

## DETERMINANTS OF HOUSEHOLDS' FOOD WASTES IN OSOGBO METROPOLIS, OSUN STATE, NIGERIA

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### ABSTRACT

Globally, food wastage is a significant problem. According to the United Nations' Food and Agriculture organization estimate, one third of human food production is lost or wasted. Waste occurs in all parts of the value chain, from post-harvest processing through the supply chain. This study examined determinants of food waste among households in Osogbo Metropolis, Osun state, Nigeria. Multistage sampling procedure was used to select one hundred and twenty (120) respondents from the study area. Data were collected with structured interview schedule. Frequency counts, means, percentages, and multiple regression analysis were the major statistical tools employed in data analysis. Results of descriptive analysis of the socioeconomic characteristics reveals that majority of the respondents were middle aged, married, female public officers, with averaged sized family. Protein from plant sources and carbohydrate are the most wasted household food items in the households. Protein from plant sources and carbohydrate are the most wasted household food items in the households. Epileptic electricity supply is a major reason for household food wastages, while refrigeration is the most widely used method of preservation among the households. The study concluded that significant quantity of food is wasted among the households. Household size, household food expenditure, the quantity of food consumption, and frequency of food consumption are significant factors influencing the level of households' food waste in the study area. Thus, strict monitoring of these variables would minimize households' food waste in the study area.

**Keywords:** Food waste, Food security, Food production, Food preservation

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## INTRODUCTION

Food loss and security are two concepts that have attracted the interest of researchers and policymakers globally. This is because of the ever-rising demand for food by the world's growing population (Chalak *et al*, 2019, Obinoju and Ikpeida, 2021). According to Food and Agriculture Organisation (FAO) (2020), food loss or waste over the entire food supply chain is estimated at 30-50% across the globe, leaving about 690 million people in hunger with the number expected to rise globally in the post-COVID-19 era. About 3 billion people worldwide could not afford a balanced diet (FAO, 2020). Food loss and waste are two distinct, but interrelated concepts. According to global estimates, 30-50% of the world's total food production are either lost or wasted in the food production and distribution chain (FAO, 2012; Gustafsson *et al* (2011) and Obinaju and Ikpeida, 2021) FAO (2019) defines food loss as the quantity of edible food commodities that do not enter the post-harvest food supply chain, and is lost during storage or transportation and is not re-utilised in another form along the consumption chain. Such foods are directly or indirectly discarded and are not consumed either by man or livestock.

On the contrary, food waste refers to food items that are lost during food distribution and consumption stages. In this stage, food waste occurs, when food produced for consumption either by humans or livestock is discarded as a result of not being kept properly until it is unfit for consumption or left to get spoilt. (Obinaju and Ikpeida 2019). Food waste has a serious negative consequence on food security, the economy, and the environment. Food waste can lead to food insecurity, economic depression, and environmental degradation (Abiad and Meho, 2018). Although there are various causes and sources of food waste, consumers at the household levels have been affirmed as the largest single group responsible for the majority of food wasted globally, it is estimated that half of the total world food wastage in developed countries occurred at the household level (Kumu *et al*, (2012), Parfitt *et al*, (2010); Griffin *et al*, (2009) and Akerele *et al*, (2017)).

Globally, food waste is seen as a problem more in the developed countries than in developing countries, as a result of rapid urbanization, population explosion, and improved standard of living (Oyawole *et al*, 2016; Stancu *et al*, 2016; Pakpour *et al*, 2013; Akere *et al*, 2017). However, food waste is also emerging as a serious issue in developing countries, including Nigeria with serious implications such as food insecurity and sustainable environmental management (Akerele *et al*, 2017). In 2013, FAO estimated the cost to the environment in

terms of production, processing distribution, and preparation of food at 500kg of CO<sub>2</sub>, 250 km<sup>2</sup> of water 1 year/person, and 28% of the global arable farmland indicating that food wastage amounted to a waste of scarce resources with alternative uses.

The world economic forum (WEF) in 2021 estimated that globally 61%, 26%, and 13% of food wastes come from households, food service, and food retail respectively resulting in economic, social, and environmental losses valued at \$1 trillion, \$900 billion, and \$700 billion respectively, amounting to \$2.6trillion. WEF (2021) valued global food wastes at \$990 billion, with \$680 billion coming from developed economies and \$310 billion from the developing economies. In Nigeria, food waste is estimated at 30 – 40% of the total annual food production valued at \$750 billion (Onwumere, 2018). From the foregoing, minimizing or total eradication of food wastes along the distribution and consumption chain will help to alleviate poverty, hunger, social and economic losses. This study investigated households' determinants of food wastes in Osogbo metropolis, specifically, the study examines the socio-economic characteristics of the respondents, level and management of households' food wastes, and food preservation strategies employed by the households.

## **METHODOLOGY**

The study was conducted in Osogbo Metropolis, Osun State, Nigeria. Data used in this study were obtained from primary sources. The data was collected with the aid of structured interview schedule. The interview schedule was structured to collect information on socio-economic characteristics of the households and their levels of food wastage. The data was aggregated for statistical analysis.

A multi-stage sampling technique was used in the study. In the first stage, four areas; Oroki Estate, Halleluyah Estate, Temidire Estate and Ayedire Estate were purposively selected in the study area because they are cosmopolitan in nature. In the second stage, thirty (30) households were randomly selected from the selected four (4) areas to make one hundred and twenty (120) households. Thereafter, using the snowball technique, one hundred and two (102) respondents were selected as sample for the study.

Data in this study was analysed with both descriptive and inferential statistics. The descriptive statistics that were employed are mean, frequency and percentages while the ordinary least square regression technique. The ordinary least square regression technique

was used to determine the significant variables influencing food wastage among households in the study area.

The implicit model that was used in the study is specified as follows:

$$Y=X_1 + X_2 + X_3 + X_4 + X_5 + X_6 + et$$

Where

Y is the monetary value (₦) of household food wastage

X<sub>1</sub> is household income in Naira

X<sub>2</sub> is household size

X<sub>3</sub> is household food expenditure in Naira

X<sub>4</sub> is the years of formal education of the household head.

X<sub>5</sub> is quantity of food consumed

X<sub>6</sub> is frequency of consumption

et is the error term.

## **RESULTS AND DISCUSSION**

### **Socio-economic characteristics of the respondents**

Table 1 presents the distribution of respondent according to their age. Majority (38.24%) of the respondent were between 20-30years of age, 28.43% were between 31-40years of age, while 27.45% were between 41-50 years of age, while 5.88% falls between 51-60 years of age. The mean age is 35.4 years. This implies that most of the respondents are youths. This result corroborates the findings of Obinaju and Ikpeida (2021).

Results in Table 1 reveals that most (99.02%) of the respondents are female, while (0.98%) were male. This result implies that women are mostly the household decision makers with regards to household food procurement items and management. Akerele *et al* (2017) reported a similar result in their study.

Table 1 shows the distribution of the respondents according to their marital status. Majority (83.33%) are married, 14.71% are single while 1.96% are separated. This result is in line with the findings of Akerele *et al* (2017).

Table 1 shows the distribution of the respondents according to their household size. Majority (77.45%) of the respondents have household size between 1-5 persons. 20.59% have 6-10 persons in their household while 1.96% of the respondents have 2 persons in their household. The mean household size is 4 persons per household. This result implies that there is average household size in the study area. Obinaju and Ikpeida (2021) obtained a similar results in their study.

Table 1 shows the distribution of respondent according to their years of formal education. Majority (82.35%) have between 1-10 years of formal education, 16.67% of respondent have between 11-20 years of formal education, while 0.98% of the respondent have between 21-30 years of formal education. The mean years of formal education is 7 years. This result implies that primary education prevalent among the respondents in the study area. This results conforms to the findings of Akerele *et al* (2017) and Obinaju and Ikpeida (2021) in their studies.

Table 1 shows the distribution of the respondents according to their primary occupation. The Table reveals that majority of the respondents are public officers and businessmen which may enhance the income and hence, the household food expenditure

Table 1 shows the distribution of monthly income of the respondents. The table reveals that majority (93.14%) of the respondents have monthly income of between ₦50,000 to ₦100,000. While 6.86% of the respondents earn between ₦101,000 to ₦400,000 monthly. The mean monthly income is ₦60,279.40. The mean income is far below ₦162,375.00 obtained by Akerele *et al* (2017) in their study. This result shows that the respondents are in the middle income category.

### **Quantity of household food waste**

Table 2 presents the distribution of the respondents according to the quantity of their household food waste. The table reveals that protein (plant source) is the most (87.35%) wasted food in households. This is followed by carbohydrates, protein (animal source), and vegetables and fruits with 11.12%, 0.78%, and 0.50% respectively. The least wasted food in the households is fat and oils with 0.25%. These results negate the findings of FAO (2010) that fruits and vegetables and carbohydrates (roots and tubers) are the most wasted household food item in the tropics.

### **Costs of household food waste**

The distribution of the respondents according to the costs of their households' food waste is shown in Table 3. The Table reveals that carbohydrates constitute the highest (67.47%) of the cost of food wasted in the household. This is followed by protein from a plant source, protein from the animal source, vegetable, and fruits with 20.04%, 7.12%, and 4.38% respectively. Fat and oil constituted the lowest (1.00%) of the cost of food wasted in the households. Although protein from plant sources constituted the highest food wasted in terms of quantity, carbohydrate constituted the highest in terms of cost. This result implies that the cost of staple foods such as carbohydrates is fast rising.

### **Causes of household food waste**

Table 4 shows the distribution of the respondents according to their reasons for households' food waste. The majority (66.67%) agree that inadequate power supply for food preservation is the major cause of household food wastage. This is followed by deteriorating food quality and inadequate refrigeration with 19.61% and 11.76% respectively. The implication of these results is that inadequate supply of electricity may be a major cause of household food waste in the study area.

### **Household management of wasted food**

#### **Household food disposal**

Table 5 shows the distribution of the household according to their disposal of wasted food. The majority (52.94%) do not dispose of their wasted food, but rather put it to another use such as in the feeding of their household pets. However, 47.06% of the respondents dispose of their wasted food.

#### **Reasons for disposal of food**

Table 6 shows the distribution of the respondents according to their reasons for the disposal of food items. The majority (42.16%) dispose of expired food items. 35.29% of the respondents dispose of food items as a result of a deteriorating smell, while 8.82% of the respondents throw away food items as a result of a moldy appearance.

#### **Methods of food preservation**

Table 7 shows the distribution of the respondents according to their methods of food preservation. The Table reveals that the majority (60.78%) of the respondents employ

refrigeration in the preservation of their food items. This is followed by the microwave oven, drying, drying and refrigeration, smoking and salting and refrigeration with 6.76%, 4.90%, 3.92%, 2.94%, and 1.96% respectively. The implication of these results is that refrigeration is the major method of food preservation in the study area. This can be attributed to the average income level of the respondents in the study area. This affords them the opportunity of acquiring refrigerators and access to electricity supply.

### **Factors influencing the level of food spoilage**

Multiple regression analysis using the ordinary least squares regression technique was used to determine the factors influencing the level of food spoilage among the households in the study area. Various functional forms (linear, log and double log) were tried, but the linear functional form was used for interpretation and discussion of the results.

The result of the factors influencing the level of household food wastage is presented in Table 8. The coefficient of determination ( $R^2$ ) is 0.79 and the F value is statistically significant at a 1% level showing that the model has a good fit. The able reveals that the coefficient of household size ( $X_2$ ) is positive and statistically significant at the 1% level. This result implies that the level of household food wastage is directly proportional to the household size; a large household size tends to waste more food than a smaller household size. This result is in line with FAO (2008) that large household is associated with higher household food wastage.

Similarly, the coefficient of household food expenditure ( $X_3$ ) is positive and statistically significant at a 5% level, implying a direct relationship between this variable and household food wastage. Higher household food expenditure is associated with a higher level of household food wastage

### **CONCLUSION**

The study established the determinants of households' food waste in Osogbo metropolis, Osun state. The study concluded that protein from plant sources and carbohydrates are the most wasted food items in the households. The significant factors influencing the level of households' food waste are household size, household food expenditure, the quantity of food consumption, and frequency of food consumption. Based on the findings from the study, it is recommended that households with large membership should strictly monitor and control the level and frequencies of household food consumption in order to minimize food wastage

among the households in the study area. Also, households' food expenditure should be centered on household food needs, rather than procurement of all categories of food which will lead to food wastage. Finally, households should ensure that quantity of food served, as well as frequency of food consumption are well regulated to prevent enormous households' food waste.

## REFERENCES

- Abiad, M.G., & Meho, L.I. (2018). Food loss and food waste research in the Arab world: A systematic review. *Food Security*. 10, 311–322. <https://doi.org/10.1007/s12571-018-0782-7>
- Akerele, D. Afolayan, S. O. Oyawole, F. P. & Sanusi, R. A. (2017). Socioeconomic determinants of food waste among households in Abeokuta, Ogun State. *Nigerian Journal of Agricultural Economics*, 7(1): 25-35
- Chalak, A., Abiad, M. G., Diab, M. & Nasreddine, L. (2019). The determinants of household food waste generation and its associated caloric and nutrient losses: the case of Lebanon. *PLoS One*, 14(12), e0225789.
- Food and Agriculture Organization (FAO) (2010). Global Food Losses and Food Waste Extent, Causes and Prevention; Study Conducted for the International Congress SAVE FOOD; FAO: Düsseldorf, Germany, 2011.
- FAO (2019). The state of food and agriculture 2019. Moving forward on food loss and waste reduction. FAO, Rome, 2-13.
- FAO. (2020). The State of Food Security and Nutrition in the World. Food and Agriculture Organization of the United Nations. <https://doi.org/10.4060/ca9692en>
- Gustafsson, J., Cederberg, C., Sonesson, U., & Emanuelsson, A. (2013). The methodology of the FAO study: Global Food Losses and Food Waste-extent, causes and prevention”- FAO, 2011
- Kummu, M., De Moel, H., Porkka, M., Siebert, S., Varis, O., & Ward, P. J. (2012). Lost food, wasted resources: Global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use. *Science of the total Environment*, 438, 477-489.
- Obinaju, L. C. & Ikpeida, D. W (2021) Determinants of food wastes among farming Households in Uyo Local Government Area, Akwa Ibom State, Nigeria. *European Journal of Agriculture and Forestry Research* 9 (4): 17-33.
- Oyawole, F. P., Ajayi, O. P., Aminu, R. O., & Akerele, D. (2016). Willingness to pay for improved solid waste management services in an urbanizing area in South-East Nigeria. *Ethiopian Journal of Environmental Studies and Management*, 9(6), 793-803.

- Pakpour, A. H., Zeidi, I. M., Emamjomeh, M. M., Asefzadeh, S., & Pearson, H. (2014). Household waste behaviours among a community sample in Iran: An application of the theory of planned behaviour. *Waste Management*, 34(6):980-986.
- Parfitt, J., Barthel, M., & Macnaughton, S. (2010). Food waste within food supply chains: quantification and potential for change to 2050. *Philosophical transactions of the royal society B: Biological Sciences*, 365(1554), 3065-3081.
- Stancu, V., Haugaard, P., & Lähteenmäki, L. (2016). Determinants of consumer food waste behaviour: Two routes to food waste. *Appetite*, 96, 7-17.

**APPENDICES**

**Table 1: Socio-economic characteristics of the respondents (n = 102)**

Variable	Frequency	Percentage	Mean
Age			
20-30	39	38.24	
31-40	29	28.43	
41-50	28	27.45	
51-60	6	5.88	35.40 years
Total	102	100	
Gender	Frequency	Percentage	
Male	1	0.98	
Female	101	99.02	
Marital status			
Single	15	14.71	
Married	85	83.33	
Separated	2	1.96	
Household size			
1-5	79	77.45	
6-10	21	20.59	
11-15	2	1.96	4 persons
Years of formal education			
1-10	84	82.35	
11-20	17	16.67	
21-30	1	0.98	7 years
Primary occupation			
Artisan	13	12.75	
Artisan and Public officer	6	5.88	
Artisan and Business	4	3.92	
Public officers	40	39.22	
Public officers and Business	13	12.75	
Business	26	25.49	
Monthly income			
50,000-100,000	95	93.14	
101,000-400,000	7	6.86	<b>₦60,279.40</b>

**Source: Field Survey, 2021**

**Table 2: Distribution of the respondents according to quantity of household food items wastage**

Food items	Mean (kg)	Percentage
Carbohydrate	0.98	11.12
Protein		
Plant source	7.66	87.35
Animal source	0.07	0.78
Fats and oil	0.02	0.25
Vegetable and fruits	0.04	0.50
<b>Total</b>	<b>8.77</b>	<b>100</b>

Source: Field Survey, 2021

**Table 3: Distribution of the respondent according to the costs of food items wasted**

Food items	Mean(₦)	Percentage
Carbohydrate	92.94	67.47
Protein		
Plant source	27.87	20.04
Animal source	9.80	7.12
Fats and oil	1.37	1.00
Vegetable and fruits	6.03	4.38
<b>Total</b>	<b>137.74</b>	<b>100</b>

Source: Field Survey, 2021

**Table 4: Distribution of the respondents according to their reasons for household food items wastage**

Reasons	Frequency	Percentage
Inadequate power supply	68	66.67
Inadequate refrigeration and power supply	1	0.98
Power supply and bad quality	1	0.98
Inadequate refrigeration	12	11.76
Deteriorating food quality	20	19.61
<b>Total</b>	<b>102</b>	<b>100</b>

Source: Field Survey, 2016.

**Table 5: Distribution of the respondents according to disposal of wasted food**

Disposal of wasted food	Frequency	Percentage
Dispose	48	47.06
Not Dispose	54	52.94
<b>Total</b>	<b>102</b>	<b>100</b>

**Source: Field Survey, 2021**

**Table 6: Distributions of the respondents according to reasons for food disposal**

Reasons for throwing food away	Frequency	Percentage
Exceeded expiring date	43	42.16
Exceeded expiring date, bad appearance and bad smell	1	0.98
Exceeded expiring date and bad smell	1	0.98
Bought more than needed	3	2.94
Bought more than needed and bad smell	1	0.98
Mouldy or slimly	9	8.82
Mouldy and bad appearance	1	0.98
Mouldy, bad appearance and bad smell	2	1.96
Bad appearance	4	3.92
Bad appearance and bad smell	1	0.98
Bad smell	36	35.29
<b>Total</b>	<b>102</b>	<b>100</b>

**Source: Field Survey, 2021**

**Table 7: Distribution of the respondents according to their methods of food preservation**

<b>Methods of food preservation</b>	<b>Frequency</b>	<b>Percentage</b>
Salting	13	12.75
Sating, smoking, drying and refrigeration	1	0.98
Salting, smoking and refrigeration	1	0.98
Salting, drying ,microwave oven and refrigeration	1	0.98
Salting, drying and refrigeration	1	0.98
Salting and refrigeration	2	1.96
Smoking	3	2.94
Smoking and refrigeration	1	0.98
Drying	5	4.90
Drying and refrigeration	4	3.92
Microwave oven	7	6.86
Microwave and refrigeration	1	0.98
Refrigeration	62	60.78
<b>Total</b>	<b>102</b>	<b>100</b>

**Source: Field Survey, 2021**

**Table 8: Results of multiple regression analysis**

Variables	Coefficient	Standard Error	t-statistics	Probability
Income(X <sub>1</sub> )	0.000	0.001	0.207	0.836
Household size(X <sub>2</sub> )	25.140	8.386	2.998	0.004**
Food expenditure(X <sub>3</sub> )	0.004	0.002	2.230	0.028**
Formal education(X <sub>4</sub> )	-4.607	5.741	-0.803	0.424
Quantity of food consumed(X <sub>5</sub> )	0.494	0.278	1.778	0.079
Frequency of consumption(X <sub>6</sub> )	0.583	1.096	0.532	0.596
Constant	-41.940	52.400	-0.800	0.426
R <sup>2</sup>	0.786			
F statistics	15.015			
Adjusted R <sup>2</sup>	0.654			

**\*means significant at 1%, \*\* means significant at 5%**