Knowledge of Global Warming and Associated Factors among Crop Production Farmers in Oyo Zone, Oyo State, Nigeria

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Global warming is a serious environmental and economic issue confronting the world. It is a threat multiplier that worsens health conditions. Correspondingly, crop production is a significant contributor to anthropogenic global warming and reducing crop production emissions. In spite of the agricultural-related challenges associated with global warming, previous studies focus on its knowledge across different population, with little concentration on crop production farmers. This study therefore, examined knowledge of global warming and associated factors among crop production farmers in Oyo Zone, Oyo State, Nigeria. Cross-sectional research design was used; registered crop production farmers of Oyo State Agric-business Development Agency were the population; while multistage sampling procedure was used to select a total of eighty seven (87) respondents. The result revealed that the level of knowledge of global warming was high (weighted mean=1.74) among crop production farmers in Oyo Zone. Furthermore, there was a significant gender difference in knowledge of global warming ($t=3.29$, $df=85$, $p<0.05$). Also, age ($\chi^2=27.07$, $df=3$, $p<0.05$) and educational qualification ($\chi^2=34.89$, $df=3$, $p<0.05$) had significant association with knowledge of global warming among the farmers. It was concluded that the knowledge of global warming was high among crop production farmers in Oyo Zone; of which male farmers had better understanding than their female counterparts. Also, age and educational qualification had significant association with knowledge of global warming among the farmers. The State Ministries of Health and Education should therefore intensify efforts to jointly organise periodic sensitization programme on knowledge of global warming specifically for crop production farmers.

Keywords: Crop production farmers, Knowledge and Associated factors of global warming.

Introduction

Since the industrial revolution, the temperature of the air on earth has increased. The overwhelming body of data suggests that human actions, notably emissions of heat-trapping greenhouse gases, are primarily to blame for our planet's warming, with some contribution coming from natural variability (World Health Organization [WHO], 2021). The negative consequences of global warming influence agriculture both directly and indirectly. Global warming and agriculture are connected phenomena that

both occur on a global scale. If appropriate action is not taken, this widespread issue could have an irreversible negative impact on people's life. Recent years have seen a rise in the importance of global warming as an environmental concern. As a result, there is alarming evidence of numerous consequences for human health. Due to the worsening air quality, rising temperatures and increased frequency of extreme weather events, it poses concerns to public health including increased morbidity and mortality (Ebiet al., 2021).

According to the Intergovernmental Panel on Climate Change (IPCC), the world must keep temperature increases to 1.5°C in order to avoid catastrophic health effects and millions of fatalities brought on by climate change (Intergovernmental Panel on Climate Change [IPCC] 2023). The rise in global temperature and other climatic changes have already become unavoidable due to past emissions. However, even a 1.5°C increase in global warming is not thought to be safe; every additional tenth of a degree of warming will have a detrimental effect on people's lives and health (United Nations, 2022). Everyone is exposed to these risks, but those whose health is being adversely affected by the climate crisis the most are also the least responsible for its causes and least able to protect themselves and their families (IPCC, 2023).

Africa is one of the continents' most severely impacted by the effects of climate change while having the lowest per capita greenhouse gas emissions in the world. Extreme weather catastrophes like droughts and floods frequently leave Africa's poorest inhabitants defenseless, and the ensuing starvation and livelihood insecurity are frequently tragic (*Fearnhead, 2023)*. Numerous variables, such as poor adaptation capability, a high reliance on ecosystem products for livelihoods as well as an underdeveloped agricultural production system, contribute to this susceptibility (Chidiebere **et al.,** 2019). Nearly the whole surface of the globe is predicted to warm over the coming decades and mean worldwide rainfall will rise (IPCC, 2020).

The rapid effects of global warming may make large areas of the African continent uninhabitable, which would be disastrous for human health, food security and poverty (World Meteorological Organization [WMO], 2021). Although changes are anticipated, regional effects on rainfall in the tropics are anticipated to be much more spatially variable and the sign of change at any particular location is frequently less certain. There is variation in knowledge of crop production farmers towards global warming (The Nation, 2022).

An in-depth understanding of the multiple layers of factors that shape farmers' knowledge of climatic risks and their adaptive responses is a prerequisite for well-targeted agricultural adaptation planning. Crop production farmers' actions that contribute to global warming include deforestation, bush burning and the usage of nitrogenated fertilizer. Also, greater comprehension of farmers' knowledge and perspectives on global warming would have an impact on their propensity for practices (Islam et al., 2015). The measured surface temperatures in Africa between the late 19th and the early

21st centuries have usually increased by about 1^0 C, but locally by as much as 3^0 C for the minimum temperature in the Sahel at the end of dry season (Sultan et al, 2015).

Precipitation trends as observed show expected regional and temporal differences (Conway et al, 2009). Regional variations in temperature and precipitation have been noted (World Bank, 2021). Global warming is having an increasing influence on the continent of Africa, particularly harming the most defenseless people. It is also causing food insecurity, population relocation and stress on water resources. Global warming thus poses a threat to human health, the availability of food and water as well as socioeconomic growth in Africa (Vermaak, 2020). In today's economic conversation, the issue of global warming and its effects, particularly in developing African nations like Nigeria, have gained center stage (Choko et al, 2019).

Complex issues brought on by global warming greatly outweigh the answers proposed by the usual analytical methods used to guide responses to significant environmental difficulties. This is not because of the variations in expected changes, but rather because of sensitivity and adaptation capability that varies among countries and regions. Global warming has a considerable impact on developing countries, especially the natural resources they possess (IPCC, 2017). Due to their gross domestic product (GDP), gross national income (GNI), and heavy reliance on agriculture, a sector that is sensitive to climate change, developing nations are more susceptible to the effects of climatic change and are most affected by them (IPCC, 2014).

Additionally, there are many poor people in these nations, making them more susceptible to the consequences of global warming (Yohe & Tol, 2022). African nations appear to be particularly vulnerable to climate change, since thirty three (33) of the fifty nine (59) nations that are most at risk from global warming are found on this continent (Brooks, 2005). The majority of African nations are located in a subtropical region with high levels of climatic variability.

With an estimated 206 million people, Nigeria is the most populous nation in Africa (Worldometers, 2022). The majorities of people in Nigeria lives in rural areas and depend on migratory livestock farming and subsistence agriculture. Between January and March 2021, Nigeria's agriculture contributed more than 22.35% of the country's GDP (Food and Agriculture Organization, 2021). Global warming has an impact on Nigeria, just like it does on other developing nations, and it seriously jeopardizes efforts to eradicate poverty and promote sustainable development (Ebele &Emodi, 2016).

Nigeria's climate has changed, as evidenced by rises in temperature, erratic rainfall patterns, sea level rise and flooding, drought and desertification, land degradation, an increase in the frequency of extreme weather events, a decline in fresh water resources and a loss of biodiversity. Nigeria has around 95.6 million rural residents that rely on climatically sensitive natural resources for their livelihood, making the country vulnerable (The World Bank 2019). Flooding in late 2022 affected 2.5 million people in **Nigeria** and caused extensive damage to the country's farmland. By mid-2023 an estimated **25 million Nigerians** will face high levels of food insecurity (*International Rescue Committee, 2023)*.

Political tensions and widespread conflict have contributed to the country's fragility, making it difficult to respond to climate disasters.

Scientific evidence continues to confirm that activities of the farmers are among others contributing to the warming of the planet. The by-products of agricultural industry including carbon dioxide, methane, nitrous oxide and other greenhouse gases have risen dramatically in recent decades leading to an overall increase in sea levels.The effects of these practices include food insecurity, trauma, drought, famine, flood, desertification, dehydration, hyperthermia, air pollution, water and vector borne diseases.

Research Question:

The below research question was raised in this study and answered:

1. What is the level of knowledge of global warming among crop production farmers in Oyo Zone, Oyo State?

Hypotheses:

The following hypotheses were formulated and tested at 0.05 level of significance:

1. There is no significant gender difference in knowledge of global warming among commercial crop production farmers in Oyo Zoneof Oyo State.
2. There is no significant association between age and knowledge of global warming among commercial crop production farmers in Oyo Zoneof Oyo State.
3. There is no significant association between educational qualification and knowledge of global warming among commercial crop production farmers in Oyo Zoneof Oyo State.

Methodology

Cross-sectional research design was used; registered crop production farmers of Oyo State Agric-business Development Agency were the population; while multistage sampling procedure was used to select a total of eighty seven (87) respondents. A self-developed and validated questionnaire, tagged; Knowledge of Global Warming and Associated Factors among Crop Production Farmers in Oyo Zone, Oyo State, Nigeria with a reliability value of 0.75 was used for data collection. The descriptive statistics of frequency counts and percentages were used to analyse demographic data and research question, while inferential statistics of chi-square (χ^2) Pearson Product Moment Correlation was to test the hypotheses.

Results

Demographic variables:

Table 1: Distribution of the Respondents by Gender, Age and Educational Qualification

S/n	Variables		Frequency	Percent (%)
1.	Gender	Male	73	83.9
		Female	14	16.1
2.	Age	18-24 years	10	11.5
		25-31 years	19	21.8
		32-38 years	16	18.4
		39 years and above	42	48.3
3.	Educational Qualification	No Formal Education	11	12.6
		Primary School Education	19	21.8
		Secondary School Education	45	51.7
		Tertiary Education	12	13.8

As indicated in table 1, most of the respondents were male (83.9%), the females constituted 16.1%. In addition, most of the respondents were 39 years and above, followed by those in the age range of 25-31 years (21.8%) and 32-38 years (18.4%) respectively; while those in the age range of 18-24 years (11.5%) were few. Also, most of the respondents had secondary school education (51.7%), followed by those with primary school education (21.8%) and tertiary education (13.8%) respectively; while those that had no formal education (12.6%) were the least.

Research Question:

Research Question 1: What is the level of knowledge of global warming among crop production farmers in Oyo Zone, Oyo State?

Table 2: Summary of Result on the Knowledge of Global Warming

S/n	Statement	Yes	No	Mean	SD
1.	Global warming is a gradual increase in the earth's temperature generally due to the greenhouse effect	78 (89.7%)	9 (10.3%)	1.90	0.31
2.	Global warming describes the current rise in the average temperature of earth's air and oceans.	72 (82.8%)	15 (17.2%)	1.83	0.38
3.	Agricultural and industrial activities like deforestation can have effect on the atmosphere	52 (59.8%)	35 (40.2%)	1.60	0.49
4.	Application of nitrogen fertilizer can cause global warming	54 (62.1%)	33 (37.8%)	1.62	0.49
5.	Global warming is responsible for fluctuation of different pattern of rainfall	55 (63.2%)	32 (36.8%)	1.63	0.49
6.	Global warming has significant effect on the yield of crop production in Nigeria.	1 (1.1%)	86 (98.9%)	1.99	0.11
7.	Global warming is responsible for heavy rainfall and scorching sunshine.	57 (65.5%)	30 (34.5%)	1.66	0.48
8.	Some of the floods in this country are due to global warming	63 (72.4%)	24 (27.6%)	1.72	0.45
Total				Weighted mean=1.74	

Decision Rule: <0.49=Low; 1.50–1.99=High; 2.00=Very High

Table 2 reveals that 78 (89.7%) respondents affirmed that global warming is a gradual increase in the earth's temperature generally due to the greenhouse effect, while 9 (10.3%) did not. Furthermore, 72 (82.8%) respondents confirmed that global warming describes the current rise in the average temperature of earth's air and oceans, while 15 (17.2%) did not. Likewise, 52 (59.8%) respondents acknowledged that agricultural and industrial activities like deforestation can have effect on the atmosphere, while 35 (40.2%) did not. Furthermore, 54 (62.1%) respondents admitted that application of nitrogen fertilizer can cause global warming, while 33 (37.8%) did not. Additionally, 55 (63.2%) respondents confirmed that global warming is responsible for fluctuation of different pattern of rainfall, while 32 (36.8%) did not. Also, 1 (1.1%)respondents established that global warming has significant effect on the yield of crop production in Nigeria, while 86 (98.9%) did not. Besides, 57 (65.5%)

respondents acknowledged that global warming is responsible for heavy rainfall and scorching sunshine, while 30 (34.5%) did not. Also, 63 (72.4%) respondents acknowledged that some of the floods in this country are due to global warming, while 24 (27.6%) did not. Table 2 further revealed that weighted mean was 1.74 which indicated that the score was high based on the decision rule. This means that the level of knowledge of global warming was high among crop production farmers in Oyo Zone.

Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

$H_0$1: There is no significant gender difference in knowledge of global warming among commercial crop production farmers in Oyo Zoneof Oyo State.

Table 3: Summary of Result on Gender Difference in Knowledge of Global Warming

	Gender	N	Mean	Std. Dev.	t-test value	Df	Sig. (p value)	Remark
Knowledge of global warming	Male	73	19.08	4.02	3.290	85	0.001	Significant
	Female	14	15.14	4.55				

Table 3 reveals that there was a significant gender difference in knowledge of global warming among commercial crop production farmers in Oyo Zoneof Oyo State (cal.-t=3.29, df=85, p<0.05). This means that, there was a significant difference in knowledge of global warming between male and female commercial crop production farmers in Oyo Zoneof Oyo State. The null hypothesis was therefore rejected. In addition, the male students had a higher mean (19.08) that their female counterparts with a mean of 15.14. This means that the male commercial crop production farmers in Oyo Zone had a better knowledge of global warming than their female counterparts.

$H_0$2: There is no significant association between age and knowledge of global warming among commercial crop production farmers in Oyo Zone of Oyo State.

Variables		N	Df	Chi-square (χ^2)	Sig.	Remark
Knowledge of Global Warming	Age	87	3	27.069	0.000	Significant

Table 4 showed that there was a significant association between age and knowledge of global warming (χ^2=27.07, df=3, $p<0.05$) among commercial crop production farmers in Oyo Zone. The null hypothesis was therefore rejected. This means that there was a relationship between the age of the respondents and their respective understanding of global warming.

$H_0$3: There is no significant association between educational qualification and knowledge of global warming among commercial crop production farmers in Oyo Zone of Oyo State.

Table 5: Summary of Result on Association between Educational Qualification and Knowledge of Global Warming

Variables		N	Df	Chi-square (χ^2)	Sig.	Remark
Knowledge of Global Warming	Educational qualification	87	3	34.885	0.000	Significant

Table 5 shows that there was a significant association between educational qualification and knowledge of global warming (χ^2=34.89, df=3, $p<0.05$) among commercial crop production farmers in Oyo Zone. The null hypothesis was therefore rejected. This means that there was a relationship between the age of the respondents and their respective understanding of global warming.

Discussion of Findings

The finding of this study on socio-demographic characteristics revealed that most of the respondents were male, while the female were few. Furthermore, majority of the respondents were 39 years and above, while those in the age range of 18-24 years were few. Also, most of the respondents had secondary school education; while those that had no formal education were the least. In the same vein, the finding of this study revealed that the level of knowledge of global warming was high among crop production farmers in Oyo Zone.This was established through the responses of most of the respondents in which they affirmed that global warming is a gradual increase in the earth's temperature generally due to the greenhouse effect. Furthermore, majority of the respondents confirmed that global warming

describes the current rise in the average temperature of earth's air and oceans.Likewise, most of the respondents acknowledged that agricultural and industrial activities like deforestation can have effect on the atmosphere.

In relation to knowledge of global warming majority of respondents admitted that application of nitrogen fertilizer could cause global warming. Additionally, most respondents confirmed that global warming is responsible for fluctuation of different pattern of rainfall. Besides, majority of the respondents acknowledged that global warming is responsible for heavy rainfall and scorching sunshine.Also, most of the respondents acknowledged that some of the floods in this country are due to global warming. The outcome of this study on high level of knowledge of global warming was in line with the finding of Oluwatayo and Ayodeji (2016) which established that the farmers were aware of climate change effects with varying levels of knowledge.

Moreover, the finding of this study revealed that there was a significant gender difference in knowledge of global warming among commercial crop production farmers in Oyo Zone of Oyo State. This means that, there was a significant difference in knowledge of global warming between male and female commercial crop production farmers in Oyo Zone of Oyo State. It was further established based on gender difference that the male commercial crop production farmers in Oyo Zone had a better knowledge of global warming than their female counterparts.

Furthermore, it was further established that there was a significant association between age and knowledge of global warming among commercial crop production farmers in Oyo Zone. This means that there was a relationship between the age of the respondents and their respective understanding of global warming; which implied that age was greatly connected with the manner at which the respondents had high knowledge of global warming. The significant association between age and knowledge of global warming among the respondents was not line with the finding of Islam et al. (2015) which established that the greater comprehension of farmers' knowledge and perspectives on global warming would have an impact on their propensity for practices.

The finding of this study further revealed that there was a significant association between educational qualification and knowledge of global warming among commercial crop production farmers in Oyo Zone. This means that there was a relationship between the age of the respondents and their respective understanding of global warming; which implied that age was strongly connected with the manner at which the respondents had high knowledge of global warming.

Conclusion

It was concluded in this study that, the knowledge of global warming was high among crop production farmers in Oyo Zone; of which male farmers had better understanding of global warming than their female counterparts. Also, age and educational qualification had significant association with knowledge of global warming among the farmers.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The State Ministries of Health and Education should therefore intensify efforts to jointly organise periodic sensitization programme on knowledge of global warming specifically for crop production farmers.
2. Government should increase eco-medical literacy within climate change stakeholders and policy makers and publish and disseminate scientifically global public health information on global warming and agriculture that supports policy-makers, researchers and practitioners.

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