UNIJERPS

Unizik Journal of Educational Research and Policy Studies VOL.18 (3);
July-December, 2024 https://unijerps.org
2023 Impact Factor: **6.834;** 2022 ***Impact Factor***: 5.156; ***2021 Impact Factor: 5.641;***
2020 Impact Factor: 5.355. *Indexing and Impact Factor URL: http://sjifactor.com/passport.php?id=21363*

SKILL-GAP ANALYSIS ON SWEET POTATO PRODUCTION AND STORAGE IN SELECTED COMMUNITIES IN ENUGU AND EBONYI STATES OF NIGERIA

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ABSTRACT

This study analysed skill-gaps on sweet potato production and storage in selected communities in Enugu and Ebonyi states in Nigeria. The study adopted a descriptive survey design. Data were collected using a well-structured questionnaire from 120 respondents out of a population of 182,431 sweet potato farmers and marketers. A stratified random sampling technique was used in selecting the sample population of the study. Data collected was analysed using mean and Pearson correlation coefficient. The findings indicated that there were gaps in land preparation skills, planting skills, field management skills and storage skills of sweet potato farmers in the study area. The study further revealed that there were very strong correlation between the two states in land preparation, planning, field management and storage skills in sweet potato production and storage in Enugu and Ebonyi States. It was recommended that government should organize workshops through extension agents to educate sweet potato farmers on essential land preparation, planting, field management and storage skills in sweet potato production. That research institutes should provide sweet potato farmers with improved varieties of sweet potato and a production manual to guide them on their production activities and a platform such as a cooperative society should be formed to attract loans/grants to farmers and help quick dissemination of information among sweet potato farmers.

Keywords: Sweet-potato, skill-gap, production, and storage, correlation

Introduction

Sweet potato (Ipomoea batata) is a dicotyledonous plant belonging to the bindweed or morning glory family *Convolvulaceae*. Sweet potatoes are one of the world's most nutritious and versatile root crops with a rich history. It's originated in the America and was first domesticated in the present-day Peru and Ecuador and was later introduced to Africa, Asia and the Pacific by European colonizers (Mbanazor, 2011).

Sweet Potatoes are a powerhouse of nutrition, rich in vitamin A and c, potassium, fiber and antioxidants. They are also excellent source of complex carbohydrates making them an ideal food for energy and satiety. The nutritional value of sweet potatoes has been recognized by the United Nations, Food and Agriculture Organization, FAO (USDA, 2019) which has identified them as a key crop for global food security and nutrition.

In addition to their nutritional value, sweet potatoes also hold significant economic importance. They are vital source of income for millions of small-scale farmers worldwide, particularly in sub-Saharan Africa and Asia. The global sweet potato market is growing rapidly, driven by increasing demand for fresh, processed, and value-added sweet potato products. Sweet potato as a nutritious crop has gained popularity in recent years due to its health benefit and versatility in cooking. Tubers are consumed after cooking frying or baking. The aerial parts are valuable feed for animals or raw material for bioethanol or biogas production. (Prakash, et al, 2016)

Medicinally, Lee and park (2018) observed that sweet potatoes offer numerous medicinal benefits due to their richness in vitamins, minerals, antioxidants and other nutrients. It's richness in vitamins helps to reduce the risk of infections, promote healthy skin and bone by reducing the risk of fractures. The antioxidant content of sweet potatoes help to protect cells from damage, reduce inflammation and may reduce the risk of chronic diseases like cancer and heart disease (Kim & Kim, 2013). Hence, Tan (2015) asserts that the plant is highly valued and used in multiple sectors of the food and pharmaceutical industries.

Chukwu (2001), further stressed that in the South East agroecological zone, the sweet potato has joined the league of life saving crops as yam and cassava. According to Ejechi et al (2009), the crop blends well with cowpea, rice and plantain when eaten together. The leaves are usually eaten, boiled or incorporated with soup and stew (Matthew et al, 2008).

Nigeria is the highest producer of sweet potato in Africa with an annual production output of 3.46 million metric tons (FAO, 2006). In addition to being the highest producer in Africa, it is globally the second largest producer after China (Aboajah et al, 2018). The crop can be produced as a single crop or intercropped with other crops such as maize, guinea corn and even cassava.

Despite the economic, nutritional and medicinal value of sweet potatoes, less research has been carried out on sweet potato when compared to other root crop such as cassava and yam. Hence, there is a

death of information on the skill-gap of sweet potato production in Nigeria, especially in Ebonyi and Enugu States of Nigeria. The production of sweet potato such as other tuber crops on Nigeria is threatened following the challenges confronting the production activities such as pests and weed infestation, farming system and skill manifestation and the low prices of the crops and their products.

To solve the problem of hunger, it is necessary to strengthen the production skills of the producers, thereby increasing the production and effectively make the product available to the consumers in an affordable price. Hence, the study seeks to analyse the skill-gaps that exist in the production and storage of sweet potato in selected communities in Enugu and Ebonyi States. Specifically, the study sought to examine:

1. Land preparation skill-gaps in sweet potato production and storage in Enugu and Ebonyi States.
2. Planting skill-gaps in sweet potato production and storage in Enugu and Ebonyi States.
3. Field management skill-gaps in sweet potato production and storage in Enugu and Ebonyi States.
4. Storage skill-gaps in sweet potato production and storage in Enugu and Ebonyi States.

Consequently, the following research questions are sought to be answered.

i. What are the land preparation skill-gaps in sweet potato production and storage in Enugu and Ebonyi States?
ii. What are the planting skill-gaps in sweet potato production and storage in Enugu and Ebonyi States?
iii. What are the field management skill-gaps in sweet potato production and storage in Enugu and Ebonyi States?
iv. What are the storage skill-gaps in sweet potato production and storage in Enugu and Ebonyi States?

Research Method

Study Design: Descriptive survey research design was adopted for the study. In the words of Babie (2016) descriptive survey research design provides detailed, factual insights into a population's characteristics, attitude, behaviours and opinions. This design was chosen because it is appropriate and ideal for getting the needed responses on the skill gap analysis of sweet potato production and storage in selected communities in Enugu and Ebonyi States of Nigeria.

Population of the Study: The population for the study consisted of all sweet potato producing and marketing families in the eight selected communities in Ebonyi and Enugu States. The population of the selected communities in both Enugu and Ebonyi States is approximately 182,431 farmers and marketers.

Study Area: The study was carried out in Enugu and Ebonyi States. The researchers selected four communities from each state. The communities selected are where the greater number of sweet potato farmers resides within the two states. The selected communities in Enugu State include: Agu-Amede, Mgbuji, Amede and Umulu. While

in Ebonyi State the selected communities include: Ubeagu, Nkalagu, Amaezu and Umuhali.

Sampling and Sampling Procedure: A multi-stage sampling technique was used. In stage one, four communities highly involved in sweet potato production were purposively selected from each state, giving a total of eight (8) communities. In stage two, the famers that were highly involved in sweet potato production were identified in the eight selected communities. Stage two involved a random selection of 15 experienced sweet potato farmers and marketers. This procedure gave 120 sweet potato farmers which were used for the study.

Instrument for Data Collection: A well-structured questionnaire titled "Skill Gap analysis on Sweet Potato Production and Storage Questionnaire (SPASPPS)" was used for data collection. The questionnaire contained twenty-four items and provided options where the respondents were asked to tick to the correct options as outlined in the questionnaire.

Validity and Reliability of the Instrument: The instrument was validated by three experts, all from the Department of Agricultural Education, Federal College of Education, Eha-Amufu; Enugu State. The instrument was assessed for proper representation, wording and consistency. The internal consistency was determined by the use of Cronbach's Alpha reliability method with a reliability coefficient of 0.81 therefore, suitable for the study.

Method of Data collection: The copies of the questionnaire numbering one hundred and twenty were administered to the sweet potato farmers and marketers with the aid of four trained research assistants recruited from the selected communities. They help interpret and fill the questions to the illiterate respondents. All the 120 questionnaires were returned and were used for data analysis. This indicates a 100% return rate for the instrument.

Method of Data Analysis: The data collected was analysed using mean and Pearson correlation coefficient. The decision rule was that any computed mean score that range from 2.50 and above was regarded as "agree" while any item with a computed mean score less than 2.50 was considered rejected by the respondents. Pearson correlation coefficient was used to obtain the extent of correlation between the performance of the respondents in Ebonyi and Enugu State.

Presentation of Results

Table 1 shows the distribution of respondents used on their gender, age, marital status, educational qualification, house-hold size and years of experience. The table indicated that 56% of the respondents were females, while 44% were males in Ebonyi State, while in Enugu State 41.7% were males while 58.3% were females. This shows that sweet potato production in both states is dominated by women. Ages of the respondents in both states are between the ages of 31 – 40 years as Ebonyi recorded 40% and Enugu 35%. Talking about marital status, most of the respondents are married. In Ebonyi, 60% of the respondents were married while in Enugu State 53.3% were married. Educationally, most of the respondents in

Ebonyi State had their primary education (46.6%) while 46.7% of the respondents in Enugu State had their secondary school education. On household size, 46.6% of the respondents had between 1-5 persons, while in Enugu State most (43.3%) of the respondents had a family size of 6-10 persons. In Ebonyi State 43.3% of the respondents had 11-15years experience, while in Enugu State 40% had experience of 11-15 years.

Table 1: Socio-economic Characteristics of the respondents

	Ebonyi		**Enugu**		**Total n = 120**
	No	**%**	**No**	**%**	
Gender					
Male	26	44	24	40	41.7
Female	34	56	36	60	58.3
Age					
Below 21	5	8.3	7	11.7	10
21 – 30	16	26.6	17	28.3	27.5
31 – 40	24	40	21	35	37.5
41 – 50	10	16	9	15	15.8
51 & Above	5	8.3	6	10	10.8
Marital Status					
Single	3	5	5	8.3	
Married	36	60	32	53.3	
Separated	14	23.3	17	28.3	
Widowed	7	11.6	6	10	
Educational Qualification					
No Formal Education	8	13.3	6	10	
Primary Education	28	46.6	20	33.3	
Secondary Education	18	30	28	46.7	
Tertiary Education	6	10	6	10	
Household Size					
1 – 5 Persons	28	46.6	24	40	
6 – 10 Persons	22	36.6	26	43.3	
11 – 15 Persons	10	16.6	10	16.7	
Years of Experience					
1 – 5 Years	13	21.6	11	18.3	
6 – 10 Years	10	16.6	15	25	
11 – 15 years	26	43.3	24	40	
16 years & Above	11	18.3	10	16.7	

Table 2.1 shows the land preparation skill-gap in sweet potato production in the study area. The response shows that farmers do not test soil pH before cultivating sweet potato with a high mean score of 3.57. They also exhibit an improper tillage of the soil before planting sweet potato and the farmers lack the knowledge of best soil type to cultivate with the mean scores of 3.02 and 3.31 respectively. Also, table 2.2 shows that

there is a very strong positive correlation between Enugu and Ebonyi States in the land preparation practices. This is shown by the mean of Ebonyi (15.250) and that of Enugu (14.130) and the correlation coefficient of 0.955.

Table 2.1: Frequencies and mean of respondent on the various land preparation activities in sweet potato production and storage

	ITEMS	SA	A	D	SD	MEAN	REMARK
1.	Farmers do not test the soil PH and nutrient level before cultivating sweet potatoes	91	15	5	9	3.57	Agree
2.	Improper tillage of soil	52	31	24	13	3.02	Agree
3.	Farmers do not clear the land well to properly remove weeds and debris	45	28	33	14	2,87	Agree
4.	Farmers do not use modern equipment such as tractor to prepare the soil	58	24	20	18	3.02	Agree
5.	Farmers lack the knowledge of best soil type to cultivate	69	20	19	12	3.31	Agree

Key: SA=strongly agreed, A=agreed, D= disagree, SD= strongly disagree

Table 2.2: Correlation analysis on the land preparation skill-gap in sweet potato production and storage in Enugu and Ebonyi states

State	No of respondents	Mean	Correlation	Sig. 2tailed	Remark
Enugu	60	14.130	0.955	0.021	Very strong positive correlation
Ebonyi	60	15.250			

Table 3.1 shows the planting skill-gap in sweet potato production and storage in the study area. The result showed that the farmers lack knowledge of sweet potato varieties that suit their locality. The recommended planting depth and spacing between sweet potato stands with mean scores of 3.59, 3.40 and 3.37 respectively. Table 3.2 in the same vein presents the correlation analysis on the planting skill-gaps in sweet potato production. The table shows that Enugu has the mean of 13.100 and Ebonyi 14.000, with a correlation coefficient of 0.9723.

Table 3.1: Shows the frequencies and mean of respondents on the planting skills in sweet potato production and storage.

S/N	ITEMS	SA	A	D	SD	MEAN	REMARK
1.	Lack knowledge of sweet potato varieties that suit their locality	89	18	3	5	3.59	Agree
2.	Farmers do not know the planting depth of sweet potato	78	22	17	5	3.40	Agree
3.	Do not know the spacing between sweet potato stands	80	17	10	13	3.37	Agree
4.	Farmers do not know the right length of vine of sweet potato to plant	69	17	17	17	3.15	Agree
5.	No knowledge of best medium to plant such as mound or ridges or flat land	50	30	29	11	2.99	Agree
6.	Farmers are not aware of the right time/month to plant sweet potato	64	24	14	17	3.10	Agree
7.	Lack knowledge of crop to intercrop with sweet potato	54	22	18	16	2.78	Agree

Key: SA=strongly agreed, A=agreed, D= disagree, SD= strongly disagree

Table 3:2 Correlation analysis on the planting skill gaps in sweet potato production in Enugu and Ebonyi states

State	No of respondents	Mean	Correlation	Sig. 2tailed	Remark
Enugu	60	13.100	0.9723	0.021	Very strong positive correlation
Ebonyi	60	14.00			

Table 4.1 shows the field management skill-gaps the sweet potato farmers are aware of. The finding revealed that the farmers are ignorant about the use of herbicides (3.53), pest and diseases of sweet potatoes (3.52) and the pesticides to use to control pests and disease of sweet potato (3.33). Table 4.2 further presents the correlation analysis of the field management skill-gap in sweet potato production and storage in the study area. The result obtained showed that Enugu and Ebonyi States had the mean scores of 13.250 and 13.292 respectively, with a correlation coefficient of 0.9614.

Table 4.1: Frequencies and mean of respondents on the field management skill gaps in sweet potato production and storage

S/N	ITEMS	SA	A	D	SD	MEAN	REMARK
1.	Farmers do not know the herbicides and correct dosage to be used on sweet potato farm	88	18	4	10	3.53	Agree
2.	Farmers are not aware of pest and diseases of sweet potatoes	75	29	10	6	3.52	Agree
3.	Farmers do not know the pesticides to be used to control pests and diseases of sweet potato	70	28	14	8	3.33	Agree
4.	Farmers do not know the correct type of fertilizer to be used on sweet potato	73	18	17	12	3.23	Agree
5.	Farmers do not know when and how to apply fertilizer on sweet potato	69	24	18	7	3.27	Agree
6.	Farmers do not know the right time to start harvesting sweet potato	55	26	30	9	3.06	Agree

Key: SA=strongly agreed, A=agreed, D= disagree, SD= strongly disagree

Table 4:2: Correlation analysis on the field management skill-gap in sweet potato production and storage in Enugu and Ebonyi States

State	No of respondents	Mean	Correlation	Sig. 2tailed	Remark
Enugu	60	13.250	0.9614	0.25	Very strong and positive correlation
Ebonyi	60	13.292			

Table 5.1 presents the storage skill-gaps in sweet potato production and storage in Enugu and Ebonyi States. The result obtained show that the farmers do not know the right temperature and humidity for storing potato (3.62), that they do not allow sweet potato to dry and heal after harvesting (3.43) and that they do not monitor stored sweet potato regularly as they ought (3.36). The correlation analysis in the storage skill of farmers in sweet potato production was presented in table 5.2. The table revealed that Enugu State had a mean score of 12.292, while Ebonyi State had a mean score of 15.000. The correlation coefficient obtained was 0.8979.

Table 5:1 Frequencies and mean on the storage skill gaps in sweet potato production and storage in Enugu and Ebonyi states.

S/N	ITEMS	SA	A	D	SD	MEAN	REMARK
1.	Farmers do not know the right temperature and humidity that sweet potato can store well	90	20	5	5	3.62	Agree
2.	Farmers do not ensure proper air flow during sweet potato storage	70	19	11	20	3.16	Agree
3.	Farmers do not allow sweet potato to dry and heal after harvesting	77	21	17	5	3.43	Agree
4.	Farmers do not separate diseased sweet potatoes from healthy ones before storing	54	30	20	16	3.01	Agree
5.	Farmers do not monitor stored sweet potato regularly	80	16	11	13	3.36	Agree
6.	Farmers do not know how long sweet potatoes can store well	45	33	28	14	2.90	Agree

Key: SA=strongly agreed, A=agreed, D= disagree, SD= strongly disagree

Table 5:2: Correlation analysis on the storage skill in sweet potato production and storage in Enugu and Ebonyi States

State	**No of respondents**	**Mean**	**Correlation**	**Sig. 2tailed**	**Remark**
Enugu	60	12.292	0.8979	0.043	Very strong positive correlation
Ebonyi	60	15.000			

Discussion of Findings

The research analysed the skill-gap on sweet potato production and storage in selected communities in Enugu and Ebonyi States of Nigeria. The findings of this study based on the results obtained showed that majority (56%) of the farmers were females which imply that women were more involved in the production of sweet potato than men. This agrees with the findings of Orunda (2013) and Egwuonwu and Ozor (2020) that sweet potato is considered a woman's crop. Most of the farmers were between the age of 31-40, and majority, Enugu (60%) and Ebonyi (53.3%) of them were married. 46.6% of the farmers in Ebonyi had primary education while in Enugu 46.7% of them had secondary education. This implies that they were literate and can easily adopt new and profitable practices and farming techniques. The farmers had an average household size of 1-10 persons which implies that family labour may help to increase production, thereby reducing the cost of production. Majority, Enugu (40.7%) and Ebonyi (43.3%) had 11-15years experience in sweet potato production and storage. This means that they have a vast knowledge about the production and storage of the crop.

From the result obtained in the research, it shows that most of the farmers do not test the soil pH before cultivation and planting of sweet potato and that the soil tillage method they apply mostly are improper as they believe that sweet potato as

a creeping plant will prevent weeds from growing early and easily. This is in tandem with Adedire, et al (2019) who stated that many farmers plant crops blindly with no knowledge of the cropping history of the land, its soil fertility level and suitable soil type. This knowledge gap could lead to seasonal pest and disease infestation, limited farm productivity and low yield of crops. The correlation analysis on the land preparation skill-gap showed that there is a very strong positive correlation between the two states, even though Ebonyi State seems to have higher mean value in knowledge more than Enugu State.

On the planting skill-gaps of sweet potato in the study area, both Ebonyi and Enugu States sweet potato farmers agreed that they lacked knowledge of sweet potato varieties that suit their locality, the recommended planting depth and spacing between sweet potato stands. This indicates the absence of extension service to sweet potato farmers in the study area. This is in tandem with Egwuonwu (2020) who asserted that one of the problems of sweet potato production is the absence of agricultural Extension agents to sensitize farmers on the improved production technologies. The correlation analysis on the planting skill-gaps of sweet potato revealed that Ebonyi State had a higher knowledge of planting skill than Enugu State. However, the correlation coefficient obtained showed that there is a very strong positive correlation between the two states.

On the field management skill gaps in sweet potato production and storage in the study area, the respondents attested that they do not know the correct herbicide, pesticide and fertilizer and the correct dosage to apply in order to effectively control weeds, pests and boost potato production. This finding disagrees with that of Egwuonwu et al (2020) where sweet potato farmers in Ohaji/Egbema Local Government Area of Imo State where a good percentage of sweet potato farmers were at the adoption stage of pesticide, herbicide and fertilizer use in the production of sweet potato. The correlation analysis on field management skill-gap revealed that there is a very strong positive correlation between the two states despite the fact that Ebonyi State slightly had higher knowledge of field management skill in sweet potato production.

The two states (Ebonyi and Enugu) studied had some gaps in their storage skills of sweet potato. They do not know the right temperature and humidity to store sweet potato, do not allow sweet potato to heal and dry after harvest and do not monitor stored sweet potato regularly following recommended/ modern technology. Mostly, they store their sweet potatoes traditionally by heap storage, in-ground storage, platform and pit storage methods. They are not aware of the modern methods of storage in warehouses, use of chemical, cold room storage and diffused light storage as outlined by Usha, Onu and Pearse (2016). The correlation analysis on the storage skill gap revealed that Ebonyi State has a higher knowledge of storage skill of sweet potato production and storage. Generally, the correlational study between Ebonyi and Enugu States on the various skill-gaps in sweet potato indicates that there is a positive relationship between the two states.

Conclusion

Identifying skill-gaps in sweet potato production and storage in Enugu and Ebonyi State can enhance productivity, increase economic benefits, inform training programs, improve farmers technical knowledge and best practices in the region. There are gaps in the skills portrayed by potato farmers in land preparation and knowledge of essential planting skills. However, the farmers portrayed knowledge in field management skills and there were very strong positive correlation between the two states in land preparation, planting, field management and storage skills in sweet potato production in Enugu and Ebonyi States.

Recommendations

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

1. Following the existent gaps in the various skills of land preparation, planting, field management and storage skills, frequent workshops should constantly be organized through the agricultural extension agents to educate sweet potato farmers on the various skills required in sweet potato production and storage.
2. Research institutions concerned with sweet potato production should provide the farmers with improved varieties of sweet potato and manuals to guide farmers towards the production activities of sweet potato.
3. Sweet potato farmers at local levels and communities in both States should form cooperative societies in order to attract loans/grants from the government and concerned bodies for increased sweet potato production and storage.

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