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Knowledge and Perceptions on the Effects of Climate Change on Food Security among Caregivers of Under-Five Children in Akpabuyo Local Government Area, Cross River State, Nigeria

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Research Article

Keywords: Climate Change, Food Security, Caregivers, Under-five-children, Nigeria

Posted Date: February 27th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-8724271/v1

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Additional Declarations: No competing interests reported.

Abstract

Background

Climate change - induced food insecurity is a global crisis disproportionately affecting children under five years old, contributing to approximately 3.1 million child deaths annually due to undernutrition.

Methods

Employing a cross-sectional descriptive design, the study involved caregivers of under-five children and was guided by three specific objectives, three research questions, and one hypothesis. A multistage sampling technique was used to select a sample size of 258 participants. Data were collected through an interviewer-administered questionnaire and analyzed using SPSS Version 23 and Microsoft Excel, focusing on frequencies and percentages.

Results

The study achieved a 100% response rate with all 258 copies of the questionnaire completed. The majority of respondents were females (50.8%), with most (70.2%) aged between 18 and 27 years. Most respondents (38.0%) had secondary education as their highest qualification, and a majority (71.7%) were single. Approximately 48.8% had good knowledge of climate change, and 38.4% had good knowledge of food security. Over half (65.9%) perceived the impact of climate change on food security for children under five positively. There was a statistically significant association between respondents' knowledge of climate change and their perceptions of its impact ($\chi^2 = 4.793$, df = 2, p-value < 0.005).

Conclusion

This study highlights the critical role of caregivers' knowledge and perceptions in addressing the impact of climate change on food security. It also shows the importance of awareness in shaping perceptions and potentially influencing actions to mitigate climate-related food insecurity.

INTRODUCTION

Food insecurity is one of the biggest issues facing many Sub-Saharan African nations [1]. Food insecurity is a process where by an individual do lack access to enough safe and nutritious food for normal growth and development and an active and healthy life [2]. Women who are of reproductive age and children under five are the most vulnerable groups among those who are the most malnourished and food insecure [1]. One of the biggest risks to human health this century is climate change, especially for those who already face significant food poverty and social marginalization [3]. One of the main health hazards that climate change is predicted to worsen is malnutrition, particularly in areas where food

poverty is already a problem [3]. The outcomes of a child's supplemental feeding regimen are mostly determined by the nutritional knowledge, perception, attitude, and actions of the caregivers [4]

Globally, climate change-induced food insecurity disproportionately affects children under five years old. Approximately 3.1 million child deaths occur annually which are attributable to undernutrition, with climate change exacerbating this crisis [5]. Climate change affects food availability, quality and diversity, exacerbating food and nutrition crises [6].

The United Nations Food and Agriculture Organization (FAO) reports that Africa is particularly vulnerable to climate change due to its dependence on rain-fed agriculture and limited adaptive capacity which has resulted to 287 million deaths [7]. The Nigerian Climate Change Adaptation Strategy and Plan of Action highlight the need to address climate change's impacts on agriculture and food security, particularly among vulnerable populations [8]. Therefore, this study seeks to assess the knowledge and perceptions on the effects of climate change on food security among

METHODS

This is a descriptive cross-sectional study conducted among caregivers of under five children in Akpabuyo LGA, Cross River State, Nigeria. Akpabuyo is situated in the southern part of Cross River State, consisting of ten (10) wards, with its headquarters located in the town of Ikot Nakanda [9] It has an estimated population of about 414,700, which is a 2.7% annual population change from 2006 to 2022, with an area of 871.9 km^2 covering a population density of about 475.6 km^2 [10]. Akpabuyo LGA is situated within the geographical coordinates of latitude 4° 5' to 5° 40' and longitude 8° 25' to 8° 32' East. Positioned within the southern Nigeria vegetation zone, it borders the Atlantic Ocean coastline, adjacent to Bakassi in the East and the Republic of Cameroon in the West [11]. Multi-stage random sampling was used in the selection of respondents. The LGA has a total of 10 wards and 5 wards were picked through sampling without replacement. Systematical random sampling was then used to select 11 households and 1 eligible respondent was selected from each household. The sample size for the study was estimated using the Fisher’s formula as cited by [12];

n =

Where;

n= desired sample size

Z = 95% (1.96)

p = 18.5% = 0.185 [13]

q = 1 - 0.185 = 0.816

d^2 = 5% = $(0.05)^2$ = 0.0025

n = 231.65 =232

Assuming a non-response rate of 10% (0.1)

= 256.67 = 257.7

The total sample was 258

Instrument for data collection

A semi-structured questionnaire designed in English, guided by the research objectives was gathered with the aid of 2 research assistants. The questionnaire had a total of thirty-six questions, divided into four sections: Section A consisted of questions to determine the socio-demographic characteristics of the respondents. Section B consisted of questions to determine the knowledge on climate change among respondents. Additionally, Section C looked at the knowledge on food security by respondents while Section D focused on the perceptions of respondents on the impact of climate change on food security for under-five children.

Pre-testing

After undergoing scrutiny, the questionnaire were pre-tested among respondents in Calabar Municipality Local Government Area. The purpose of this pre-testing is to ensure that the data collection instrument is reliable, valid, and capable of effectively measuring the variables of interest. Based on the results from the pre-test, necessary adjustments were made to the questionnaire before it was used. Field assistants received training on how to administer the questionnaires.

Method of data analysis

Upon completion, the questionnaires were manually verified to ensure completeness. All pertinent information were recorded, scrubbed, and analyzed utilizing Microsoft Excel. Subsequently, the data were transferred to Statistical Product and Service Solutions (SPSS) Version 23 for additional analysis. Explain how you arrived at the classification of the knowledge and perception level. Based on the modified Bloom's cut-off, respondent who scored ≥ 80% of the correct knowledge questions (≥ 8 out of 11possible points) was considered to possess "good knowledge", those who scored 60-79% (4-7 points) were regarded as having fair knowledge while those scoring < 60% (0-3 points out of 11 possible points) were considered to have "poor knowledge".

Attitudes of respondents were based on a 8-item questionnaire that assessed respondents. The response of each statement was indicated on a 4-point Likert scale as follows: statements with options 'Strongly disagree', 'disagree', 'Agree', or 'strongly agree' were given 1,2,3 and 4 respectively for all 10 questions. The expected minimum and maximum total attitude scores were 4 and 24 respectively. Categorizing into two groups, the total score of each respondent were divided into two (0-12 = negative, 13-24 = positive attitude).

Ethical consideration

The study protocol was approved by the Ethics and Research Committee within the Public Health Department of the University of Calabar, Calabar, Nigeria (UC/CM/PUH/ETH/2398). The study was conducted in accordance with the tenets of the Declaration of Helsinki and guidelines of the ethics committee board of the department. Informed consent was obtained from all the respondents to ensure their full participation. Only those who gave verbal consent participated in the study. Respondents were assured of their confidentiality, anonymity, respect and dignity. To maintain anonymity, personal information such as name was not collected. Respondents were also duly informed that participation is voluntary and at any time in the study they can decide to withdraw without fear of penalty.

RESULTS

A total of 258 eligible respondents participated in the study, resulting in a 100% response rate. This part of the study will present the findings from the respondents in relation to the study. Table 1 illustrates the socio-demographic traits of the participants. Majority of the respondents were females 131(50.8%). About 181(70.2%) of the respondents were of the ages of 18 and 27 with a mean age and standard deviation of 24.82±5.366. 18 and 50 were the minimum and maximum ages respectively. Most of the respondents 98(38.0%) had secondary education as their highest level of academic qualification. More than three quarters of the respondents 185(71.7%) were single.

Table 1: Sociodemographic Characteristics of respondents (n = 258)

Variables	Frequency	Percentage (%)
Gender		
Male	127	49.2
Female	131	50.8
Age		
18-27	181	70.2
28-37	73	28.3
38 and above	4	1.6
Educational Level		
No formal education	49	19.0
Primary education	12	4.7
Secondary education	98	38.0
Tertiary education	99	38.4
Religion		
Christianity	146	56.6
Islam	14	5.4
Others (please specify)	98	38.0
Marital Status		
Single	185	71.7
Married	56	21.7
Co-habiting partners	11	4.3
Divorced	4	1.6
Separated	2	0.8

****Others = Atheist, Traditional Religion**

Knowledge level on climate change among respondents

Figure 1 below, is a graphical representation of respondents' level of knowledge of climate change. Majority of the respondents 126(48.8%) had good knowledge on climate change while 86(33.3%) had fair knowledge and 46(17.8%) had poor knowledge of climate change. Hence, there is a good knowledge level of climate change among respondents.

Knowledge level on food security by respondents

Figure 2 below, is a representation of respondents' knowledge level on food security. Most of the respondents 99(38.4%) had good knowledge on food security while about 82(31.8%) had fair knowledge on food security and 77(29.8%) had poor knowledge on food security. Hence there is a good level of knowledge among respondents on food security.

Respondents' perception level on the impact of climate change on food security for under five children

Figure 3 below illustrates respondents' perception level of the impact of climate change on food security for under five children. More than half of the respondents 170(65.9%) had a positive perception of the impact of climate change on food security for under five children. Whereas, about 88(34.1%) had a negative perception.

Association between respondents' knowledge on climate change and their perception.

Table 5 below present the statistically significant association between knowledge level of respondents to climate change and their perception level toward climate change, and the result showed that there was no statistically significant association between knowledge level and perception level of respondents. (χ^2 = 9.814, df = 4, p-value = 0.044). indicating that we failed to reject the null hypothesis.

Table 2 Association between respondents' knowledge on climate change and their perception.

Variable	Knowledge level					
	Poor knowledge	Fair knowledge	Good knowledge	χ^2	p-value	df
negative perception	10(21.7%)	35(40.7%)	43(34.1%)	4.793	0.91	2
positive perception	36(78.3%)	51(59.3%)	83(65.9%)			

***Statistical significance based on *p*-Value <0.05; *p*-value= Probability value; χ2= Observed Chi Square statistic**

DISCUSSION

Findings from this study show that majority of the respondents 126(48.8%) had good knowledge on climate change. The results of this study resonate with the results of a study conducted by Lagally et al. [14] on climate change and child health - assessment of parents' perspective and relevance. The findings from the study indicated that about 75% of the respondents knew at least one health consequence of climate change. Heat related illnesses were named as the most important health consequences (74.1%). Parents obtain most of their information from the Internet (73.3%). This study is also similar to the

results of a study conducted by Reyes-García et al. [15] on level of knowledge on climate change among the people residing in a selected area of Dhaka city. The results showed that nearly half of the respondents heard about the global warming but 43.24% didn't. A major portion of the respondents (62.39%) agreed to include the Climate Change in school curriculum. 39.38% respondents strongly agreed that the world climate is changing but it was due to human behaviour which was strongly agreed by 16.81%. 17.26% strongly believed that developed countries are the main contributors. 15.49% of the respondents strongly agreed that developed countries should provide compensation to the affected developing countries. Neither agreed nor disagreed that the Climate Change had impact on economy was 38.06% but 40.27% respondents strongly agreed that Climate has impact on human health. 36.73% respondents strongly agreed that Climate Change has impact on food production and 34.07% strongly agreed that it has impact on soil condition and fertility. 49.56% respondents strongly agreed for the need to take measure to reduce or prevent Climatic Change and 43.23% strongly agreed on awareness creation to cope with Climate Change. Indicating a moderate knowledge level among participants.

The results from this study showed that 99(38.4%) of the respondents had good knowledge on food security The results of this study differ from the results of a study conducted by Achiro et al. [16] on Status of food safety knowledge, attitude, and practices of caregivers of children in northern Uganda. The results showed that there was a high proportion of caregivers with sufficient food safety knowledge (74.1%). The results of this current study contradicts the results of a study conducted by La et al. [17] on investigation of food selection and processing among primary food. The results found that 78.9% of people had good knowledge regarding food poisoning prevention in food selection and processing. Also, the findings of this current study differs from the results of a study conducted by Bilbeisi et al. [18] on Households' Food Insecurity and Their Association With Dietary Intakes, Nutrition-Related Knowledge, Attitudes and Practices Among Under-five Children in Gaza Strip, Palestine.. The results showed that about (56.0%) food-insecure households have inadequate nutrition-related knowledge.

Findings from this study revealed that more than half of the respondents 170(65.9%) had positive perception of the impact of climate change on food security for under five children. This study resonates with a study conducted by Poudel et al. [19] on Household perceptions about the impacts of climate change on food security in the mountainous region of Nepal. Similarly, this study is in line with a study conducted by Mayala et al. [20] on knowledge, perception and practices about malaria, climate change, livelihoods and food security among rural communities of central Tanzania.

Also, the results of this study resonates with the results of a research conducted by Rahman et al. [21]. Additionally the results of this current study are in line with the results of a study conducted by Debela et al. [22] on perception of climate change and its impact by smallholders in pastoral/agropastoral systems of Borana, South Ethiopia.

Limitation of the study

Since the study heavily relied on participants' responses, there was a possibility of social desirability bias, where participants provided answers, their believe was socially acceptable rather than reflecting

their true knowledge, perceptions, and practices. This potentially affected the accuracy and reliability of the findings. The cross-sectional nature of the study design also hindered the ability to establish causal relationships. Since data was collected at a single point in time, it became challenging to determine the temporal sequence of events, making it difficult to draw firm conclusions about the cause-and-effect relationships between climate change knowledge, perceptions, and food security outcomes.

CONCLUSION

In conclusion, this study highlights the critical role of caregivers' knowledge and perceptions in addressing the impact of climate change on food security for children under five in Akpabuyo LGA, Cross River State, Nigeria. The findings reveal that while a substantial proportion of caregivers possess a positive perception of the impact of climate change on food security, there is still a need to enhance their knowledge to ensure effective responses to this pressing issue. The significant association between knowledge levels and perceptions underscores the importance of educational interventions aimed at increasing knowledge and understanding of climate change's effects on child nutrition. Strengthening caregivers' capacity to adapt to climate-related challenges is essential for improving food security and reducing undernutrition among vulnerable populations. These insights can inform policies and programs designed to mitigate the adverse effects of climate change on child health and nutrition, ultimately contributing to global efforts to combat child mortality related to undernutrition.

Recommendation

It is recommended that promotion of sustainable agricultural practices among caregivers should be adopted as well as training on nutrition to help caregivers make informed decisions about children’s diets. It is also recommended that community-led initiatives and support groups should be established in communities for caregivers to collaborate on local solutions for food production and distribution. Most importantly, advocacy for the development of national policies that integrate climate change adaptation into food security and agricultural planning is advised.

Declarations

No funding was received for the submitted work or during the preparation of the manuscript.

Conflict of Interest: The authors declare no conflict of interest.

Author Contribution:

Conceptualization and design - HNN, AEU, SNO

Acquisition, analysis, or interpretation of data- HNN, AEU, UMU

Statistical analysis - HNN, AEU

Supervision - AEU, UMU

Drafting of the manuscript - SNO

Critical revision of the manuscript for important intellectual content - HNN, AEU, UMU, SNO.

Ethical Approval: The study protocol was approved by the Ethics and Research Committee within the Public Health Department of the University of Calabar – with ethical number: UC/CM/PUH/ETH/2398.

Accordance Statement: The study and methods were carried out in accordance with relevant guidelines and regulations.

Consent to Participate: Informed consent was obtained from all participants; they had the option to participate voluntarily and withdraw from the study at any time without facing any negative consequences.

Informed Consent: was obtained from all participants and all were above the age of 18. Only those who gave informed consent participated in the study.

Clinical Trial Number: not applicable.

Consent to Publish: Approval of final article for publication: All authors

Data Availability: The dataset generated during and / or analysed during the current study are available from the corresponding author on reasonable request.

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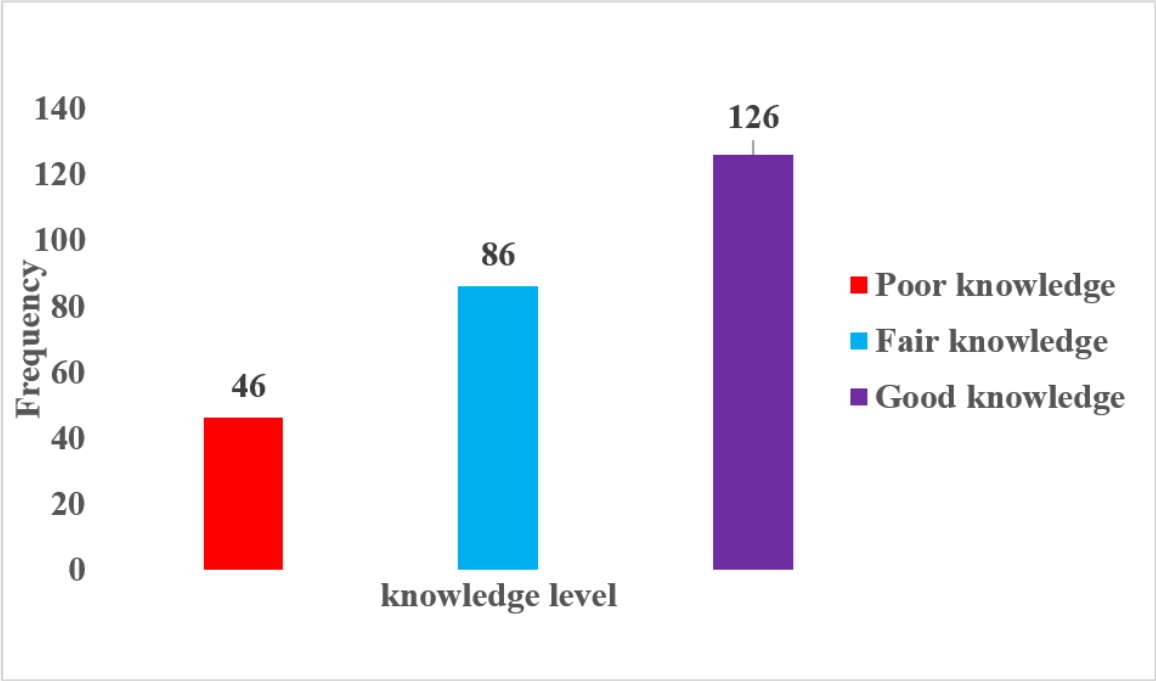
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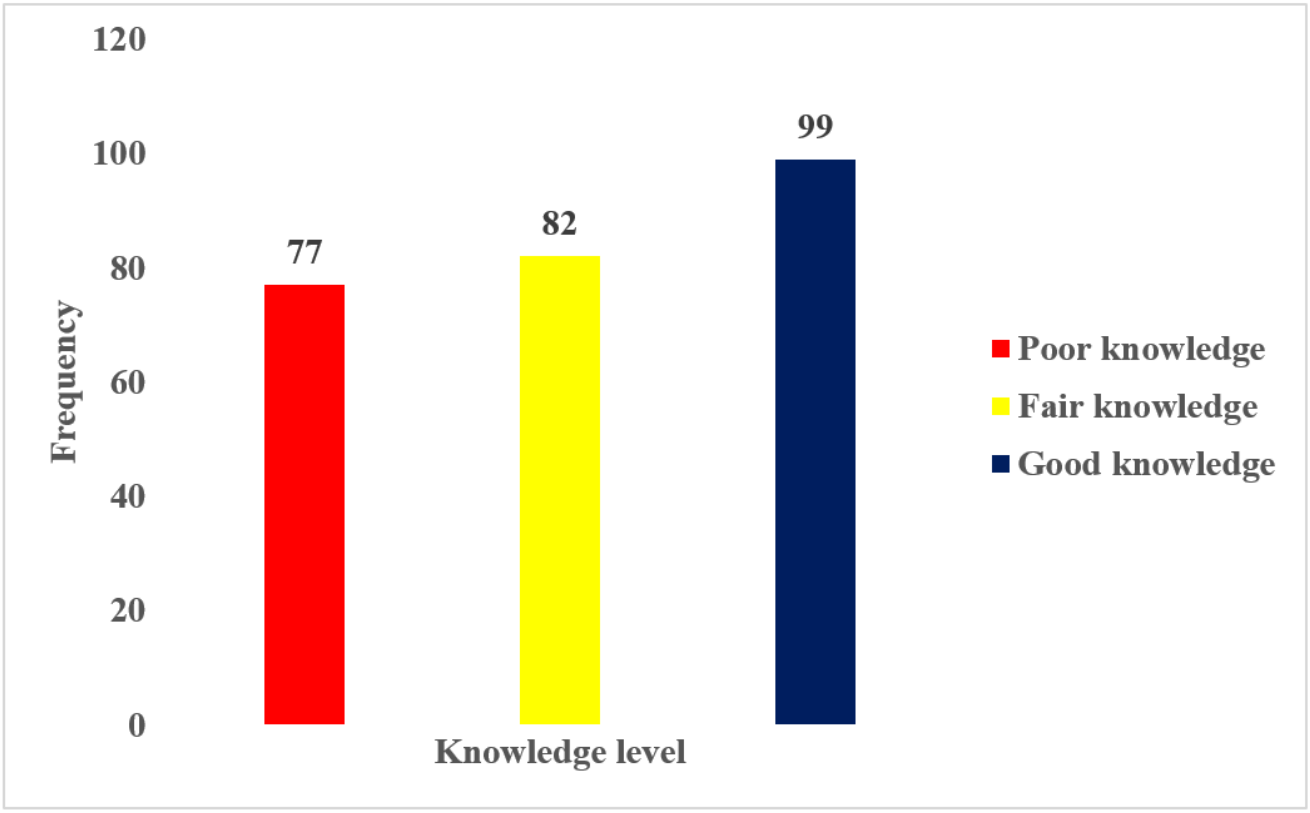
Figures



Scoring based on mean with 0-3 points = Poor knowledge; 4-7 points = Fair knowledge; 8-11 points = Good knowledge

Figure 1

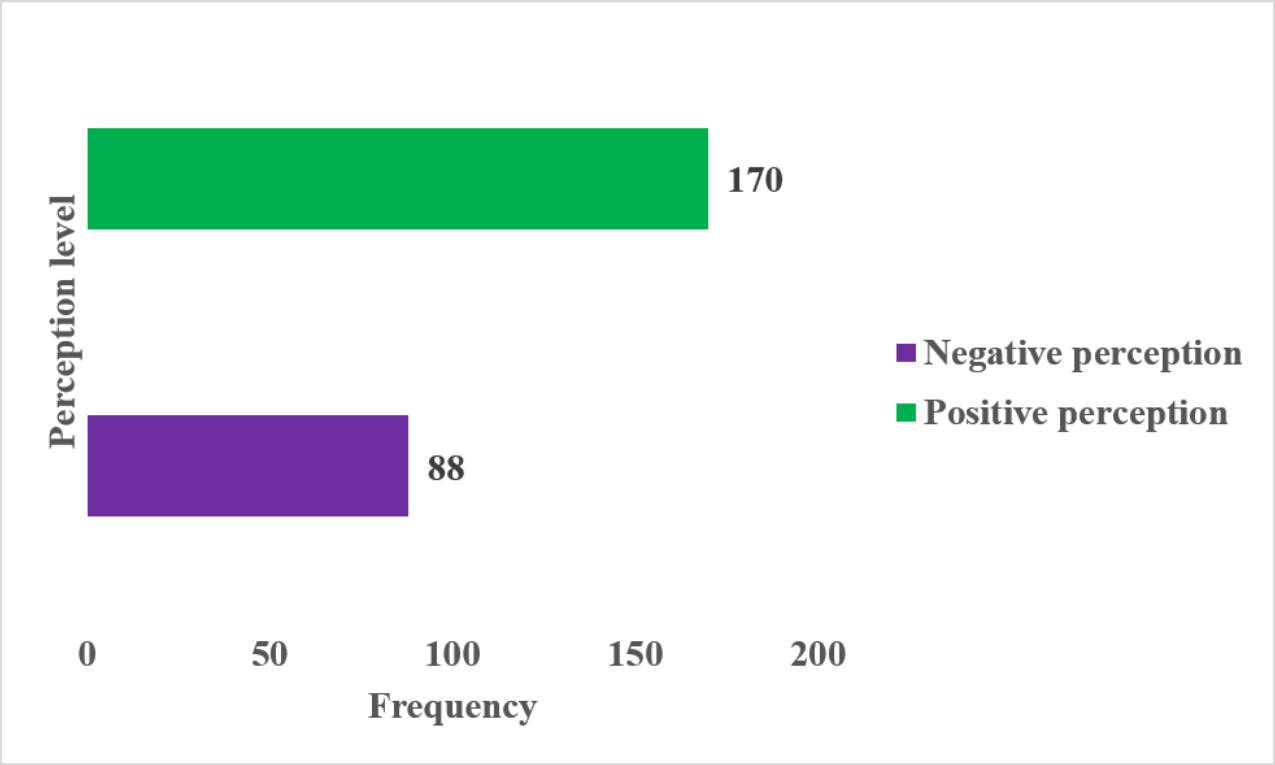
Knowledge level of climate change among respondents



Scoring based on mean with 0-3 points = Poor knowledge; 4-7points = Fair knowledge; 8-11points = Good knowledge

Figure 2

Knowledge level of climate change among respondents



Score range = 0-12= Negative perception; 13-24 = Positive perception

Figure 3

Respondents' perception level of the impact of climate change on food security for under five children