukker *et al*., 2010; Ivanova *et al*., 2016; Riahi *et al*., 2017; Moberg *et al*., 2018), however, concur that modifications to household consumption patterns and behaviours can result in significant decreases in greenhouse gas emissions at comparatively low costs. Many of these studies focus on cases from developed countries, often with scant or non-existent data from developing countries. Thus, a thorough grasp of the relationship between household characteristics and climate change mitigation behaviour in the context of developing nations is necessary for the development of climate change policies and strategies in these countries, which is why this study is necessary. This is to offer factual information for planning and engagement that is grounded in evidence. As a result, this study evaluated the various behavioural adjustments made by the households in an effort to lower their greenhouse gas emissions, as well as the factors that influence those adjustments. This is due to the fact that, in order for individuals and households to be the driving forces behind climate change mitigation efforts, there needs to be a clear understanding of the various socioeconomic drivers of those individuals and households and how these drivers work together to influence their behaviours (Agrawal, 2005). As a result, socioeconomic scenarios shape and contextualise climate change mitigation efforts, which do not occur in a vacuum.

There is currently insufficient empirical data to improve upon current policies or create new ones in developing countries, especially in Nigeria. For example, in Africa, the majority of the literature guiding national policies focuses more on household coping mechanisms and adaptation (Enete and Onyekuru, 2011; Enete *et al*., 2011; Sunny *et al*., 2018). Farm households and the different types of climate smart agricultural practices they implemented have been the focus of efforts to assess mitigation behaviours (Nyong *et al.,* 2007; Besada and Sewankambo, 2009; Gockowski *et al*., 2011). There is still a severe lack of empirical research on mitigation behaviours and household attributes. This study proceeds along this trajectory based on that premise. From a policy standpoint, Nigeria's Intended Nationally Determined Contribution (INDC) shows its commitment to promoting sustainable economic growth via the reduction of greenhouse gas emissions and to helping the 2015 Paris Climate Summit succeed. Nigeria pledged in the INDC to reduce greenhouse gas emissions by 20% on its own and by 45% with help from abroad. Also, she has completed the Sectoral Action Plan (SAP) that will implement the NDC through six major mitigation strategies: reducing transmission losses, promoting the use of renewable energy, ending gas flaring, ending gas flaring, and ending economy-wide energy efficiency. Therefore, by examining household strategies targeted at lowering the carbon footprint of households in the areas of economy-wide energy efficiency and renewable energy use is the focus of this paper; to contribute to these efforts. By 2030, these two important mitigation strategies hope to reduce greenhouse gas emissions by 210 million tonnes annually (mt $year^{-1}$). Through economy-wide energy efficiency and 31 million tonnes of greenhouse gas reduction from renewable energy, Nigeria's approved INDC aims to reduce GHG emissions by 179 million tonnes annually.

It will take behavioural adjustments on the part of households and citizens to achieve the above-mentioned targets through these two essential mitigation measures: reduction through renewable energy and economy-wide energy efficiency. Considering the aforementioned, the purpose of this study is to investigate the relationship between Nigerian household behaviours and efforts to mitigate the effects of climate change. Comprehending the interconnection among these components is imperative as it will distil insights and evidence for Nigerian policymakers regarding how to formulate an approach that will enhance mitigation efforts by households, which are pivotal entities in the agricultural industry and energy consumption. The following inquiries are relevant in order to accomplish this: what are the socioeconomic features of the households in the research area? Which various methods of mitigating climate change have these households implemented? And what impact do their socioeconomic circumstances have on the mitigation strategies they use?

The research had two goals in mind: In order to understand the relationship between household characteristics and mitigation behaviours, it is important to (i) examine the socioeconomic attributes of the households, and (ii) provide policy makers with information about the socioeconomic attributes that influence households' adoption of key mitigation measures as well as the necessary policy tools and action plans to achieve the desired mitigation behavioural changes as outlined in the NDC.

METHODOLOGY

Study Area

This study was carried out in Enugu State, with a population of ca. 3,257,298 and a land area of 71,161 km^2. About 85% of the state's population resides in its rural areas (National Population Commission, NPC, 2016). Enugu State is situated between the Greenwich meridian's latitudes 5°56'N and 7°60'N and longitudes 6°53'E and 7°55'E. (FGN, 2001). Its borders are shared by Benue and Ebonyi States to the East, Abia State to the South, Kogi State to the North, and Anambra State to the West.

The State has 17 local government areas, which are distributed into three agricultural zones (AZs) namely Nsukka, Awgu, and Enugu by ENADEP (2012) on the basis of similar soil characteristics and, consequently, similar meteorological properties (Figure 1). The State was chosen with purpose because: (a) the majority of residents, particularly farmers, have been noted to exhibit poor mitigation behaviours (Sunny *et al*., 2018), (b) the region is thought to be the capital and seat of government for the South-East geopolitical zone, and (c) there have reportedly been recent reports of climate impacts in the State (Enete and Amusa, 2010).

Data Collection

A multiphase sampling strategy was used to choose 120 households for the research. All three of the local zones – Nsukka, Enugu, and Awgu – were chosen in the first round. Twelve towns were surveyed in total, with four randomly chosen towns from each of the three AZs in the second stage. Ultimately, 10 households were chosen randomly from each of the state's twelve towns, for a total of 120 households spread across the various town areas. Both primary and secondary data were used in this investigation. To collect the primary data for the study, a mixed method approach was employed. Pretested semi-structured questionnaires were used to combine qualitative data specific to the context with quantitative data obtained from household surveys. The questionnaire was designed to produce information that would adequately realise the study's general and focused objectives. The socioeconomic details of the households, such as gender, age, marital status, income, and the household head's educational attainment, are among the primary data that were collected. Data on the household head's knowledge of climate change indicators and the coping mechanisms used by households are among the others. Since it is believed that the opinion of the household head represents those of the members, the questionnaire were only given to household heads.

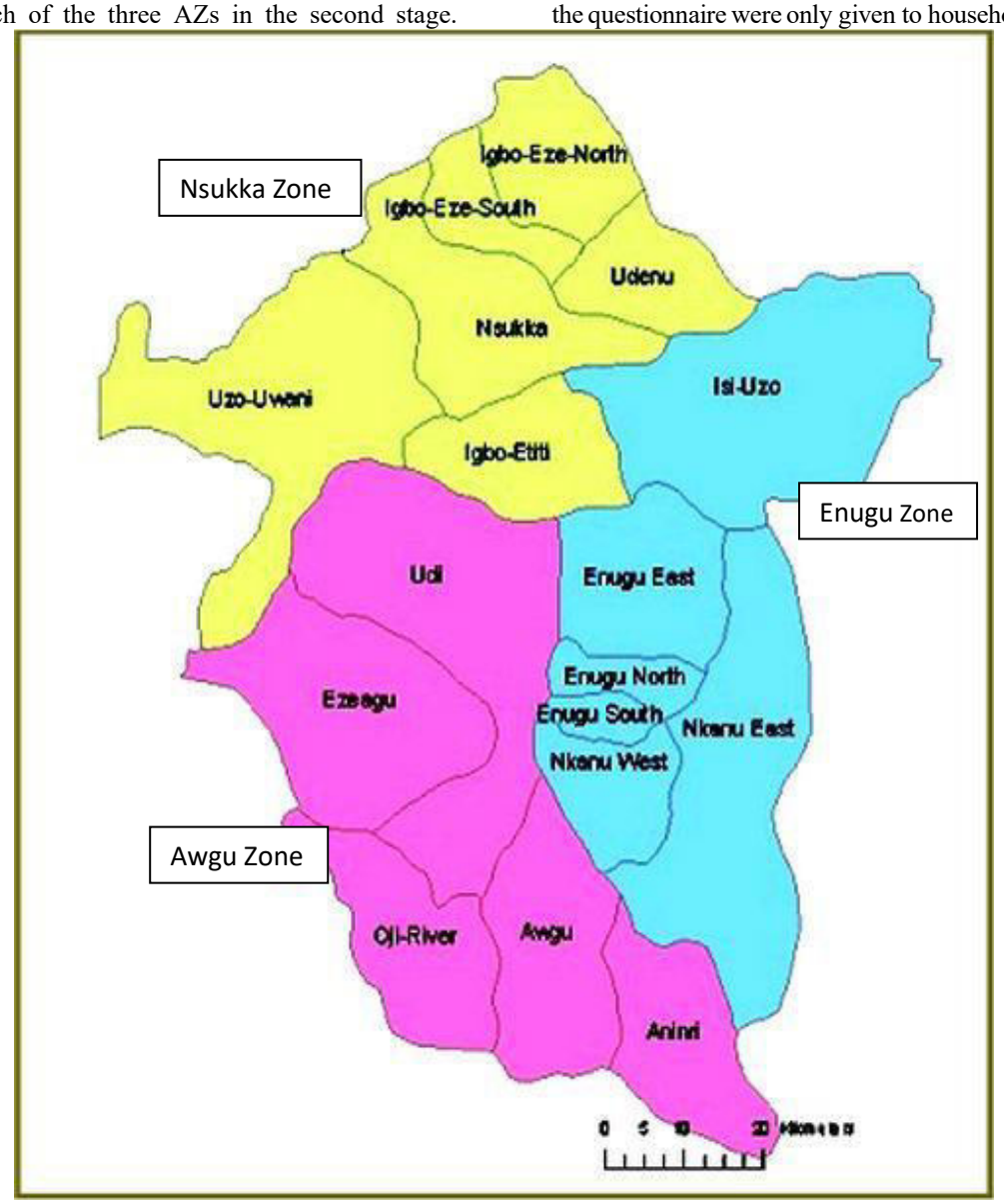

Figure 1: Enugu State Map with the three agricultural zones

Data Analysis

The respondents' socioeconomic characteristics were described using descriptive statistics like frequencies and percentages. The socioeconomic characteristics were derived from a thorough analysis of the respondents' socioeconomic characteristics, including their gender, age, marital status, level of education, number of years spent farming, size of household, type of occupation (major and minor), membership in social and economic organisations like cooperative societies, visits by extension agents, media coverage, and climate change education. The study utilised Binomial Logistic Regression to determine the impact of household attributes on climate change mitigation practices within the household. By calculating changes in the dependent's log odds but not in the dependent itself, logistic regression maximises likelihood by estimating the likelihood of a particular event occurring (Onyekuru and Marchant, 2014). Given the issue of mutual exclusivity associated with the multinomial logit model (MNL), the researcher chose the logit model over the MNL model due to the large number of practices that would be difficult to analyse within one empirical model. Onyekuru and Marchant (2014) also encountered this issue, so they chose the logit model. It became crucial, therefore, to approach every practice as a single equation with a binary result – 1 for use and 0 for non-use.

This study evaluated ten different mitigation strategies, including planting trees, buying only what is necessary, driving cars that emit less CO_2, using energy-saving devices, turning off lights and appliances when not in use, using renewable energy sources, minimising waste, using water-saving techniques, using less paper and nylon bags, and printing only when necessary. The dependent variables for all ten mitigation strategies were chosen, and they were coded as dichotomous (also known as dummy variables) with two possible outcomes: adopted, which is coded 1, or not adopted, which is coded 0. In this study, each mitigation strategy is taken into consideration independently, and the predictors are tested against the mitigation behaviours evaluated. This is in contrast to a scenario where data on mitigation strategies (dependent variable) are converted from dummy to continuous variables by adding up the number of mitigation strategies adopted by each respondent. This approach was influenced by the fact that each strategy has a different weight and strength, and that different strategies may have different predictors. The dependent variable only has two values: 0 and 1. For this reason, it was used. The association between the socioeconomic features of the households and the adoption of climate change mitigation behaviours was investigated using a logit model, as was done in various studies by Amusa (2010) and Onyekuru and Marchant (2014).

The definition of the socioeconomic attributes assessed of the respondents and the a *priori* expectations are presented in Table 1. The household attributes predicted the natural log of the odds of adopting one mitigation strategy (Yes) or not (No). The model can be represented as follows:

$$\hat{Y}/_{1-\hat{Y}} = a + b_1X_1 + b_2X_2 + b_3X_3 + \cdots + b_nX_n;$$

where a is constant, b_1 - b_n is parameter estimates, X_1 - X_n is predictor variables, $\hat{Y}$ is the predicted probability of adopting a given mitigation strategy, 1-$\hat{Y}$ is the predicted probability of not adopting a particular mitigation strategy.

On the presumptions that dependent variables (mitigation strategies) are measured, exhaustive, and mutually exclusive, binomial logistic regression is performed. Furthermore, there are multiple independent variables that are all measured at nominal and continuous levels. The Box-Tidwell test and correlation analysis of the independent variables were used to check for multicollinearity and linearity. For each of the chosen mitigation strategies, a BLR was run to determine the parameter estimates for the model, and the exponential of the coefficient of the household attributes was extracted. The exponential of coefficient Exp (B) in a binomial logistic regression can be understood in terms of the odd ratio, as stated in Schüppert (2009). When the odds ratio is > 1, there is a greater chance of the event happening with each unit increase in the independent variable than there was at the independent variable's initial value. Conversely, at odds ratios < 1, there is a reduced likelihood of the event transpiring with each unit increase in the independent variable compared to its initial value (Schüppert, 2009).

Table 1: Definition of regression analysis variables

Variable	Nature	Description	*A Priori* Expectations
Level of Education	Independent(X_1)	Continuous (number of years spent in school)	Positive
Marital Status	Independent (X_2)	Dummy (Married = 1: 0, otherwise)	Positive
Number in a household	Independent (X_3)	Continuous (number)	Positive
Age	Independent (X_4)	Continuous (number)	Negative
Gender	Independent (X_5)	Dummy (male =1, female = 0)	Negative
Major occupation	Independent (X_6)	(if public service is a major occupation) Dummy (1 = yes, 0 otherwise)	Positive
Awareness of climate change	Independent (X_7)	Dummy (1 = yes, 0 otherwise)	Positive

Authors' conceptualization. Note: The dependent variables are: planting trees, buying only what is necessary, reduction in the use of CO_2 emitting automobiles, using energy-saving devices, turning off lights and appliances when not in use, using renewable energy sources, minimising waste, using water-saving techniques, using less paper and nylon bags, and printing only when necessary.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Respondents

The frequency and percentage distribution of the socioeconomic characteristics of the respondents are shown in Table 2. The majority of them (65%) were women. The area thus has a higher proportion of households headed by women. The men possibly moved to the town in pursuit of white-collar jobs, leaving the women to take on domestic duties like housework and farm work. As a result, the female heads of the majority of these households make the important decisions regarding the home and farm.

Table 2: Distribution of respondents according to Socio-economic characteristics (n = 120)

Socio-economic characteristics	Percentage (Frequency)
Gender	
Male	35 (42)
Female	65 (78)
Age	
< 20	25 (30)
21-40	70 (28)
41 and above	5 (6)
Religion	
Christianity	100 (120)
Others	-
Marital status	
Married	65 (42)
Single	35 (78)
Household size	
1-5	66.7 (80)
5 and above	33.3 (40)
Level of education	
1-6 years	10 (12)
7-12 years	5 (6)
13-18 years	21.7 (26)
18 and above	63.3 (76)
Major occupation	
Civil service	11.7 (14)
Others	88.3 (106)
Minor occupation	
Farming	61.7 (74)
Others	38.3 (46)
Organization	
Belongs to an organization	73.3 (88)
Does not belong to an organization	26.7 (32)
Extension visits	
Extension visits	36.7 (44)
No extension visits	63.3 (76)
Number of extensions visit	
One time	6.7 (8)
Two times	8.3 (10)
Three times	8.3 (10)
Four times	6.7 (8)
Five times	3.3 (4)
Six times	3.3 (4)
Heard of climate change	
Have heard of climate change	91.7 (110)
Have not heard of climate change	8.3 (10)
Media	
Television	15 (18)
Radio	38.4 (42)
Classroom	11.7 (14)
Internet	6.7 (8)
Friends and relatives	23.3 (28)
More than one source	8.3 (30)
Training on climate change mitigation	
Training	16.6 (20)
No training	83.4 (100)
Number of trainings	
One time	8.3 (10)
Two times	5.0 (6)
Three times	3.3 (4)

Source: Field Survey, 2018

The age distribution of the respondents is also significant since it affects their general productivity, experience, and availability of productive resources. According to Table 2 majority of respondents (70%) were between the ages of 21 and 40, 25% were under the age of 20, and the smallest percentage (5% of respondents) were 40 years of age and older. It indicates that young people made up the bulk of the responders. As a result, they would be more creative and receptive to mitigation strategies for climate change (Ume, 2017).

Furthermore, 35% of respondents were single and the majority of respondents, or roughly 65%, were married to the heads of household. This suggests that a higher percentage of those surveyed were married. Given that it has been shown to affect who owns the productive resource, it is significant to the study. Married people own the majority of resources. It is thought that the heads of households' marital status may also have an impact on the mitigating behaviours (Amusa, 2010). Married heads of households will, of course, enjoy greater stability in their farming and non-farming activities and, consequently, in their agricultural and non-agricultural production. The number of people who share a household's expenses for housing, food, and other necessities of life is measured. Since decisions regarding childbearing, living arrangements, health care and education, labour force participation, migration, and savings are frequently made at the household level, households are at the centre of many demographic, social, and economic processes (Sunny *et al.,* 2018). A significant proportion of the respondents – 66.7% had households with 1–5 members, and 33.3% had households with 5 or more – were aware of the importance of having children they could easily support. Osuafor and Nnorom (2017) assert that the number of households in a given geographical setting will determine how many homes that need to be built. Condominium ownership is undoubtedly supported by the trend towards smaller households.

Majority of the respondents (63.3%) attended school for 18 years or more, compared to 21.7% who attended for 13–18 years, 5% of respondents for 7–12 years, and 10% for 1–6 years. This suggests that the majority of responders possess reading and writing skills. It also implies that more educated people are likely to be enlightened about climate change. People's knowledge of climate change and their actions to mitigate it have been found to be influenced by their educational attainment. Accordingly, Hoekstra *et al*. (2024) discovered that citizens that are less educated have a lower level of trust in climate science and are more skeptics about climate change than their counterparts that are more educated. Additionally, Bako (2013) contended in their study that people with higher levels of education typically have greater knowledge, are more concerned, and participate in climate change mitigation efforts.

A respondent's level of education is the only factor considered when interpreting and applying perception and mitigation behaviours related to climate change. Consequently, mitigation behaviours are linked to an individual's, families, and community's capacity to adapt to changes or seize opportunities presented by threatening circumstances. They also highlight the importance of education as a fundamental human resource in achieving the expected capacity for adaptation to the changing climate and its adverse effects (IPCC, 2007). It is common knowledge that the majority of rural dwellers are farmers, and that the rural economy is primarily based on agriculture. Table 2 displays the respondents' distribution based on their occupation. This indicates that 88.3% of the respondents worked in professions unrelated to the civil service. This comprises business and farming occupations, with only 11.7% of workers being civil servants. This was due to the fact that general households in the community, not farmers, were the study's target population. This was due to the fact that the data collected were on the impact of the participants' various characteristics on their general mitigation behaviours in their individual homes and daily lives rather than adopting a farm-based approach. Furthermore, since the majority of respondents were female, our investigation revealed that more women are beginning to work in professions other than agriculture, such as hair styling, sewing, teaching, and even secretarial duties.

Table 2 also reveals that while 26.7% of respondents do not belong to any organisations, the majority of respondents (73.3%) belonged to at least one, such as social clubs, thrift societies, cooperative societies, and men's and women's religious groups. This is significant because, among other things, organisations typically provide them with pertinent information about climate change and assist them in coping with shocks, making it an excellent adaptive measure. Because there aren't enough trained extension agents in the area, a significant portion of respondents (63.3%) have not received a visit from an extension agent. However, 36.7% or so have had an extension agent visit. The table also indicated that, of the respondents who had been visited by an extension agent, 8.3% had been visited twice or three times in the previous five years, 6.7% had been visited once or four times, and 3.3% had been visited five or six times.

Over eighty one percent of the respondents (81.7%) had heard of climate change, compared to just 18.3% who had not. This suggests that because of their high level of education, more people than not have heard of it. The data table indicates that the majority of participants (38.4%) obtain information about climate change from radio, followed by television (15%), the classroom (11.7%), multiple sources (8.3%), the internet (6.3%), and friends and family (38.4%). This suggests that the majority of them primarily obtain their information from radio and are not exposed to the use of the internet. According to this Table 2, 16.6% of respondents had climate change training within the previous five years, while the majority of respondents, 83.4%, had not received any training at all. The outcome also revealed that, of the respondents who had received training on methods for mitigating climate change, 8.3% had done so just once, whereas 5% and 3.3% had done so twice and three times, respectively.

Adoption of Climate Change Mitigation Practices

The various climate change mitigation strategies employed by the respondents are detailed in this section. Figure 2 displays the respondents' frequency and percentage distribution based on the mitigation strategies they have implemented. Figure 2 reveals that a significant number of households (82%) have embraced the practice of planting trees and only making necessary purchases. Because trees can absorb CO_2 from the atmosphere, planting trees is regarded as a mitigation measure. Additionally, pointless purchases imply resource waste. In this situation, reducing one's carbon footprint by purchasing only what is necessary is crucial because the more things one purchases, the more one encourages the production and use of those goods, which increases CO_2 emissions.

About seventy percent (77%) of people used the mitigation strategy of driving fewer cars that emit greenhouse gases. Most of the time, people will turn to driving cars that do not pollute the environment in an attempt to lower their carbon footprint. Some even turn to riding bicycles. One of the main sources of CO_2 emissions has been identified as the use of cars that emit CO_2. The majority of nations have laws that impose requirements on new cars to reduce their emissions. This is to promote a decrease in CO_2 emissions from passenger automobiles. In situations where this is not feasible, encouraging passengers to drive cars that do not damage the environment is an option. Lower taxes on vehicles like bicycles and higher taxes on vehicles with high emissions, like passenger cars, are two possible forms of these incentives.

Furthermore, 73% of people started using energy-saving gadgets. These include appliances like energy-efficient air conditioners and light bulbs. It was discovered that these devices are more expensive than conventional devices. For example, televisions with Light Emitting Diodes (LEDS) save more energy than televisions with Liquid Crystal Displays (LCDs), but CFLs are more expensive than incandescent bulbs. Nevertheless, the cost of purchasing LEDs and CFLs is higher. This means that in order to promote the use of these energy-saving gadgets, it will be necessary to figure out how to lower their price so that a wider range of people can afford them.

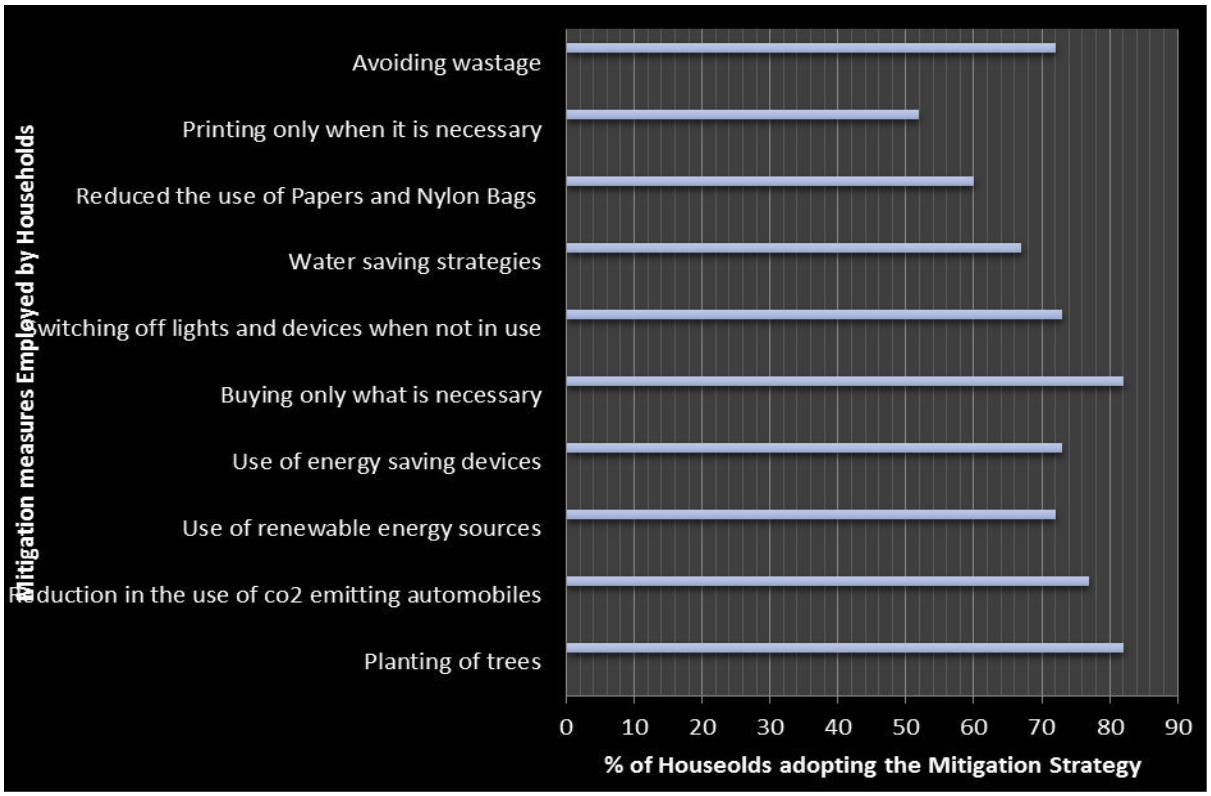

Figure 2: Distribution of Respondents based on the Mitigation Measure they have adopted (Multiple responses recorded)
Source: Field Survey, 2018

Moreover, 73% of those surveyed said they now turn off lights and electronics when not in use. Not only can energy be saved by turning off lightbulbs and other devices when not in use, but money can also be saved. But only when energy supplies are billed according to Pay As You Use (PAYU) will this be feasible. The PSYU foundation will raise awareness in homes to always turn off electronics when not in use. Using renewable energy sources and cutting back on waste are two more important mitigation strategies that households use (72%). The potential for using renewable energy globally to mitigate climate change was assessed in the Intergovernmental Panel on Climate Change (IPCC) report, which was published on May 9, 2011. This is because renewable energy reduces negative environmental and health impacts. Additionally, reducing household carbon footprints will be ensured by conserving resources and making the best use of those that are already available. Furthermore, the figure demonstrates that 67% of the respondents used water-saving techniques.

Sixty percent (60%) less paper and nylon bag were used. There are numerous connections between climate change and nylon bags. They contribute to pollution of the environment and disturbance of ecosystems. They add to the build-up of CO_2 in the atmosphere and are not biodegradable. Fifty-two percent (52%) of the respondents print only when it is absolutely necessary as a climate change mitigation strategy. Avoiding deforestation and promoting afforestation are two strategies to counteract climate change. Most printing paper comes from forests. One crucial mitigation strategy is to discourage pointless printing. Another crucial strategy for lowering the need to cut down trees for paper production is paper recycling.

Effects of Household Attributes on Mitigation Practices

Ten distinct mitigation behaviours were examined in relation to the attributes of the households using a binomial logistic regression. Table 3 reveals that seven out of the ten mitigation strategies were significantly impacted by the assessed household attributes. These strategies include reducing the use of cars that emit CO_2, adopting renewable energy sources, using energy-saving devices, turning off lights and appliances when not in use, adopting water-saving techniques, reducing the use of paper and nylon bags, and printing only when necessary. These strategies aligned with the two primary mitigation measures of energy efficiency and renewable energy adoption for the economy. The significant Likelihood ratio (LR) chi2 test values demonstrated this. This indicates that seven of the 10 mitigation behaviours under consideration were significantly predicted by the socioeconomic characteristics included in the study, within the constraints of the research. They are:

Table 3: Effects of socio-economic characteristics on mitigation practices/behaviours

Mitigation strategies Socioeconomic Attributes	Planting of trees	Reduction in the use of CO_2 emitting automobiles	Use of renewable energy sources	Use of energy saving devices	Buying only what is necessary	Switching off lights and devices when not in use	Water saving strategies	Reducing the use of paper and nylon bags	Printing only when it is necessary	Avoiding wastage
Gender	1.656684 (0.22)	.7329199 (-0.54)	1.348774 (0.56)	2.578851 (1.70)*	1.291232 (0.57)	1.374581 (0.61)	2.42151 (1.09)	1.636106 (0.88)	1.62325 (1.04)	1.596347 (0.71)
Age	.9184683 (-0.75)	.9730552 (-0.78)	1.044233 (1.22)	1.049911 (1.32)	1.053858 (1.71)*	1.059414 (1.56)	.9381862 (-1.33)	1.03289 (0.94)	.9973126 (-0.09)	.9592856 (-1.02)
Marital status	.0040357 (-1.21)	1.134229 (0.15)	5.118939 (2.14)**	7.174077 (2.43)**	2.932689 (1.57)	4.101262 (1.71)*	2.481774 (0.90)	1.264038 (0.31)	1.574249 (0.67)	.9909266 (-0.01)
Household size	.4374373 (-1.37)	.9094263 (-0.81)	.8037251 (-2.22)**	.8478182 (-1.71)*	.8537806 (-1.57)	.7301369 (-2.54)***	.9088609 (-0.61)	.7484394 (-2.70)***	.9509264 (-0.56)	1.119168 (0.75)
Education	.728715 (-0.38)	.8907248 (-0.66)	1.098112 (0.51)	1.792938 (2.38)**	1.045498 (0.28)	1.541147 (2.11)**	1.685921 (1.74)**	1.453184 (1.74)*	1.316854 (1.66)	1.146766 (0.58)
Major Occupation	-	.1929361 (-2.03)**	4.94824 (1.72)*	-	3.755776 (1.70)*	11.15848 (2.52)***	-	8.869644 (2.06)**	28.75651 (2.89)*	-
Membership of Organization	7.477279 (1.00)	1.637081 (0.77)	3.259203 (2.08)**	2.130526 (1.35)	1.085358 (0.17)	9.183766 (3.66)***	5.20798 (1.89)*	4.119082 (2.41)**	2.548291 (1.87)***	1.355299 (0.45)
Access to Extension agents	.0003117 (-1.70)	.6050452 (-0.57)	.5511104 (-0.67)	.4022877 (-0.90)	4.556111 (1.88)	.4886955 (-0.48)	.0882813 (-2.18)**	.1283827 (-2.17)**	1.067364 (0.08)*	.2247155 (-1.21)
Awareness of climate change	-	1.363976 (0.26)	.8071387 (-0.18)	.5600212 (-0.36)	5.670235 (1.58)	.717404 (0.26)	-	.8172418 (-0.16)	1.282137 (0.21)	.8974652 (-0.07)
Training on Climate change	-	1.303405 (0.45)	2.184524 (1.44)	2.016092 (1.26)	.5311521 (-1.30)	.7692273 (-0.49)	3.105101 (1.39)	12.31486 (3.59)***	1.174932 (0.34)	10.13095 (2.05)**
Pseudo R^2	**0.2584**	**0.1656**	**0.1376**	**0.1746**	**0.1007**	**0.2596**	**0.2283**	**0.2765**	**0.1475**	**0.1509**
Prob> chi2	**0.3683**	**0.0229**	**0.0406**	**0.0000**	**0.1037**	**0.0000**	**0.0192**	**0.0000**	**0.0900**	**0.1486**

Figures in parentheses are z-values; ***, ** and * - significance at 1%, 5% and 10% respectively
Source: Field Survey, 2018

1. Reduced use of CO_2 emitting automobiles

The only characteristic that substantially predicted the odds ratio of a decrease in the use of cars that emit CO_2 was major occupation. It was discovered that the variable's coefficient (0.1929361) was less than unitary. This indicates that we anticipate a 1929361 increase in the log-odds of adopting the use of cars that emit CO_2 for every unit increase in number of households engaged in public service.

2. The use of renewable energy sources

Behaviour with regard to the use of renewable energy sources was significantly predicted by factors such as marital status, household size, major occupation, and organisational membership. It was discovered that the parameter estimates were, in order, 5.118939,.8037251, 4.94824, and 3.259203. This indicates that while the odds of using renewable energy sources increase with marital status, major occupation, and organisation membership, the log odds of using renewable energy sources decrease with household size, increasing by.8037251 units as the log odds were found to be less than unitary.

3. Use of energy saving devices

It was shown that larger households greatly reduced the log odds when it came to using energy-saving devices. The findings indicated that the log odds of utilising energy-saving devices increase by 0.8478182 with a net increase in household size. Nonetheless, it was discovered that the log odds were significantly increased by marital status, gender and educational attainment (with log odds of 7.174077. 2.578851 and 1.7929, respectively).

4. Switching off lights/devices when not in use

The results of the logistic regression indicate that, when it comes to turning off lights and electronics when not in use, larger households have lower log odds of doing so (.73013), while attributes like education (1.5411), employment as a civil servant (11.1584), marital status (4.1013), and membership in an organisation (9.183766) have higher log odds.

5. Water saving strategies

It was discovered that receiving instruction and training on mitigating the effects of climate change greatly increased the log odds of using water-saving techniques by 1.685921. Likewise, it was discovered that a unit increase in the proportion of respondents who belonged to both formal and informal organisations increased log odds by 5.20798.

6. Reducing the use of paper and nylon bags

The outcome also demonstrates that the log-odds of adopting the behaviour of reducing the use of paper and nylon bags are decreased by 0.1283827 and 0.7484394 for every unit increase in access to extension visit and household size. Adopting this behaviour is positively impacted by organisation membership and climate change training, with log odds of 4.119082 and 12.31486 units, respectively. Similarly, the log odds of not using paper and nylon bags were increased by and 4.119082 and 8.869644, if one was a member of at least one organisation and worked as a public servant, respectively.

7. Choosing to print only when it is necessary

Three factors – major occupation, membership in an organisation, and access to extension – increased the log odds by 28.75651, 2.548291, and 1.067364, respectively, as regards printing only when necessary.

The only characteristic that was able to significantly predict the odd of a decrease in using cars which emit CO_2 was being employed as a public servant. This indicates that in comparison with people in other sectors and occupations like business and farming, households whose primary occupation is in the public sector or the civil service typically use more CO_2 emitting cars. This is consistent with the *a priori* prediction. This may be due to the fact that people who work in the public sector tend to be wealthier, own multiple cars, and drive their vehicles on a daily basis. This stands in contrast to the majority of other households, including those of farmers and traders, who typically walk everywhere and don't own cars. This bolsters the view expressed by Amekudzi and Meyer (2005) that planning for and encouraging the adoption of alternative modes of transport is the best way to instil environmental stewardship. To meet the emission reduction target, civil servants must be made aware of the need to drive less carbon-emitting vehicles, such as bicycles.

The use of renewable energy sources in behaviour was significantly predicted by factors such as marital status, household size, major occupation, and organisational membership. The likelihood of using renewable energy sources is increased by marital status, having a major occupation, and being a member of an organisation; the odds are decreased by household size. The most widely used renewable energy source is solar power. It was found that employing solar panels to generate large amounts of energy is highly costly. The positive correlation between the use of renewable energy sources and marital status highlights the advantages married people have over the single ones since they are able to pool their resources together to achieve this. This also clarifies why people who work in government and the civil service typically embrace the use of renewable energy sources. Because they are typically wealthier, people working in the public sector and civil servants are better able to use renewable energy alternatives. In addition, their level of education and awareness has increased, enabling them to recognise the importance of utilising renewable energy sources. Similar to this, being a member of an organisation expands a person's social network and increases their awareness of the importance of switching to renewable energy. Additionally, by being a part of an organisation, the majority of its members can pool their resources to pay for renewable energy more affordably. On the other hand, the evidence indicating a negative correlation between

household size and the utilisation of renewable energy sources implies that smaller households may promote mitigation practices associated with the adoption of renewable energy sources. The size of the household determines how much money is allocated to meeting each member's needs, leaving less money for renewable energy sources.

It was found that gender, marital status, and educational attainment increased the log odds of using energy-saving devices, while household size was found to significantly reduce the log odds. Energy-saving devices are more expensive to buy than conventional devices, much like renewable energy sources. Large families will always have more people living in their home, which lowers their income and decreases the likelihood that they will buy the more expensive energy-saving gadgets. Those with smaller households, on the other hand, can afford to buy more energy-saving gadgets. The usage of energy-saving gadgets and educational attainment were found to be positively correlated. Whether through a formal or informal approach, education can play a significant role in educating households about the importance of implementing energy-saving devices. Similar to education, it was discovered that higher respondents' membership in both formal and informal organisations increased the likelihood that they would use energy-saving devices. The findings of Amusa (2010) showed that the number of mitigation strategies adopted by households were significantly influenced by the level of education and training on climate change. Mutabazi *et al*. (2015) found a positive correlation between mitigation counts and the coefficient of education. According to the author, education motivates households to take actions that help them adjust to and lessen climatic changes. Additionally, Bako (2013) contended in their study that people with higher levels of education typically have greater knowledge, are more concerned, and participate in climate change mitigation efforts. Since they have access to a wider variety of information sources and are more likely to understand complex environmental issues like climate change than less educated citizens, those with more formal education have demonstrated a greater concern for and behavioural commitment to environmental protection. The log odds of using energy-saving devices increased with education, gender, and marital status. The findings indicated that households headed by men utilise energy-saving devices at a higher rate than households headed by women. This matches the *a priori* prediction. Men are typically in a better financial position to purchase the more costly energy-saving gadgets in a society where they have improved access to resources for both adaptation and mitigation. In a similar vein, married couples are better able to afford energy-saving devices because they can pool their resources to buy them.

The regression analysis's conclusion indicates that while characteristics like education, employment as a civil servant, marital status, and organisation membership raise the log odds of a household adopting the behaviour of turning off lights and electronics when not in use, a larger household decreases those odds. All of these matches the a priori expectation. A larger household will almost always have a tendency to leave the lights on because no one will usually take the initiative to turn off the lights and other electronics when not in use. In fact, the likelihood of having someone in the home who enjoys leaving their electronics on all the time increases with the number of people living there. People who are educated or who belong to organisations are exposed to the idea that electronics should be turned off when not in use. Comparably, the status of civil servant also denotes that the person is intelligent and knowledgeable enough to understand that leaving electronics on when not in use increases greenhouse gas emissions and increases the risk of fires or device damage.

There is a significant positive correlation between education, involvement in formal and informal organisations, and training related to mitigating climate change and the likelihood of implementing water-saving measures. It is also widely accepted that formal, informal, and non-formal education are essential for inspiring climate change adaptation and mitigation efforts (UNESCO, 2024). This explains a great deal about the value of training and education related to mitigating climate change in terms of educating households about the necessity of making efficient use of resources and preventing water waste. People in certain households use more water than they actually need, and occasionally they even let the water run while it's not in use. Nonetheless, some of these water-wasting behaviours can be reduced with instruction and training. It was discovered that belonging to an organisation had a comparable impact. Organisations establish the social networks through which people can be taught to think responsibly about the environment and use resources.

Regarding cutting back on the use of paper and nylon bags, the findings indicate that while working in the public sector, belonging to an organisation, and receiving climate change training all have a positive impact on adopting this behaviour, household size and access to extension services reduce the log-odds of adoption of this behaviour. In comparison to households with a small number of members, the number of paper and nylon bags increases with household size. Contrary to a priori expectations, it was discovered that having access to extension services had a negative impact on this behaviour. This may be the result of the majority of surveyed households being non-farm households, which rarely have access to extension agents and

thus affect the analysis's conclusion. As would be expected, working in the public sector raised the log odd. People who work in public service are typically more receptive and educated about the need to use fewer paper products and nylon bags. This also explains why households that have received prior training on mitigating climate change adopt this measure at a higher rate than households that have not. Education is another important tool for changing behaviour which informs people about the negative effects of nylon bag uses on the environment and human health (Ujeh, 2024). Additionally, joining a society establishes a social network through which people can learn more about the environmental effects of utilizing paper products and nylon bags excessively.

Lastly, the results also demonstrated that having access to extension agents, belonging to an organisation, and working in the civil service sector all increased the likelihood that an employee would choose to print only when absolutely necessary. These match the a priori prediction. It is anticipated that civil servants will receive training on the importance of only using printers when absolutely necessary. For example, the Nigerian Central Bank's sustainable banking principle lays out guidelines and moral standards for using office supplies. Printing should only be done when soft copies are insufficient, according to one such ethical guideline. Furthermore, the findings indicated that households with greater access to extension agents will possess a greater awareness of fundamental conservative practices. Membership in clubs and organisations also serves to expose and educate members on the importance of adopting these practices.

CONCLUSION

Realising the NDCs of developing economies and the environmental goal of mitigating climate change requires an understanding of the socioeconomic characteristics influencing households' efforts to mitigate climate change in the context of developing nations. The focus of mitigation efforts must shift from high-tech sequestration activities to everyday anthropogenic activities that can be changed to produce the desired effects. The goal of this study was to identify the ten different mitigation strategies that households use in their daily lives and to determine how their socioeconomic characteristics affect these strategies' adoption. Out of the six mitigation measures proposed by the Nigerian Ministry of Environment's mitigation department in an attempt to achieve the NDC, these efforts are focused on two major mitigation measures: adoption of renewable energy sources and economy-wide energy efficiency. To ascertain the behaviours that are impacted by the socioeconomic characteristics of the household, a binomial logistic regression was utilised. The results of the regression analysis demonstrated that seven out of the ten mitigation strategies—reducing the use of cars that emit CO_2, using renewable energy sources, using energy-saving devices, turning off lights and appliances when not in use, using water-saving techniques, using fewer paper products and nylon bags, and printing only when necessary—were significantly impacted by the assessed household attributes. While working in public service, it was discovered that education and household size were the main factors that significantly predicted all of the mitigation behaviours. Belonging to social networks and education also significantly and positively influenced the odds of adopting most of the mitigation behaviours, while an increase in family size had the opposite effect. Therefore, the greater an individual's enlightenment, wealth, and social media following, the greater their awareness of and capacity for positive behaviour related to mitigating climate change. On the other hand, there is less chance of adopting constructive behaviour towards mitigating climate change in households with larger family sizes. Political support and household orientation (i.e., teaching households how to behave in a way that ensures environmental stewardship) are the key factors that determine whether mitigation efforts succeed or fail. As a result, it is imperative to incorporate a large body of knowledge and training courses intended to accelerate awareness of climate change and its mitigating effects. To improve household mitigation behaviours, additional variables may be required in addition to the socioeconomic ones found in this study. Therefore, more investigation is recommended to find and validate additional factors. There isn't a strong correlation between the independent variable and the correlation result indicating that the multicollinearity assumption was upheld. We also came to the conclusion that the relationships found in the models were not linear based on the box-tidwell test of non-linearity results (p-value < 0.05).

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