

**DETERMINANTS OF FOOD WASTES AMONG FARMING HOUSEHOLDS IN UYO  
LOCAL GOVERNMENT AREA, AKWA IBOM STATE, NIGERIA**

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**ABSTRACT:** *The subject of food waste is one in which has been of great concern to many governments and countries in the world. Combatting the issue of food waste has therefore been in focus in recent times. Reduction in food waste would preserve the environment and improve the lives, livelihood and economies of several households across the globe. In order to properly reduce food waste, it is imperative that there should be an understanding of the factors that influence household food waste . This research paper presents data from 120 households sample in Uyo Local Government Area. The result shows that an average of ₦8,110.94 worth of food is wasted monthly among farming households in Uyo Local Government Area. From the results, there was a positive relationship between the value of food waste and household size, household monthly income and access to credit of households. This paper also identified the stages where household food waste was experienced to include storage, during preparation, cooking and also leftovers after eating. It also considered how much waste was generated by households in these stages.*

**KEY WORDS:** food waste, socioeconomic characteristics, farming, households.

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## **INTRODUCTION**

Food waste and food security are gaining an increasing amount of attention among both researchers and policy-makers in both developed and developing countries, given the world's growing population (Chalak, Abiad, Diab and Nasreddine, 2019). The Food and Agriculture Organization of the United Nations (FAO) estimates that 690 million people were hungry in 2019, a number that is expected to rise sharply during and post-COVID-19, with a staggering 3 billion people that cannot afford a healthy diet (FAO, 2020). Generally, farmers venture into agriculture for several reasons one of which is to provide food for the rapidly growing world population. Food fulfils a fundamental human need and it is vital for our existence as human beings but it is seen that our eating habits, the way we consume, remain leftovers and how it is disposed is greatly affecting us as well as the environment we live in. According to national estimates, Nigeria is said to generate some 32 million tonnes of waste per year (including all stages of the value chain) (Lantz, 2021). According to global estimates, 30 – 50 percent of food produced for human

consumption is either lost or wasted each year along the food supply chain (Food and Agriculture Organization, 2012; Gustavsson, Cederberg, Sonesson, Otterdijk and Meybeck, 2011).

In order to reduce food waste, it will require a careful analysis of the exact linkages between food loss, food waste and food security (Food and Agriculture Organization, 2019). The distinction between food loss and food waste is not only conceptually relevant, but also useful in understanding and tackling the problem and can be seen in Fig. 1. below. Technically, food loss and waste is understood as the decrease in quantity or quality of food along the food supply chain (FAO, 2019). Food loss refers to all the crop, livestock and fish, human-edible commodity quantities that, directly or indirectly, completely exit the post-harvest supply chain during storage, transportation and processing by being discarded, and do not re-enter in any other utilization (such as animal feed, industrial use, etc.) (FAO, 2019). On the other hand, food waste is seen to represent losses at the distribution and consumption stages (FAO, 2019). At the distribution and consumption stage, food waste occurs when food suitable for human consumption ends up being discarded, whether it is kept carelessly, beyond its expiry date or left to spoil. In simple terms, food waste can be defined as any food that is cultivated and harvested for the purpose of consumption but is then discarded, therefore losing the initial intended purpose of the food and thereby impacting negatively on labour, machines and cost as well as households. This is then further divided into the sub-categories, avoidable food waste (food cooked or served too much which results in leftovers) and possibly avoidable food waste (waste arising from food preparation that is not edible under normal circumstances such as bones, eggshells, etc.), (Waste & Resources Action Programme (WRAP) 2014).

**Figure 1.: Distinction between food loss and food waste along the food supply chain**



Food waste is a crucial issue that has emerged globally and needs to be addressed in order to achieve sustainable consumption. According to Food and Agriculture Organization (FAO 2011), one-third of the food produced for human consumption is lost or wasted globally, which amounts to about 1.3 billion tonnes per year and this should be unacceptable when more than 820 million

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people in the world continue to go hungry every day. The World Economic Forum has noted that 61 percent of global food waste comes from households, 26 percent from food service and 13 percent from retail (World Economic Forum, 2021). Societal costs of wasting food add up to around \$2.6 trillion globally, of which \$1 trillion are economic losses to the agro-food chain, \$900 billion are human welfare losses, and \$700 billion are losses due to the environmental impact of food waste. Food waste amounts to roughly \$680 billion in industrialized countries and \$310 billion in developing countries. Whereas, nationally, about 30-40 percent of food produced in Nigeria, amounting to \$750 billion yearly is wasted (Onwumere, 2018). There are a number of causes of food waste, but consumers are seen to be the largest group (directly or indirectly) responsible for food waste in many countries, especially developed countries (Kunmu, deMoel, Porkka, Siebert, Varis, and Ward, 2012).

Food loss and waste is recognized as a serious threat to food security, the economy, and the environment (Abiad and Meho, 2018) and this issue of food waste has become quite necessary because of the considerable environmental, economic and social costs which it imposes on the society. It is necessary to note the fact that losing food implies unnecessary pressure on the environment and the natural resources that have been used to produce it in the first place because food that never gets eaten by the consumers is not only a waste of that food but as well a waste of the resources put in the production of the food such as, land, soil, seeds, water as well as energy. It is almost unjustifiable to have such a dominant and increasing waste of such scarce resources that have alternative uses from both a production and purchase point of view. Also, food wasted globally would be of help to feed some people with food insecurity. The increase in the world population has been apparent, from 7.4 billion in 2015 to 7.6 billion in 2017 (United Nations Report, 2017). Recent estimates suggest that in 2014–2016 around 815 million people out of the 7.6 billion people in the world are undernourished (FAO, 2016) and with the projections of a world population increase to 9.6 billion individuals by 2050 has driven many commentators to note that food production needs to increase by a minimum of 70 percent to keep up with the pace (Baig, Al-Zahrani, Schneider, Straquadine, Mourad, 2019.). Minimizing or even eliminating food wastage can help address the dietary needs of one-eighth of the undernourished population globally. There is, therefore, an urgent need to explore various avenues to prevent food waste while contributing to the alleviation of hunger and malnutrition. Indeed, there have been many recent examples of private sector initiatives that have successfully gathered food waste to feed undernourished people. Several studies have investigated consumers' food waste behaviour, with the objectives of developing effective and efficient interventions program for food waste mitigation (Bravi, Murmura, Savelli, Viganò, 2019). Interest in food waste research has been steadily gaining momentum globally in the last decade (Fanelli, 2019).

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## RESEARCH METHODOLOGY

### Study Area and Population of the Study

This study was conducted in Uyo Local Government Area, the capital of Akwa Ibom State, Nigeria. The target population of the study considered farming households among four clans (Offot, Etoi, Oku, Ikono) in Uyo Local Government Area of Akwa Ibom State.

### Sampling Procedure and Sample Size

samples were selected using multi-stage sampling technique. First stage was selection of the four clans in Uyo namely Offot, Etoi, Oku and Ikono. Secondly, 10 villages were selected using random sampling technique from each clan making a total of 40 villages in the study area. In the third stage, 3 households were randomly sampled from each of the villages to give a total of 120 households which was used for this study.

### Sources of Data and Methods of Data Collection

Primary data for this research was collected through the use of a well-structured questionnaire which was divided into different sections according to the stated objectives. Oral interview was also used to complement the questionnaire. The food waste was estimated using inferential method which implies the comparison of the total quantity of food which goes into the household with the quantity of food that is actually consumed by members of the household.

### Methods of Data Analysis and Measurement of Variables

The data collected was analyzed using descriptive statistics such as mean, median, mode, percentages, frequency distribution, while the multiple regression was used to estimate the factors that determined the value of food waste in the study area. The model used is as specified below

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e_i$$

Where,

Y= Value of food waste (in Naira)

The explanatory variables in the model include

X<sub>1</sub> = Age of Household Head (In number of years)

X<sub>2</sub> = Household Size (Number of persons)

X<sub>3</sub> = Educational Level of Household Head (Years of Formal Education)

$X_4$  = Household Income (In Naira)

$X_5$  = Years of Farming Experience (Number of years)

$X_6$  = Access to Credit (Yes = 1; No = 0)

## RESULTS AND DISCUSSION

### Socioeconomic Characteristics of the Respondents

The result reveals that most of the respondents (54.20 percent) were females with 35 percent of them (42) falling between the age range of 31 – 45 years, having a mean age of 44 years and few of them (17) within the age range of 61 – 75 years. This result shows that the respondents in the area were relatively young and strong enough to be actively involved in farming activities in the study area. The study revealed that 73.33 percent of the respondents had household size ranging from 1 – 5 persons, while 0.84 percent had household size above 10 persons. From this study, the mean household size was 4 persons.

Results from this study reveal that 67.50 percent of household heads were graduates with tertiary education while 5.83 percent and 24.17 percent were holders of first school leaving certificate and senior school certificate (S.S.C.E) respectively. It was also seen that only 2.5 percent of household heads possessed no formal education. The study also reveals that for the educational level of the spouse, 51.67 percent were seen to have tertiary education, 10.83 percent and 28.33 percent were seen to have primary and secondary education respectively, and 9.17 percent possessed no formal education at all.

From the study it was observed that most of the respondents (63) earned between ₦1 – ₦50,000 monthly from their farming activities, while just a few (3) earned above ₦200,000 monthly from their farming activities monthly.

Table 1: Socioeconomic Characteristics of respondents

Socio-economic Characteristics	Frequency	Percentage
<b>Sex</b>		
Male	55	45.80
Female	65	54.20
<b>Age of Household Head</b>		
Less than 31 years	26	21.67
31 – 45 years	42	35.00
46 – 60 years	35	29.16
61 – 75 years	17	14.17
<b>Mean Age</b>	44 years	

<b>Marital Status</b>		
Single	58	48.30
Married	59	49.20
Separated/Divorced	2	1.70
Widowed	1	0.80
<b>Household Size</b>		
1 – 5 persons	88	73.33
6- 10 persons	31	25.83
Above 10 persons	1	0.84
<b>Mean Household Size</b>	4 persons	
<b>Position in the Household</b>		
Household Head	62	51.66
Not Household Head	58	48.34
<b>Highest Educational Attainment of Household Head</b>		
No Formal Education	3	2.50
Primary Education	7	5.83
Secondary Education	29	24.17
Tertiary Education	81	67.50
<b>Highest Educational Attainment of Spouse</b>		
No Formal Education	11	9.17
Primary Education	13	10.83
Secondary Education	34	28.33
Tertiary Education	62	51.67
<b>Major Source of Power Supply</b>		
Public power supply	96	80.00
Private power supply	24	20.00
<b>Years of Farming Experience (in years)</b>		
1 – 5	35	29.16
6 – 10	38	31.67
11 – 15	18	15.00
16 – 20	17	14.17
21 – 25	6	5.00
26 – 30	5	4.17
Above 30	1	0.83
<b>Mean Years of Farming</b>	11 years	
<b>Monthly Income from Farming (in Naira)</b>		
1 – 50,000	63	52.50
50,000 – 100,000	28	23.33
100,001 – 150,000	17	14.17
150,001 – 200,000	9	7.50

200,001 – 250,000	3	2.50
<b>Mean Monthly Income</b>	<b>₦96,864.47</b>	
<b>Income from Secondary Occupation</b>		
<b>(in Naira)</b>		
1 – 25000	71	59.17
25,001 – 50,000	32	26.66
50,001 – 100,000	15	12.50
100,001 – 150,000	2	1.67
<b>Mean Monthly Income</b>	<b>₦23,972.17</b>	
<b>Amount of Income Spent on Food</b>		
<b>Monthly</b>		
15,001 – 20,000	16	13.33
20,001 – 25,000	62	51.67
25,001 – 30,000	23	19.17
30,001 – 35,000	16	13.33
Above 35,000	3	2.50
<b>Average Monthly Income Spent on Food</b>	<b>₦24,546.27</b>	
<b>Ownership/Access to Refrigerator</b>		
YES	93	77.50
NO	27	22.50
<b>Co-operative Membership</b>		
YES (Member)	33	27.50
NO (Not a member)	87	72.50
<b>Access to Credit</b>		
YES	39	32.50
NO	81	67.50

Source: Computed from Field Data Survey, 2021. N=120

### Stages in Household's activities where food waste is experienced

The study reveals in Table 2. above the stages where households' food waste occurred. It also shows the different food groups and how much of each of them are wasted in these stages. From the table, the study shows that the highest amount of food waste generated by households in the study area were seen to have occurred in storage with an average amount of ₦4566.09 which ran across all food groups. This finding is in accordance with a similar study conducted in Ogun State which observed that most of the food groups considered are wasted more during storage in the study area, with only cereals and noodles and pasta being wasted more as left over (Akerele, Oyawole, Sanusi, 2017). The second highest was however seen to be from leftovers after eating, with an average amount of ₦2199.81 and the least amount of waste noticed was during preparation and cooking with an average amount of ₦1345.04.

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**In storage**

The study reveals that the food group with the highest amount of waste generated by households in storage was Cereals with an average value of ₦1148.88. This is followed by Roots and Tubers in which households were seen to generate an average amount of ₦987.29. The third highest amount of waste which was generated in storage was from Meat, fish and eggs with an average amount of ₦872.88. Fruits and Vegetables, Legumes and Noodles and Pasta were however seen to generate an average amount of ₦617.58, ₦593.00 and ₦350.46 respectively. The total value of waste of Fruits and Vegetables being considerably lower than other food groups contradicts with certain findings which believe that soft and leafy fruits and vegetables are more likely to be wasted than roots and tubers and other classes in general, which are sturdier and not so easily damaged during handling, transportation and storage (Oelofse, Polasi, Haywood, Musvoto, 2021).

**During Preparation & Cooking**

The results from the study show that households in the study area generate more waste during preparation and cooking from Cereals with an average amount of ₦351.26. The second highest amount of waste generated in this stage is seen to be from Roots and Tubers which has an average amount of ₦335.58. This amount is closely followed by Meat, fish and eggs which was seen to have an average amount of ₦233.00. Legumes, Fruits and Vegetables were however seen to generate average amounts of ₦207.88, ₦121.54 and ₦95.78 respectively.

**Leftover after eating**

From Table 2, the study shows that households waste more of Cereals as leftovers with an average amount of ₦632.71. Fruits and Vegetables were seen to be wasted in this stage with an average amount of ₦500.43. The third highest amount of waste generated by households from leftovers after eating was seen to be from Roots and Tubers with an average amount of ₦454.92. Legumes, Meat, fish and eggs and Noodles and pasta generated average amounts of waste of ₦377.54, ₦146.04 and ₦88.17 respectively.



**Table 2: Stages in Household's activities where food waste is experienced**

<b>Food Items Consumed</b>	<b>In storage (₦)</b>	<b>During Preparation &amp; Cooking (₦)</b>	<b>Leftover after eating (₦)</b>
<b>Cereals (Rice, corn, wheat, etc.)</b>	1148.88***	351.26***	632.71***
<b>Legumes (Beans, groundnut, etc.)</b>	593.00	207.88	377.54
<b>Roots &amp; Tubers (Yams, potatoes, etc.)</b>	987.29**	335.58**	454.92*
<b>Meat, fish &amp; eggs</b>	872.88*	233.00*	146.04
<b>Noodles &amp; Pasta</b>	350.46	95.78	88.17
<b>Fruits &amp; Vegetables</b>	617.58	121.54	500.43**
<b>Total</b>	4566.09	1345.04	2199.81

Source: Computed from Field Data Survey, 2021

N/B: \*\*\*, \*\*, \* - Highest amount of food wasted in descending order

### **Results of Value of Food Waste Among Farming Households**

In Table 3 below, results from this study show the contribution of each food group to the total value of household food waste in naira. On average, the total value that was seen to be generated by households in the study area monthly was ₦8110.94. When compared to the total amount spent on food monthly which is ₦24,546.27, households are seen to waste 33.04 percent of the amount they spend on food. Furthermore, from the table, Cereals are seen to contribute the greatest to the total value of food waste of households by 26.25 percent. The next highest are seen to be contributed by Roots and Tubers with 21.92 percent of the total amount. However, the third highest value of food waste is seen to be from Meat, fish and eggs with 15.43 percent of the total waste. The contributions of other food groups to the total value of food waste are seen as, Fruits and Vegetables with 15.28 percent, Legumes with 14.53 percent and lastly, Noodles and Pasta with 6.59 percent of the total amount.

**Table 3: Results of Value of Food Waste Among Farming Households**

<b>Food Items Consumed</b>	<b>Value of Food Waste (₦)</b>	<b>Proportion of Waste ( percent)</b>
<b>Cereals (Rice, corn, wheat, etc.)</b>	2128.85***	26.25
<b>Legumes (Beans, groundnut, etc.)</b>	1178.42	14.53
<b>Roots &amp; Tubers (Yams, potatoes, etc.)</b>	1777.79**	21.92
<b>Meat, fish &amp; eggs</b>	1251.92*	15.43
<b>Noodles &amp; Pasta</b>	534.41	6.59
<b>Fruits &amp; Vegetables</b>	1239.55	15.28
<b>Total Waste</b>	8110.94	100
<b>Mean monthly Food Consumption</b>	₦24,546.27	

Source: Computed from Field Data Survey, 2021

N/B: \*\*\*, \*\*, \* - Highest amount of food wasted in descending order

### **Factors affecting food waste among farming households in the study area**

The multiple regression model as presented in Table 4. below was used to determine the factors which affect food waste of farming households. It can be seen from the table that Household Size, Household Income and Access to Credit are the only Socio-economic characteristics that affect food waste of households in the study area as opposed to a study conducted in Abeokuta which had Age, Household Size, Level of education of Spouse, Low income households, type of work and location of households as other factors which affect food waste (Akerele, Oyawole, Sanusi, 2017).

From Table 4., Household Size is seen to be significant at 10 percent level of significance. The table also reveals that the coefficient of household size (1934.059) was seen to influence the value of food waste positively in the study area, this implies that the higher the household size, that is, the higher the number of people in a household, the higher the amount of food waste generated by

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that household. The reason for this may be due to cooking in large amounts. This is comparable with a study conducted with South Australian households which identified that smaller households generated smaller waste (Vicki Mavrakis, 2014). Similarly, literature gives evidence suggests that larger household sizes, particularly with younger members, have a higher effect on waste generation (Tucker and Farrelly, 2016). Notwithstanding, there have also been studies that observed a negative relationship between household size and household food waste where it was noticed that smaller households wasted more food than larger households (Joˆrissen, Priefer and Braˆutigam, 2015). The reason was that these smaller households tend to display a ‘single person’s lifestyle’.

Household Income is significant at 1 percent level of significance and the coefficient (0.019) displays a positive relationship with food waste in the study area. This means that as income of households in the study area increases, the amount of food wasted generated by these households increase as well. This shows that households with low income were seen to waste less food which may be as a result of reduced disposable income which lowers the purchasing power of households as opposed to high income households that waste more, after all, you cannot waste what you cannot buy. Other studies conducted have also found a positive relationship between income and food waste generation whereas some studies did not find any effect. The results obtained in a model from a case study of Lebanon however diverges from other findings and show a negative correlation between household income and food waste. One possible explanation which was given was that high-income earners are more likely to possess better conditions of food storage, which will help them conserve food for longer periods, especially as they have better access to private electricity generation (Chalak, Abiad, Diab, Nasreddine, 2019).

Results in Table 4 show that Access to Credit was significant at 10 percent level of significance and the coefficient (8398.209) also exhibits a positive relationship with food waste. It can be seen that households that had access to credit were seen to waste more food than households that did not have access to credit facilities. This is because households that had access to credit facilities had significantly higher income which thereby increased their chances of wasting more food.

The fact that these three socio-economic characteristics, Household size, Household Income and Access to Credit were the only socio-economic characteristics seen to affect food waste generated by farming households in Uyo Local Government Area, it however does not mean that other factors may not affect food waste generated by households, rather it can be said that these other factors do not have a direct effect on food waste of farming households in the study area.

**Table 4: Factors affecting food waste among farming households in the study area**

Variable	Coefficients	t-value	p>/t/
Constant	7487.737 (16226.03)	0.4641	0.646
Age of Household Head	-171.899 (198.760)	-0.865	0.390
Household size	1934.059 (1140.364)*	1.696	0.070
Educational Level of Household Head	-1238.095 (3298.353)	-0.375	0.709
Household Income	0.019 (0.004)***	5.347	0.000
Years of farming Experience	84.258 (253.822)	0.332	0.741
Access to Credit	8398.209 (4758.192)*	1.765	0.080
R <sup>2</sup>	0.627		
Adjusted R <sup>2</sup>	0.591		
F-Ratio	6.203		

Source: Field Survey, 2021

N/B: Figures in Parenthesis () are standard errors

\*\*\* Significant at 1 percent level of significance, \* Significant at 10 percent level of significance

The result also shows that the age distribution of household heads did not affect the quantity of food waste generated by households in the study area as opposed to a similar to a study where the food waste behavior of two age-based classes of consumers in Poland were surveyed, one mostly 19–26, the other mostly 35–50, their results suggest that young people declare to waste more food than older people (Przezbórska-Skobiej, Wiza, 2021). The results from the study however is in line with the findings of Chalak et. al. which shows that the respondents' socio-demographic characteristics, such as gender, age, and marital status, did not affect the food waste generation of households (Chalak, Hassan, Aoun, Abiad, 2021).

## CONCLUSION

The study estimated the value of food waste and examined the influence of socioeconomic factors on food waste in the study area. The results show that food waste is generated more while in storage with Cereals being wasted than any other food group. The factors that were seen to affect food waste directly in the study area were household size, household income and access to credit. However, these may not necessarily be the only factors affecting food waste as other factors may have an indirect effect on food waste generated by households. Although there would always be unavoidable food waste, combatting the issue of food waste would however need the entire public to be aware of how much of their income is wasted and how to ensure that all resources are properly managed to avoid food waste. The study therefore recommends that in order to reduce food waste, the government should provide constant power supply for its citizens which would in turn encourage households in using refrigerators as a means of storage. Also, Campaigns on food waste and its effect on the environment and the economies of households should be held around the country to educate people and to instill in them food waste management behaviours. Furthermore, Households should endeavour to plan meals and measure food before cooking and to invest in storage facilities for both raw food and leftovers that could be used again. Further research should as well be carried out in other parts of the state and the country as well to give a broader scope as to what is being wasted and how to tackle this growing problem of food waste.

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