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Constraints to the Use of Climate-Smart Agriculture Practices among Small Holder Farmers in Kwara State, Nigeria. https://dx.doi.org/10.4314/jae.v27i1.12S

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Abstract:
The study examined the constraints to the use of climate smart agricultural practices among smallholder farmers in Kwara State, Nigeria. Three stage sampling procedure was used to select 150 respondents for the study. Data was collected through the use of structured interview schedule and analyzed using frequency, percentage and regression analysis. Almost half of the respondents (49.3%) indicated that access to farmer-based insurance is a very high economic constraint. A high percentage of respondents indicated incidence of weeds, pests and diseases (67.3%) and infertile soil (58.0%) as serious environmental constraints. Socio-cultural constraints included occurrence of tribal conflicts (51.3%) and farmers/herders conflicts (62.0%). Demand for time (66.0%) and family needs (64.0%) the were among personal constraints identified while insufficient government support with farm inputs (53.3%) and inadequate access to extension services (57.3%) were institutional constraints. There was a significant relationship between constraints faced by farmers and use of climate-smart agricultural practices (p=0.000, r=-4.992). Provision of budgetary support and strengthening public-private partnerships to leverage funds for the adoption of climate smart practices is therefore recommended.
Keywords: Climate-smart agriculture, environmental constraints, sociocultural and economic constraints

Introduction
There are factors affecting the development and sustainability of agriculture which include social, economic and environmental factors (Toliatkashani, Najaf Abadi & Lashgararal., 2019). Climate is an environmental factor with a great impact on agriculture; it influences the types of crops that can be grown as well as the length of the growing season of any crops planted. Unfortunately, the world is presently experiencing change in the climate pattern which is now affecting agriculture in a number of ways (Girma & Amanue., 2017). These are through changes in average temperatures, rainfall and other climate extremes (e.g. heat waves); pests and diseases infestation; changes in atmospheric carbon ground-level ozone

concentration; and changes in the nutritional quality of some foods (Abdulrahman, et. al., 2021)

Developing countries and smallholder farmers are more affected by these changes. It is therefore, necessary to devise a strategic means of achieving sustainable agricultural development for food security against the influence of climate change without causing depletion to the natural state of the soil (Ukhurebor, et al., 2021). One such intervention is climate-smart agricultural practices. It is not a new agricultural system but a new approach, a way to guide the needed changes of agricultural systems particularly to address food security and climate challenges. Climate-smart agriculture (CSA) may be defined as an approach for transforming and reorienting agricultural development under the new realities of climate change (Food and Agricultural Organisation, 2022).

Climate change can have effects on all human beings due to its alarming threats to the environment, and agricultural yields all over the world. The climate is an important factor of the distribution and abundance of species. Enhancing the accumulation of carbon dioxide (CO_2) will have a lot of potential effects on plants and may also have a lot of indirect threats on herbivores and all other food chain members (Jones, Wang, Fawcett, & Grant, 2007).

Extreme weather conditions such as powerful rainstorms, high wind pressures and high temperatures have much influence on agricultural activities. Climate and agriculture are strongly interrelated universal processes and thus variations in climate influence agricultural activities. A large climate change risk is due to a rise in temperature (global warming) which is predicted to have major threats to the environment disturbing agriculture, with higher CO_2 quantities, increase in atmospheric average temperature, large glacial overflow, varied rainfall sequence and the interrelation of all the above factors (Ekpa, et al 2021).

In a study by Mburu et al. (2014), on the effects of climate variability and change on food security, they affirmed the severe and adverse effects in terms of access, availability and sufficiency of food among small-scale farmers. The interactions of several factors such as temporal and spatial variability of climate, change in seasonal patterns, degraded soil and uncertain future climate scenario will pose further drop in production and consequently lead to enhanced food insecurity, retardation in economic growth and increased poverty among close to 80% of small-scale farmers who depend on agriculture for their livelihood (Ani, *et al*., 2022).

The general objective of the study was to ascertain constraints to the use of climate smart agricultural practices among smallholder farmers in Kwara State, Nigeria. Specifically, the research

1. Assessed farmers' level of awareness of climate smart agricultural practices
2. Examined the constraints to the use of climate smart agriculture practices among farmers;

Methodology

The study was conducted in Kwara State, situated between parallels $8A^0$ and 10^0 north latitudes and $3A^0$ and $6A^0$ east longitudes.

The population of this study comprised all smallholder farmers in Kwara State.

A randomized selection was used to select 150 small-scale farmers from three local governments in the state. One local government area was randomly selected from each of the three senatorial districts of Kwara State. These include Moro, Asa and Ifelodun Local Government Areas from Kwara North, Central and South respectively. Two rural communities were selected from each of the local government areas and respondents were selected from each community through house listing.

A structured interview schedule was used to collect data from the respondents. Descriptive statistics were used to describe the socioeconomic characteristics of respondents while Pearson Product Moment Correlation and regression analysis were used to test for the relationship between variables in the stated hypotheses.

Results and discussion

Farmers Awareness of Climate Smart Agricultural Practices

Table 1 shows farmers' awareness and level of use of climate smart agricultural practices.

Table 1: Awareness of climate-smart agricultural practices

	Yes
Weather prediction	70.7%
Soil water conservation	46.0%
Improved fodder productions	26.0
Agroforestry and fodder trees	24.7%
Manure management: composting and biogas use	16.7%
Better livestock management	27.3%
Feed conservation and utilization	38.7%
Awareness campaigns on climate change	39.3%
Establishment of tree nurseries	32.7%
Establishment of tree planting	36.0%

Source: Researcher's Field Survey, 2021

About 70.0% of the respondents were aware of weather prediction but very few made use of the information. Almost half (46.0%) of the respondents also heard about water conservation but they hardly practised it. It could be observed from the table that respondents were quite aware of some climate-smart practices such as feed conservation and utilization (38.7%), establishment of tree planting (36.0%), improved fodder production (38.3%), agroforestry and fodder trees (43.3%) and Establishment of tree nurseries (35.3%). This is in consonance with the report of Muriithi et al (2021) who found that farmers adapted to climate change using integrated farming system, intercropping, crop rotation and agroforestry. However, 29.3%, and 32.7%, were still using manure management: composting and biogas use, and better livestock management. This result also corroborates the findings of Adebayo and Ojogu (2019) that farmers had awareness and training about climate-smart agricultural practices and were even using some of them. Level of awareness, knowledge and use is however still very low.

Constraints to the use of Climate-Smart Agricultural Practices

The constraints to the use of climate-smart agricultural practices were grouped into five; economic constraints, environmental constraints, socio-cultural constraints, personal constraints and institutional constraints.

The data in Table 2a shows the economic constraints to the use of climate-smart agricultural practices

Table 2a: Economic constraints

Economic issues	Very high constraint	Low constraint	Not a constraint
There is demand for farm produce	49.3%	11.3%	38.0%
Access to farmer-based insurance companies	31.3%	40.0%	28.7%
Access to labour	39.3%	29.3%	29.3%
Access to sustainable agriculture technologies	41.3%	32.7%	26.0%
Poor pricing of agricultural produce	31.3%	24.7%	44.0%

Source: Researcher's Field Survey, 2021

Table 2a shows the economic challenges faced by farmers in Kwara State in the use of climate-smart agricultural practices. It can be seen from the table that 49.3%, 39.3%, and 41.3% of the total respondents indicated the following economic issues as being a very high constraint to them; demand for farm produce, labour access, and sustainable agricultural technologies access respectively. This findings corroborates the report of Asadu (2018) that poor market facility, non-availability of credit facility, high cost of labour, poor access to information sources were serious challenges to farmers. Moreover, 40.0% of the respondents indicated that access to farmer-based insurance companies is also a challenge but with low constraints. However, the analysis shows that poor pricing of agricultural produce is not a major constraint as indicated by 44.0% of the farmers.

The data in Table 2b shows the environmental constraints to the use of climate-Smart agricultural practices

Table 2b: Environmental constraints

Environmental issues	high constraint	Low constraint	Not a constraint
Experience of bush/forest fires	42.0%	25.3%	32.7%
Infertile soil	58.0%	30.0%	12.0%
Drought occurrence	55.3%	44.7%	-
Experience of weeds & pesticides	67.3%	31.3%	1.3%
Pests and diseases	67.3%	19.3%	13.3%

Source: Researcher's Field Survey, 2021

The result constitutes the environmental challenges that farmers in Kwara State face in the use of climate smart agricultural practices. It can be seen that 42.0%, 58.0%, 55.3%, 67.3%, and 67.3% of the total respondents indicated that the followings

environmental issues were very high constraint to them; experience of bush/forest fires, infertile soil, drought occurrence, experience of weeds & pesticides, and pests and diseases respectively. This result agrees with the findings of Nnadi *et al.* (2021) who reported that increased pest and disease pathogens as a major challenge to farmers. This deduces that all the environmental issues listed above are challenges to these farmers.

The data in Table 2c shows the socio-cultural constraints to the use of climate-Smart agricultural practices

Table 2c: Socio-cultural constraints

Socio-cultural issues	**high constraint**	**Low constraint**	**Not a constraint**
Taboos and values of community	39.3%	25.3%	35.3%
Occurrence of tribal conflicts	51.3%	18.7%	30.0%
Encroachment of farmlands	30.0%	56.0%	14.0%
Land tenure system	50.7%	44.0%	5.3%
Farmers/herders' conflicts	62.0%	18.0%	20.0%

Source: Researcher's Field Survey, 2021

The above result constitutes the socio-cultural challenges that farmers in Kwara State face in the use of climate smart agricultural practices. It can be seen from the response that 39.3%, 51.3%, 50.7% and 62.0% of the total respondents stated the following socio-cultural issues as being very high constraint to them; taboos and values of community, tribal conflicts occurrence, land tenure system, and farmers/herders' conflicts respectively. These are powerful forces that can influence farmers' behaviour towards adopting sustainable agricultural practices. However, 56.0% of the respondents indicated that, encroachment of farmlands is not a serious constraint.

The data in Table 2d shows the personal constraints to the use of climate-Smart agricultural practices

Table 2d: Personal constraints

Personal issues	**high constraint**	**Low constraint**	**Not a constraint**
Perceptions of climate smart agriculture	48.0%	24.0%	26.0%
Demand for time	66.0%	28.0%	6.0%
Family needs	64.0%	26.7%	9.3%
Personal values on the environment	54.0%	24.7%	21.3%

Source: Researcher's Field Survey, 2021

The result in Table 3d constitutes the personal challenges that farmers in Kwara State face in the use of climate smart agricultural practices. The table shows that 48.0%, 66.0%, 64.3%, and 54.0% of the total respondents indicated the following personal issues; perceptions of climate smart agriculture, demand for time, family needs, and personal values on the environment respectively constituted very high

constraints to these farmers. This reveals that all the personal issues listed in the table above were challenges to these farmers.
The data in Table 2e shows the institutional constraints to the use of climate-Smart agricultural practices

Table 2e: Institutional constraints

Institutional issues	Very high constraint	Low constraint	Not a constraint
Government support with farm inputs	53.3%	24.0%	22.7%
Access to extension services	57.3%	30.7%	12.0%
Availability of Climate Smart Agriculture funds by government	40.7%	46.7%	12.7%
Access to roads and markets	49.3%	32.0%	18.7%
Government policy on Climate Smart Agriculture	38.0%	36.7%	25.3%

Source: Researcher's Field Survey, 2021

The entries in Table 3e show the institutional challenges that farmers in Kwara State encounter in the use of climate smart agricultural practices. It can be observed that 53.3%, 57.3%, 49.3% and 38.0% of the total respondents indicated the following institutional issues; government support with farm inputs, access to extension services, access to roads and markets, and government policy on Climate Smart Agriculture respectively are associated with very high constraint to the farmers in Kwara State. While 46.7% of the total respondents opined that, availability of Climate Smart Agriculture funds by government as another constraint. This is in line with the report of Adebayo and Ojogu (2019) that lack of government support and funding was a challenge to farmers' use of climate smart agricultural practices. For instance, technologies for the successful implementation of CSA practices are sometimes expensive, thereby limit smallholder farmers' ability to access and use them (Rochecouste *et al*., 2015; Feliciano *et al*., 2014).

Relationship between constraints faced by farmers and their use of climate smart agricultural practices.

Table 3: Relationship between constraints faced and farmers' use of climate smart agricultural practices.

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	
		B	Std. Error	Beta	t
1	(Constant)	54.360	3.708		14.662
	CHL	-.440	.088	-.652	-4.992

Table 3 shows that there is significant relationship between constraints faced by farmers and their use of climate smart agriculture. This implies that, challenges encountered by the small holder farmers affect the level of climate smart agriculture

usage in the study area. This could mean that the more difficult/severe the constraint, the less the level of use of climate smart agricultural practices.

Conclusion and recommendations

The constraints to the use of CSA practices include economic, socio-cultural, environmental and institutional factors. Economic related issues which include demand for farm produce, labour access, and sustainable agriculture technologies influenced farmers' use of CSA. CSA often requires substantial initial investments, but the range of costs can be very wide depending on the investment type. Experience of bush/forest fires constitutes a major environmental factor.

Institutional and socio-cultural factors were also significant constraints to the use of CSA practices in the study area. The government's support with the provision of farm inputs, access to extension services and availability of CSA funds were found to be the major variables of the institutional factor.

The farmers' level of knowledge contributes to the efficient and effective usage of climate-smart agriculture, and challenges encountered by the smallholder farmers affect the level of climate smart agriculture usage. The concept of agriculture extension should be strengthened to promote easier and faster assimilation of CSA. Government should revisit the concept and prioritize their focus to facilitate general acceptance, easy adoption of CSA practices with their up-scaling at all levels including financial and intuitional support. The socio-cultural factors should be properly integrated into CSA blueprints.

References

Abdulrahman, O.L., Adebayo, A.R and Olatunde, P.F (2021): Climate change and insecurity in Nigeria. Proceedings of the 30th annual National congress of the Rural Sociological Association of Nigeria**.** Pp 122-125 https://rusan.org.ng/proceedings/30th.pdf

Adebayo A. E. and Ojogu E. O. (2019). Assessment of the Use of Climate Smart Agricultural Practices among Smallholder Farmers in Ogun State. *Acta Scientific Agriculture* Volume 3 Issue 6; 47-56.

Ani, K.J., Anyika, V.O. and Mutambara, E. (2022), "The impact of climate change on food and Human security in Nigeria", *International Journal of Climate Change Strategies and Management*. Vol. 14 No. 2, pp. 148-167. https://doi.org/10.1108/IJCCSM-11-2020-0119

Asadu A. N., Ikechukwu, O. R., & Dimelu, M. (2018). The Climate Change Information Source and Indigenous Adaptation Strategies of Cucumber Farmers in Enugu State, Nigeria. *Journal of Agricultural Extension*, *22*(2), 126–146. Retrieved from https://journal.aesonnigeria.org/index.php/jae/article/view/1560

Ekpa D. , Tiri G.D., and Ekpa M.O (2021). Analysis of the Challenges of Climate Smart Agricultural Practices among crop farmers in North-West, Nigeria *Journal of Agriculture and Environment* Vol. 17 No. 2, 2021: Pp 7-24 ISSN: 1595-465x (print) 2695-236x (online)

Food and Agricultural Organisation (FAO, 2022): Climate smart Agriculture. https://www.fao.org/climate-smart-agriculture/overview/en/

Muriithi, L. N., Onyari, C. N., Mogaka, H. R., Gichimu, B. M., Gatumo, G. N., & Kwena, K. (2021). Adoption Determinants of Adapted Climate Smart Agriculture Technologies Among Smallholder Farmers in Machakos, Makueni, and Kitui Counties of Kenya. *Journal of Agricultural Extension*,

25(2), 75–85. Retrieved from https://journal.aesonnigeria.org/index.php/jae/article/view/2797

Nnadi, O. I., Ogbodo, F. N., Ohagwu, A. V., Onyia, C. C., Ozioko, R. I., & Nnadi, U. V. (2021). Effectiveness of Climate Change Adaptation Measures used by Women Garden Egg Farmers in Enugu State, Nigeria. *Journal of Agricultural Extension*, *25*(4), 50–61. Retrieved from https://journal.aesonnigeria.org/index.php/jae/article/view/2919

Toliatkashani T., Najaf Abadi M. O. and, Lashgarara F. (2019). Factors Affecting the Use of Sustainable Agriculture in Iran's Potato Cultivars. *International Journal of Advanced Biological and Biomedical Research*, 2019, 7(3), 213-224. http://www.ijabbr.com/article_34757.html

Ukhurebor, K.E., Aidonojie, P.A. The influence of climate change on food innovation technology: review on topical developments and legal framework. *Agriculture & Food Security* 10, 50 (2021). https://doi.org/10.1186/s40066-021-00327-4