Original Research Article

Climate-Friendly Farming Self-Efficacy and Its Correlates among Secondary School Agricultural Science Students in Uyo, Akwa Ibom State, Nigeria.

ABSTRACT

The Paper assessed self-efficacy of secondary school agricultural science towards climate-friendly farming. It specifically examined the influence that attitude towards climate-friendly farming, knowledge of climate change and ownership of household farms could have on the climate-friendly farming self-efficacy of the respondents. Correlation analysis, chi-square, percentages and composite index technique were applied to a set of primary data collected from 200 randomly sampled agricultural science students in 4 randomly selected schools in Uyo, AKS. Findings revealed that 52% of the respondents have high climate-friendly farming self-efficacy. The respondents had a positive attitudinal disposition towards climate-friendly farming. Most (48.5%) of the respondents had low knowledge of climate change. There is a need for stakeholders to translate the high climate-friendly farming self-efficacy observed among the respondents into climate-smart farming through a conscious effort at increasing their participation in practical farming activities both in school and home farms. There is a need to include climate change issues in secondary school curriculum to raise the knowledge level of the agricultural students on climate change. Students, upon the acquisition of this knowledge and skills, would help in the extension of innovative and efficient farming methods to their households and communities thereby complementing government efforts in the extension of modern and acceptable practices in farming.

Keywords: Climate-Friendly Farming, Self-Efficacy, Secondary school, Agricultural Science Students, Nigeria

1. INTRODUCTION

Climate change and agriculture are interrelated processes both of which take place on a global scale. Global warming is projected to have an impact on conditions affecting agriculture including temperature precipitation and glacial run-off. These conditions determine the carrying capacity of the biosphere to produce enough food for the human population and domesticated animal. Small-scale farmers are among the first to feel the impacts of climate change because of their greater dependence on the natural environment. Extreme climate variability (drought, floods and frost) can destroy the economies and welfare of poor rural families because they lack technologies, social protection mechanisms (such as benefits, insurance and savings) and adequate protection for their crops and animals [1; 2].

Few large farms and numerous household and other small farms including teaching and learning farms in schools and colleges characterize agriculture in Nigeria. Young farmers in secondary schools and colleges, always make effort, with guidance from their instructors/teachers, to demonstrate their ability to apply what was learnt in the class at the field in what is referred to as practical agriculture in most school and colleges. Prominent cropping systems adopted by the farmers include mixed

cropping and intercropping. This is in addition to the sole cropping and mixed farming sparingly practised [3]. Secondary school students embark on various cultural practices that lead to the production of various crops and in few cases livestock.

Agricultural production must increase if the global food supply is to keep pace with population growth. Yet at the same time, it is clear that if the world is to meet its targets for reducing greenhouse gas emission and mitigating climate change, agriculture must become "climate-friendly/smart". Agricultural production system managed in a climate-friendly way, emit lower greenhouse gases, create significant carbon sinks, and at the same time become more productive and more resilient in the face of climate change [4]. The adaptive capacity of a family is also of importance. The current livelihood of a family may be highly exposed to climate change, but if they can adapt, their overall vulnerability may not be high [5]. If a family accustomed to growing maize, has experience in producing sorghum in dry years, they may be better prepared to make a more permanent change if conditions become drier. Again, the capacity to adapt varies considerably between families even within the same community. The most important characteristics for the capacity to adapt our human knowledge and access to social institutions where this knowledge can be shared [5].

For Africa and Nigeria in particular, there is the looming threat of food insecurity [6; 7]. Arable lands are dwindling, climate change is taking a toll on agricultural practices, the farming population is ageing and going extinct, famine is ravaging the Horn of Africa [8]. This should be of urgent concern to all stakeholders and getting a young person's to invest in or practice agriculture is a way of translating the threats to opportunities. Ultimately, it is the world farmers, Agricultural Students inclusive, who have the largest role to play in making agriculture both climate-friendly and more productive. Agricultural science students are relatively young; this category of people ought to be active, inquisitive and willing to learn to add to their knowledge [9]. Both the female and male students should be better informed about climatic changes and how it affects agriculture since they have been learning about it. They should always be willing and ready to personally seek for information on climate change which will give them a good level of familiarity with climate change issues. These students upon the acquisition of this knowledge and skills would help in the extension of innovative, climate-change-adaptation strategies and efficient farming methods to their households and communities thereby complementing government's effort in the extension of modern and acceptable practices in farming.

Therefore, it is important to understand what affects students' willingness to engage in climate-friendly farming. According to [10], people’s judgment of their capabilities to organise and execute courses of action required to attain designated types of performances strongly influences the choices people make, the effort they expend, and how long they persevere in the face of challenges.

People’s judgement of their capabilities to organise and execute courses of action required to attain designated types of performance is what is referred to in the literature as self-efficacy. Self-efficacy is therefore based on self-perceptions regarding particular behaviours. It can be defined as the belief a person has about his ability to perform a particular task or behaviour [11]. It can also be referred to an

individual's confidence in their ability to complete a task or achieve a goal [12]. Self-efficacy is, therefore, domain or task-specific. Self-efficacy is an important psychological construct which requires attention in research as it influences (i) the choice of activities that an individual takes part in; (ii) the amount of effort they will expend in performing a task and (iii) how long they will persevere in the face of stressful situations in completing that task [11].

Self-efficacy, as explained by [13], determine how people think, feel, motivate themselves and even how they behave. He further explains that people with a strong sense of self-efficacy view challenging problems as tasks to be mastered develop a deeper interest in the activities in which they participate, form a stronger sense of commitment to their interest and activities, and recover quickly from setbacks and disappointments. People with a weak sense of self-efficacy avoid challenging tasks, believe that difficult tasks and situations are beyond their capabilities, focus on personal failures and negative outcomes and quickly lose confidence in personal abilities. As submitted by [14], high self-efficacy can enhance motivation. He further submits that people with high self-efficacy set themselves higher goals, invest more efforts, show more resilience and persist longer than those with low self-efficacy. Research on self-efficacy theory has powerful effects which are embedded in social cognitive theory, positing that confidence in completing behaviours of interest will lead to the achievement of those behaviours [10]. It is believed that self-efficacy will influence climate-friendly agricultural practices among the students in the study area.

Another factor that is viewed by the researchers to be capable of influencing students' climate-friendly farming is their attitude. Attitude is a psychological concept is relative. It could be viewed as the way one reacts towards an object or situation. It could be favourable or unfavourable. As asserted by [15], attitude is a desire or tendency to approach or avoid something" He stated further that the attitude of an individual can be either positive or negative. When it is positive, the individual approaches the object. When otherwise, the object is avoided.

Literature and opinions of climate scientists suggest that there is much uncertainty as changes in climatic condition unfold. Though positive and negative scenarios are being speculated, many concerns are paid towards more risk for the farmer concerning productions. Agricultural students in Akwa Ibom State may not understand the driving force of climate change but, certainly, the direction of climate change will alter the cropping and soil management system and cause many diversification strategies to mitigate and adapt to the unfolding condition. Income and other livelihood activities are at risk as the majority are already living below the World Bank poverty line of two (2) dollars per day.
There is doubt whether young farmers in schools and colleges are prepared for or know what constitutes environmental and climate changes and what could be the best responses to these changes to guarantee environmental and climatic friendly agriculture. Are the students' attitude and self-efficacy favourably disposed towards climate-friendly farming practices, especially in their various homes? This present study was carried out to fill in the gap by focusing on the influence of students' knowledge of climate change, students' attitude towards climate-friendly farming on the students' self-efficacy towards climate-friendly farming in Uyo Local Government Area of Akwa Ibom State.

Specifically, the study identified the demographic characteristics of the respondents, examined students' knowledge of climate change, assessed students' attitude towards climate-friendly farming, assessed students' self-efficacy towards climate-friendly farming and examined the influence of gender, age, knowledge of climate change and attitude towards climate-friendly farming on students' self-efficacy towards climate-friendly farming.

2. METHODOLOGY

The study was conducted in the educational zones of Uyo Local Government Area of Akwa Ibom State. Uyo Local Government lies between latitude 5.04 North and longitude 7.90 East. This is within the equatorial rain forest belt, which is a tropical zone that house vegetation of green foliage of trees shrubs and oil palm trees. The area is endowed with abundant mineral and forest resources, among which are gravel, silica, sand, clay, and timber. Agricultural produce includes cassava, yam, vegetables and plantain. The people of Uyo Local Government Area are predominantly farmers and traders. Their area of trade is mostly on food items like palm oil and other palm produce, vegetables, plantain, banana, yam, cassava, live stocks e.g poultry, goat, sheep, cow etc.

The study was targeted at all the Senior Secondary School 2 (SS2) Agriculture science students in Uyo Local Government Area of Akwa Ibom State. This study adopted a multi-stage sampling technique in the selection of the respondents. There are four clans in Uyo Local Government Area Vis Ikono Clan, Etoi Clan, Oku Clan and Offot Clan and there are fifteen (15) Public secondary schools spread across the four clans. Secondary schools in Uyo L.G.A were clustered into the four clans. One (1) secondary school was randomly selected from each of the four (4) clans, thereafter, simple random sampling was used to select 50 students from each of the schools. A total of 4 schools and 200 students who offer agricultural science as a subject were selected respectively. The unit of measurement for the study was the student.

A well-designed questionnaire, developed by the researchers, was used for data collection. Kuder Richardson 20 (KR20) and Cronbach alpha formulae were used to establish the reliability and the internal consistency of sections B, C 1&2 of the questionnaire and coefficients of 0.60, 0.58 & 0.71 were found respectively suggesting that the scales were quite reliable. Section B was a knowledge test designed to measure the knowledge (awareness) level of the respondents on climate change. The section contained climate change items with response format given as "Yes, No, and Don't know". Section C measured the climate-friendly attitude and self-efficacy of the respondents. It had two (2) sub-sections. Sub-section 1 measured the attitude of the respondents towards climate-friendly farming practices and had items with response format ranging from strongly agree to strongly disagree while Sub-section 2 measured the self-efficacy of the respondents towards climate-friendly farming. It had items with response format ranging from absolutely confident to not at all confident. Correlation analysis, simple percentages and frequency analysis, chi-square as well as composite index technique were deployed to analyze the data collected.

3. RESULTS AND DISCUSSION

3.1 Demographic Characteristics of the Respondents

With regards to table 1, item 1, the researcher had more access to female respondents than males. Hundred and nine (54.5%) females and Ninety - one (45.5%) male students were sampled for the study. Item 2 on table 1 reveals that the majority (88.5%) of the respondents were between 13 to 16 years of age while 11.5% aged between 17-20 years. The majority (77.5%) made a range of between 1 – 5 person household, 20.5% had 6 – 10 person household, while 2.0% of the respondents had a household size of 16 persons and above. Thus the majority of the students have a household size of 1 – 5 people with its attendance consequence on welfare. Similarly, the majority (87.5%) of the respondents affirmed that farms are available in their houses (families) while 12.5% affirmed unavailability and 80% affirmed their involvements in household farming.

Table 1: Frequency counts and Percentages of the Demographic Characteristics of the Respondents.

Item	Variables	Frequency	Percentages (%)
1	**Gender**		
	Male	91	45.5
	Female	109	54.5
2	**Age**		
	13 – 16	177	88.5
	17 – 20	23	11.5
3	**Family Size**		
	1 – 5	155	77.5
	6 – 10	41	20.5
	16 and above	4	2.0
4	**Availability of Household Farms**		
	Yes	175	87.5
	No	25	12.5
5	**Involvement in Household Farming**		
	Yes	160	80.0
	No	40	20.0

Source: Field survey, 2018

3.2 Respondents Level of Knowledge on Climate Change

Table 2 indicates that 48.5% of the respondents have low knowledge of climate change issues, 42.0% have average knowledge while only 9.5% of the respondents have high knowledge of climate change. Climate change awareness involves creating knowledge, understanding and values, attitude, skills and abilities among individuals and social groups towards the issues of climate change for attaining a better quality environment. Climate change specialists have repeatedly pointed out that a solution to climate change problem will require climate change awareness and its proper understanding. The research found that a good number of the sampled students still have low knowledge of climate

change. Most of the sampled students did not know the difference between climate and weather; they did not know the atmospheric layer of gas; they did not know what greenhouse gases are, how the gases act in the atmosphere and the effects of these gases on agricultural production. The students did not know that deforestation, bush burning, continuous tillage, animal rearing, rice cultivation, desertification, fertilizer use and fuel-intensive farming can cause climate change. Hence, to develop farming strategies that adapt to climate change might be difficult.

However, the study also found that a sizeable number of the sampled students are averagely knowledgeable about climate change issues, but much effort need to be exerted by the research institutions and government agencies in encouraging the inclusion of climate-change issues in the Secondary school curriculum so as to raise the knowledge level of the student-farmers for mitigation and adaptation. This, of course, will imply the level of knowledge and adaptation of the farmers who benefit directly from the information.

The findings of this study tend to corroborate the findings of [16] who discussed how school-age children were confused about climate change and ozone layer depletion. Result also agrees with the findings of [17] who emphasized how Swedish students in grades 9 and 12 (15 ± 16 and 18 ± 19 years old respectively) explain the greenhouse effect and how they think the reduction of CO_2 emissions would affect the society. The study strongly supports the work of [18] who examined similar ideas among students of various age groups and aimed at proposing strategies for education in climate change.

Table 2: Distribution of Respondents on Level of Knowledge on Climate Change

Level	Respondents	Percentage (%)
Very low knowledge of climate change	5	2.5
Low knowledge of climate change	92	46.0
Average knowledge of climate change	84	42.0
High knowledge of climate change	19	9.5
Total	**200**	**100.0**

Source: Field survey, 2018

3.3 Respondents' Attitude towards Climate-Friendly Farming

Results in tables 3a &3b provide insights to attitudinal dispositions of the respondents towards climate-friendly farming. The frequency distributions, percentages in table 3a show the pattern of agreement of the respondents with the climate-friendly farming statements. It can be seen from the table that majority of the respondents either strongly agreed or just agreed to most of the statements. The mean scores of the responses to attitudinal statements were also calculated. Any statement that had a mean score of 2.5 and above was regarded as the positive or favourable attitudinal disposition of that particular statement since the maximum response score for each item was 4 and the minimum was 1. The mean score distribution shows that almost all the statements attracted a mean score above 2.5 leading to the revelation, as shown on table 3b, that majority (87.5%) of the respondents had a favourable or positive attitudinal disposition towards climate-friendly farming. They agreed that use of water channels in the farm as draining system is advisable to all farmers to check to flood, that

breeding of drought and heat resistant crop varieties can help lessen the effect of climate change on crop production and that mulching can conserve soil moisture in the face of rising temperature to mention but a few.

Table 3a: Distribution of Respondents on Attitude towards Climate-friendly Farming

S/N	Items	SA	A	D	SD	Mean
1.	I feel climate-friendly farming is an interesting area of discussion	88 (44.0)	73 (36.5)	23 (11.5)	16 (8)	3.16
2	Use of water channels in the farm as the draining system is advisable to all farmers to check to flood.	99 (49.5)	57 (28.5)	29 (14.5)	15 (7.5)	3.20
3	Farmers should use organic manure to conserve soil nutrient	78 (39.0)	92 (46.0)	12 (6.0)	18 (9.0)	3.15
4	Planting of cover crops should be recommended to farmers as a means of reducing the harmful effect of climate change	74 (37.0)	74 (37.0)	32 (16.0)	20 (10.0)	3.01
5	Mixed cropping practices are the best approaches to response to uncertainties in crop yield occasioned by climate change.	45 (22.5)	81 (40.0)	43 (21.5)	31 (15.5)	2.70
6	Every farmer should be told to plant pest and disease-resistant crops.	66 (33.0)	67 (33.5)	37 (18.5)	30 (15.0)	2.84
7	Mulching can conserve soil moisture in the face of rising temperature	83 (41.5)	75 (37.5)	21 (10.5)	21 (10.5)	3.10
8	Farmers should ensure regular weeding to avoid breed of some insects pest	100 (50.0)	56 (28.0)	22 (11.0)	22 (11.0)	3.17
9	Breeding of drought and heat resistant crop varieties can help lessen the effect of climate change on crop production.	51 (25.5)	83 (41.5)	43 (21.5)	23 (11.5)	2.81
10	Farmers should know how to conserve soil moisture through appropriate tillage operation.	61 (30.0)	85 (42.5)	28 (14.0)	26 (13.0)	2.90
11	I feel intimidated to talk about climate change	42 (21.0)	47 (23.5)	55 (27.5)	56 (28.0)	2.37
12	Afforestation should be encouraged at all times	75 (37.5)	64 (32.0)	28 (14.0)	33 (16.5)	2.90
13	Proper conservation of seeds should be encouraged at all times	75 (37.5)	65 (32.5)	28 (14.0)	32 (16.0)	2.91
14	Farmers should be encouraged to reduce the use of generators for electrification	51 (25.5)	58 (29.0)	47 (23.5)	44 (22.0)	2.58
15	Regular practice of crop rotation can reduce the harmful effect of climate change on crops	59 (29.5	69 (34.5)	37 (18.5)	35 (17.5)	2.76

Source: Field survey, 2018. **Note:** Percentages in parenthesis and values outside parenthesis are the Frequencies

Key: SA=Strongly Agree; A=Agree; D=Disagree; SD=Strongly Disagree

Table 3b: Distribution of Respondents based on Attitudinal Disposition towards Climate-friendly Farming Index (ADCFF)

The index range of ADCFF	ADCFF Index Interpretation	Respondents	Frequency
0.00 – 0.59	Unfavourable attitudinal disposition	25	12.5
0.60 – 1.00	Favourable attitudinal disposition	175	87.5
Total		**200**	**100.0**

Source: Field survey, 2018

3.4 **Respondents' Self-efficacy towards Climate-friendly Farming**

Results on tables 4a &4b provide insights into the self-efficacy of the respondents towards climate-friendly farming. The frequency distributions values, as well as percentages on table 3a, show the pattern of confidence the respondents demonstrated towards the climate-friendly farming statements. It can be seen from the table that majority of the respondents were absolutely, mostly and slightly confident that they can practice most of those climate-friendly farming activities. The mean scores of the responses to self-efficacy statements were also calculated. Any statement that had a mean score of 1.5 and above was regarded as high self-efficacy of that particular statement since the maximum response score for each item was 3 and the minimum was 0. The mean score distribution shows that almost all the statements attracted a mean score above 1.5 leading to the revelation, as shown on table 3b, that majority (52.0%) of the respondents fell into the high self-efficacy towards the climate-friendly farming category. They were confident that they can monitor and provide information on the effect of climate change on crops, that they can monitor and provide information on the effect of climate change on livestock, that they can suggest the appropriate seed-bed that can be used for the planting of various crops and that they can always develop measures of checking/controlling erosion on farmland, to mention but a few.

Table 4a: Distribution of Respondents on Self-efficacy towards Climate-friendly Farming

S/N	Items	Mean
1	I can monitor and provide information on the effect of climate change on livestock	1.77
2	I can suggest the appropriate seed-bed that can be used for the planting of various crops.	1.63
3	I can always develop measures of checking/controlling erosion on farmland	1.92
4	I can devote a greater part of my time to carrying out climate-friendly farming practices	1.58
5	I can educate people on how to check fertility and PH status of the soil before planting	1.67
6	I can educate people on the breeding of new crops or livestock that are tolerant to drought	1.55
7	I can spend a whole day learning about conservation farming systems that use minimum or no-tillage	1.57
8	I can spend more time reading about various crop and	1.95

	climate-induced animal diseases	
9	I can ensure regular weeding and pest control in my farm	2.07
10	I can monitor and provide information on the effect of climate change on crops	1.75

Source: Field survey, 2018.

Table 4b: Distribution of Respondents based on Self Efficacy towards Climate-friendly Farming Index (SECFFI)

The index range of SECFFI	SECFFI Index Interpretation	Respondents	Frequency
0.00 – 0.59	Low self-efficacy	97	48.0
0.60 – 1.00	High self-efficacy	103	52.0
Total		**200**	**100.0**

Source: Field survey, 2018.

3.5 Influence of Gender, Age, Ownership of Household farms, Knowledge of Climate Change and Attitude towards Climate-Friendly Farming on Students' Self-Efficacy towards Climate-Friendly Farming

A. Chi-square analysis of the relationship between gender, ownership of household farms and students' self-efficacy towards climate-friendly farming.

Chi-square analysis was done to determine whether gender and ownership of household farms significantly influenced the respondents' self-efficacy towards climate-friendly farming in the study area. Results from the analysis shown in table 5a below reveal that ownership of household farms (X^2 =4.35; P=0.00) significantly influenced the respondents' self-efficacy towards climate-friendly farming in the study area while sex (X^2=0.10; P=0.74) did not significantly contribute to the model.

Table 5a: Chi-square Analysis between Gender, Ownership of Household farm and Students' Self-Efficacy towards Climate-Friendly Farming

	Variables:	X^2-value	df	Sign 2-tail	P-value	Remark
i	Gender	0.10	1	0.74	0.05	NS
ii	Ownership of farm	4.35	1	0.00	0.05	Sig

Source: Field Survey 2018 Note: NS implies Not Significant

A. Pearson product-moment correlation between age, knowledge of climate change, attitude towards climate-friendly farming and respondents' self-efficacy towards climate-friendly farming.

The table 5b below reveals that there is a very low and negative relationship between age of the respondents and their self-efficacy towards climate-friendly farming in the study area, r = -0.046. This means that the self-efficacy towards climate-friendly farming drops as the age of the respondent's increases. However, the relationship is low, the table also reveals that the relationships are not statistically significant at r = -0.046, P=0.516, R^2=0.002, explaining that only 0.2% variation in self-efficacy towards climate-friendly farming can be attributed to the variation in the ages of respondents.

Item 2 in table 5b presents the results of the analysis on the relationship between knowledge of climate change and self-efficacy towards climate-friendly farming. The table reveals that there is a low and positive relationship between the respondents' knowledge of climate change and their self-

efficacy towards climate-friendly farming. The table revealed that the respondents will increase their self-efficacy with increased knowledge therefore, as knowledge of climate change increases, self-efficacy towards climate-friendly farming increases as well. It may be reasonable to relate that gaining knowledge of concept can serve as a motivational factor towards the understanding and eventual practice or willingness to practice the concept. Research findings show that higher levels of perceived self-efficacy correlate to greater motivational efforts like knowledge and perseverance [19]. According to [11], computer self-efficacy has proven to be a factor in understanding the frequency and success with which individuals use computers. Self- efficacy theory, according to [20] has emerged as an important means of understanding and predicting a person's performance and vice versa. More should be done to promote the young farmer's knowledge on climate change issues as this has proven effective in promoting the respondents' self-efficacy on climate-friendly farming. The table also indicated that although there was a low relationship, it was statistically significant r = 0.136, P=0.040, R^2=0.018 explaining that only 1.8% variation in the self-efficacy towards climate-friendly farming could be attributed to variations in the knowledge of the respondents on climate change.

Table 5b: PPMC Analysis between Age, Knowledge of Climate Change, Attitude towards Climate-Friendly Farming and Students' Self-Efficacy towards Climate-Friendly Farming in the Study Area

	Variables: EUFSM and	r	r^2	Sign 2-tail	P-value	Remark
i	Age	-0.046	0.002	0.516	0.05	NS.
ii	Knowledge	0.136	0.018	0.040	0.05	Sig.
iii	Attitude	0.062	0.0038	0.384	0.05	NS.

Source: Field Survey 2018. Note: NS implies Not Significant

4. CONCLUSION AND RECOMMENDATION

Degree of knowledge on climate change and ownership or availability of farms in the respondent's homes were found to significantly and statistically influence the climate-friendly farming self-efficacy of the students. Therefore, the more agricultural students, especially those that own farms in their homes, know or read about climate change, the more confident they will be in contributing to climate change adaptation farming practices in their various household farms and the society at large. However, it is logical to conclude in this study that knowledge of climate change and ownership of farms in some ways contributes to self-efficacy towards climate-friendly farming in Uyo, Akwa Ibom State. These present a need to include climate change issues in the secondary school curriculum to raise the knowledge level of the agricultural students on climate change issues. Also important is the need for stakeholders to translate the high climate-friendly farming self-efficacy observed among the respondents into climate-smart farming through a conscious effort at increasing their participation in practical farming activities both in school and home farms. Students, upon the acquisition of this knowledge and skills, would help in the extension of innovative and efficient farming methods to their households and communities thereby complementing government efforts in the extension of modern and acceptable practices in farming.

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