Women Food Entrepreneurship(WFE) in Kenya and Burkina Faso
Building Inclusive Business Models for Food Security
in the City Slums of Kisumu and Ouagadougou

FOOD AND NUTRITION
BASELINE SURVEY REPORT- KISUMU
BY

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1.0 Introduction

Through a better understanding of the interactions between soil, food, nutrition, entrepreneurship, and community, the international research project 'Women Food Entrepreneurs in Kenya and Burkina Faso: Building inclusive business models for food security in the city slums of Kisumu and Ouagadougou aims at supporting women food entrepreneurs in the informal settlements. The project's team, consisting of social and natural scientists, entrepreneurs and government actors of Kenyan, Dutch and Burkinabé origin, looks to understand and work with local communities and entrepreneurs to address challenges faced by women as food growers, processors and marketers in the growing city. The study was conducted in Kenya's Kisumu city (See Map 1) with three primary objectives (i) measure the quality of food and nutrition quality consumed in slum households; (ii) to understand the initial nutritional conditions in the population in focus; and (iii) highlighting linkages to women entrepreneurship, the food value chain, soil and water quality issues that are relevant to the research project.
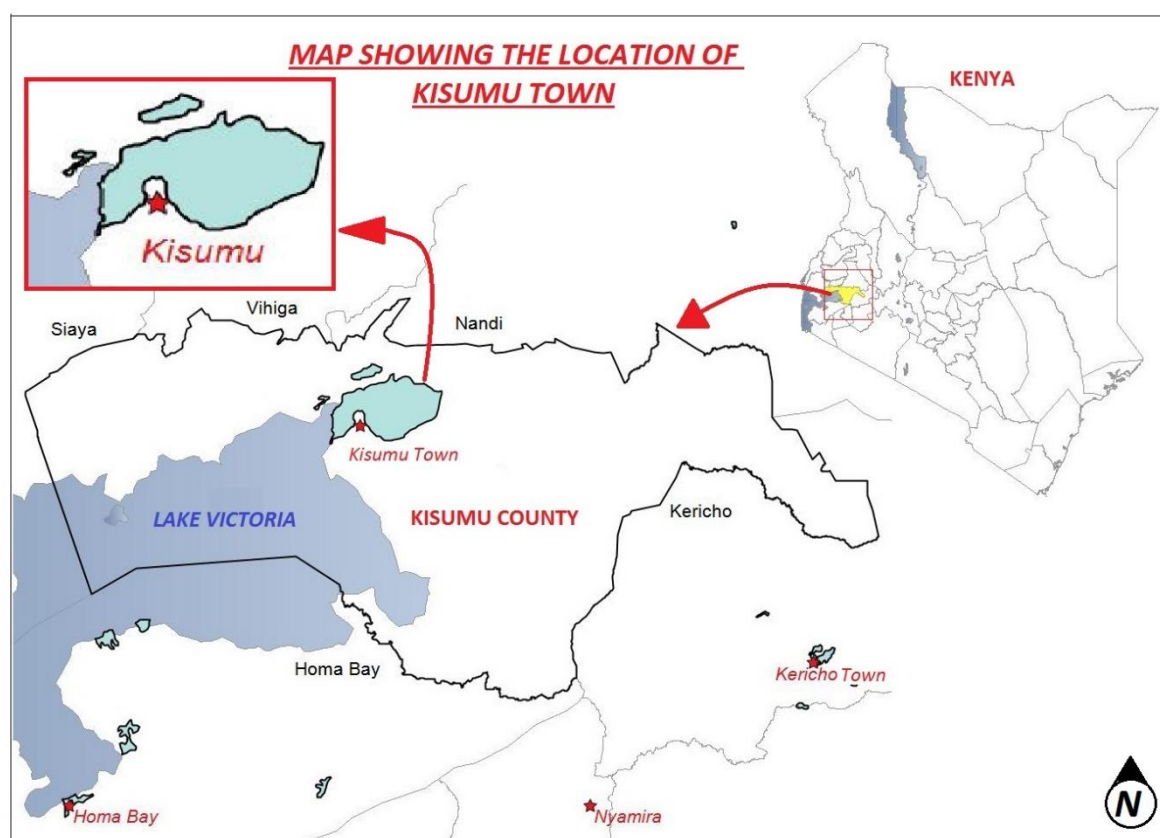
Map 1: Shows *the location of Kisumu county*

This baseline study provides data that allows the research project team to capture the quality of food and nutrition consumed in the slum households while highlighting linkages to women entrepreneurship, the food value chain, soil and water quality issues that are relevant to the research project. The survey was conducted among 150 households in Nyalenda slum and 150 households in Obunga slum. Map 2 shows the location of the two slums in Kisumu.
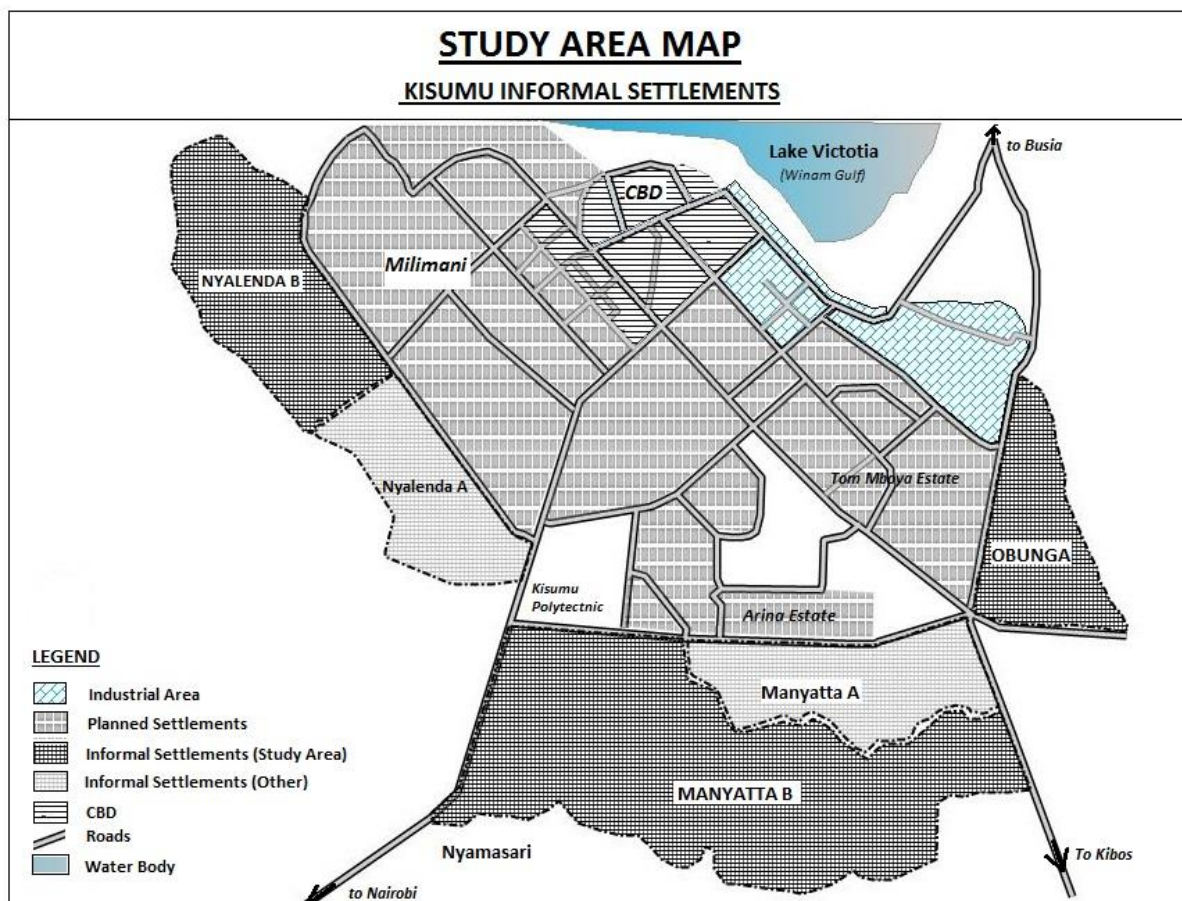
Map 2 : shows the location of the two slums in Kisumu.

2.0 Methodology

2.1 Sample

A cross-sectional household survey, including questionnaires, was carried out from 28th February 2017 to 3rd March 2017 in two slums-Obunga and Nyalenda in Kisumu County, Kenya. It was conducted during a period presumed to be 'neutral' from a food point of view, that is, away from the food scarcity season. The study area was divided into 3 namely; Nyalenda, Nyalenda B and Obunga. The total number of respondents for the household survey was 120 with those interviewed in Nyalenda, Nyalenda B, and Obunga being 29 (24%), 72 (60%) and 19 (16%) respectively. There were 14 men and 106 women interviewed. There were more women interviewed since they are the ones charged with food preparation in the many households except where it is the man. All of the respondents gave their free and knowledgeable consent to participate in the study.

The households were selected through systematic random sampling by interviewing every 11th household from the starting point. Each enumerator was dropped off at a point along the main road and from the house where they conducted the first interview, counted 10 houses and again interviewed in the 11th house. The respondents were the household heads and not groups and they comprised of consumers, food producers, marketers, handlers, and processors. In some houses, widowers were the respondents as they are in charge of food in their households. The respondents were distributed as shown in maps 3 and 4.

NYALENDA HOUSEHOLD MAP
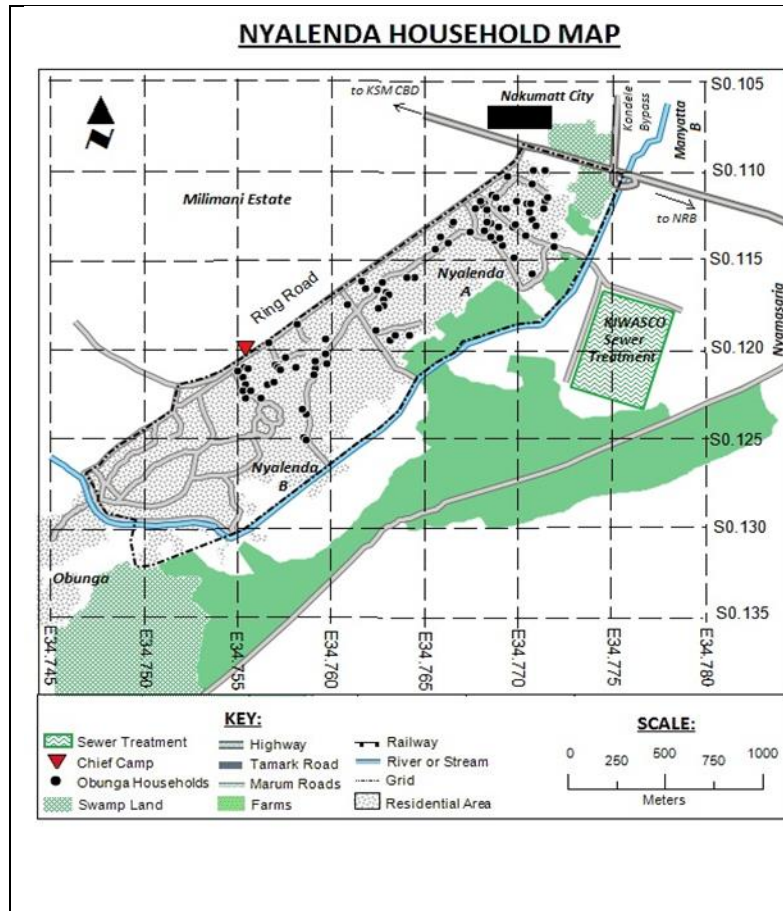
Map 3: Nyalenda household respondents

OBUNGA HOUSEHOLD RESPONDENT MAP
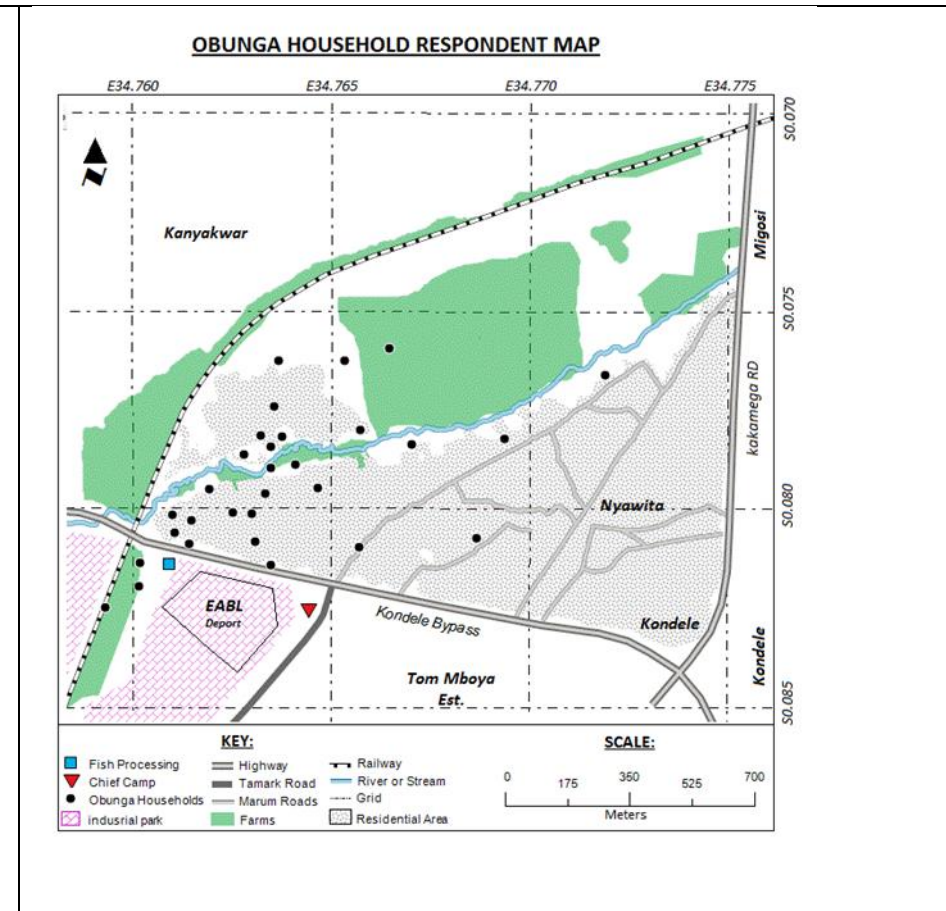
Map 4: Obunga household respondents

A reconnaissance survey enabled to identify the known dietary items potentially consumed in Kisumu County. Unidentified food items were added to this list, which remained open throughout the survey. We then used this list to distinguish food groups so as to get closer to the food composition table proposed by FAO and frequently used in Africa (FAO, 1970). They comprise of cereals, roots/tubers, pulses and nuts, green leafy vegetables, other vegetables, fruits, sugar, meat/poultry/insects, eggs, fish/seafood, milk/dairy products, oils and fats, condiments, drinks and miscellaneous. The dietary consumption was measured by a qualitative recall of all foods consumed by each household during the previous week, i.e., on a 7-day recall and the most preferred food on a one month recall. To measure the household's dietary consumption, the interviewer first enquired for the collective dishes consumed by members of the household. Also taken into account were other foods consumed by household members outside the compound (meals, snacks, and others). The respondents were first requested to describe their food consumption and then prompted to ensure that no meal or snack was forgotten. 14 local fieldworkers trained by the team leader and having at least Form 4 education and the ability to speak English and Kiswahili or the local dialect Dholuo conducted the interviews. The information collected in the list of food items and its organization enabled the calculation of two types of scores:

Food variety score (FVS)
This discusses the sum of various dietary items consumed by the household the week before the survey. The frequency of consumption and the amount of food consumed was taken into account (World Food Programme, 2008).

Dietary diversity score (DDS)
This refers to the number of the different food groups to which the above food items belong (irrespective of the number of representatives of each group). The Household Dietary Diversity Score (HDDS) was used and this can be described as the number of food groups consumed by a household over a given reference period, and is an essential indicator of food security for many reasons, for example, the HDDs indicator provides a glimpse of a household's ability to access food as well as its socio-economic status.
It is used as an indicator
1. For a proxy measure of a household's food access indicator
2. A proxy for household socio-economic status
3. To assess how interventions to increase household income have affected food consumption

These dietary scores were then divided into terciles to distinguish diets of 'high,' 'medium' and 'low' quality, regarding both variety and diversity. A wide range of social, demographic, economic factors has an impact on the household's nutritional status and the quality of their diet. Socio-demographic and economic data were collected at the household level including the number and composition of each household, food sources, and access to water for irrigation, the age, marital status, and education, among others.

2.2 Process of Construction
The following 12 food groups are used to calculate the HDD indicator:

Plant Origin
    A. Group 1 - Cereals and Grain Products
    B. Group 2 - Starchy Roots, Tubers, and Fruits
    C. Group 3 - Grain Legumes and Legume Products/ Nuts and Seeds

D. Group 4 - Vegetables and Vegetable Products
E. Group 5 - Fruits
F. Group 6 - Sugars and Syrups

Animal Origin
G. Group 7 - Meats, Poultry, offal and Insects
H. Group 8 - Eggs
I. Group 9 - Fish and Shellfish
J. Group 10 - Milk and Milk Products

Other
K. Group 11 - Oils and Fats
L. Group 12 - Miscellaneous

Each food group is given a score of 1 (if consumed) or 0 (if not consumed). The household score ranges from 0-12 and is equals the total number of food groups consumed by the household:

Sum (A + B + C + D + E + F + G + H + I + J + K + L)

The average household dietary diversity score for the population of study can be calculated as follows:

Sum (HDDs)/Total number of households surveyed

Results

Dietary variety and diversity

Sum (A + B + C + D + E + F + G + H + I + J + K + L)

The average household dietary diversity score for the population of study was calculated as follows:

Sum (HDDs)/Total number of households surveyed (Sum (HDDs) 898/120 households surveyed= 7.48)

The usual local diet consists of Ugali accompanied by leafy vegetables with kales being the most popularly consumed. It was found that the typical diet systematically included cereals (100%) and leafy vegetables (82%). Regarding food groups, the DDS ranged from 5 to 10, over 12 possible groups (mean DDS=7.48±1.5)

The DDS for the slums is 489/67=7.3±1.5 for Nyalenda A, 186/23=8.1±1.1 for Nyalenda B and 7.4±1.6 for Obunga respectively

Household characteristics

The average household size is 6 persons. The total number of male-headed households was 79 (66%), female-headed 40 (33%) and the male-headed, female-run is 1 (1%) as shown in Table 1.

Table 1: Type of household by area (N=120)

Residence	Male-headed	Female-headed	Male-headed, female-run
Obunga	15 (12%)	13 (11%)	1 (1%)
Nyalenda	50 (42%)	22 (18%)	0 (0%)
Nyalenda B	14 (12%)	5 (4%)	0 (%)

Total	79 (66%)	40 (33%)	1 (1%)

The most significant number of persons interviewed were from the age group of 31-40 followed by those of age group 21-30. These are the groups with young families as shown in Table 2 that need balanced diets as the children are developing. Nutritionally related illnesses are likely to affect this group the most. Some of the nutritionally related illnesses mentioned by respondents are 'kwashiorkor' and marasmus.

Table 2: Age of respondent by residence (N=120)

	Age of respondent				
Residence	21-30	31-40	41-50	51-60	>60
Obunga	8 (7%)	10 (8%)	6 (5%)	2 (1.5%)	3 (3%)
Nyalenda	15 (12%)	30 (25%)	11 (9%)	6 (5%)	10 (8%)
Nyalenda B	11 (9%)	6 (5%)	0 (0%)	2 (1.5%)	0 (0%)
Total	34 (28%)	46 (38%)	17 (14%)	10 (8%)	13(11%)

Of the interviewees, 63 (53%) had secondary school education with 34 (28%) having some form of post-secondary training (Table 3). The level of education is vital as it is easier for the respondents to explain issues of nutrition.

Table 3: Level of education (N=120)

Residence	None	Lower primary (Std 1-3)	Upper primary (Std 4-8)	Secondary (Form 1-4)	Post-secondary training	Middle-level colleges
Obunga	2	1	2	17	6	1
Nyalenda	4	0	5	41	18	4
Nyalenda B	1	0	1	5	10	2
Total	7	1	8	63	34	7

The number of widowed respondents was relatively high forming 25.8% of those interviewed. The number of widowers who are charged with the responsibility of purchasing and preparing food for their household members. The distribution of respondents based on their marital status is shown in Table 4.

Table 4: Marital status by residence (N=120)

Residence	Married	Single	Widowed	Divorced/separated	Total
Obunga	17	3	9	0	29
Nyalenda	46	6	20	0	72
Nyalenda B	15	1	2	1	19
Total	78	10	31	1	120

Most of the respondents in the survey deal with food handling (see Table 5). A large number sell vegetables (22%), fish (10%), and cooked food (10%) and do farming (13%)

Table 5: Main source of income for respondents (N=120)

Principal source of revenue for respondents	Number of respondents	(%) percentage
Not earning an income	2	2
Business	10	8
Casual labour	2	2
Charcoal vendor	6	5
Community / Social Worker (CHV)	3	3
Farming	16	13
Fishmonger	12	10
Food vendor	12	10
Hairdresser	4	3

Hotelier	1	1
Housewife	2	2
Making and selling liquid soap	1	1
Rental income	1	1
Selling alcohol	1	1
Selling ice cubes	1	1
Selling secondhand clothes	6	5
Selling shoes	1	1
Shopkeeper	2	2
Tailor	4	3
Teacher	2	2
Vegetable vendor	26	22
Washing clothes	1	1
Watchman	1	1
Water vendor	3	3

The most consumed carbohydrate in the study area is Ugali which was eaten in all the households surveyed followed by rice at 63% and the Chapati at 40%. Chapati and chips are commonly taken by children who stay at home as lunch is rarely cooked in the majority of the households. Ugali is consumed at daily in most of the households as shown in Table 6.

Table 6: Carbohydrate households ate in the study area (N=120)

Carbohydrate eaten	Number of respondents	(%) percentage of respondents
Arrowroots	1	1
Banana	1	1
Bread	1	1
Cassava	11	9
Chapati	48	40
Chips	17	14
Mandazi	4	3
Porridge	13	11
Potatoes	3	3
Pumpkin	1	1
Rice	75	63
Sweet potatoes	9	8
Ugali	120	100

There are households where Chapati, rice, Chips, and Ugali are eaten more than 7 times during the week implying that on certain days these foods were consumed twice in the day, i.e., lunch and supper as shown in table 7 below.

Table 7: Frequency of eating carbohydrates (N=120)

Carbohydrate eaten	Number of times carbohydrate eaten per week									
	1	2	3	4	5	6	7	8	9	10
Arrow roots	1	0	0	0	0	0	0	0	0	0
Banana	1	0	0	0	0	0	0	0	0	0
Bread	1	0	0	0	0	0	0	0	0	0
Cassava	6	3	2	0	0	0	0	0	0	0
Chapati	19	8	3	1	3	3	9	1	0	0
Chips	3	1	3	1	6	1	1	0	9	0
Mandazi	0	0	2	0	0	0	2	0	0	0
Porridge	3	2	2	0	3	0	3	0	0	0
Potatoes	3	0	1	0	0	0	0	0	0	0
Pumpkin	1	0	0	0	0	0	0	0	0	0
Rice	27	24	13	3	2	1	2	1	0	0
Sweet potatoes	5	3	1	0	0	0	0	0	0	0
Ugali	0	1	8	10	24	18	57	0	0	1

The most commonly eaten vegetable is kales because the cost is relatively lower than that of traditional vegetables. It is also more readily available in the market throughout the year and can be transported over long distances. Another factor making the kales a favorite vegetable is that its preparation is less cumbersome and in the slums, the vegetable vendors cut it and hence only washed and cooked. The traditional vegetables take a longer time to prepare as most require plucking the leaves from the stalk which is time-consuming. The vegetables consumed in the households are shown in Table 8 below.

Table 8: Vegetables eaten by households in the study area (N=120)

Vegetable eaten	Number of respondents	(%) percentage of respondents
Black nightshade	52	43
Brassica oleracea var. acephala (Kandhira)	3	3
Cabbage	9	8
Corchorus olitorius (Mrenda/apoth)	6	5
Cowpeas	59	49
Crotalaria brevidens (Mitoo)	6	5
Kales	98	82
Kienyeji	4	3
Pumpkin leaves (Susa)	1	1
Spiderweed	42	35
Spinach	1	1

10 households reported that kales are consumed daily by household members with the highest number of times it is consumed being 4 times in a week.

Table 9: Frequency of eating vegetables (N=120)

Vegetable eaten	Number of times vegetable is eaten per week						
	1	2	3	4	5	6	7
Blacknightshade	11	22	8	1	0	2	1
Brassica oleracea var. acephala (Kandhira)	1	0	1	0	0	1	0
Cabbage	5	2	1	0	0	0	0
Corchorus olitorius (Mrenda/apoth)	0	4	2	0	0	0	0
Cowpeas	12	24	14	3	1	1	0
Crotalaria brevidens (Mitoo)	3	1	1	0	0	0	0
Kales	5	18	19	24	10	3	9
Kienyeji	1	2	0	1	0	0	0
Pumpkin leaves (Susa)	0	0	0	0	0	0	0
Spiderweed	13	15	3	2	0	1	0
Spinach	0	0	1	0	0	0	0

Rastrineobola argentea (Omena) is the most commonly eaten fish due to the cost. 76% of the households interviewed consume the fish. Ongin pasi is pieces of fish flesh remaining from processing or scrapped from the skin of Nile perch which is coated with flour paste and then deep fried. It is usually stewed before consumption. One area of concern that was noted is the poor hygiene in the handling of fish such as Fried *Haplochromis nubilus* (Wiu), Obambo (Dried tilapia, Mumi)) Ongin pasi and Nile perch (Mgongo Wazi) all which have undergone some value addition/processing. The types of fish and the number/percentage of respondents consuming the fish found in Table 10.

Table 10: Fish eaten by households in the study area (N=120)

Fish eaten	Number of respondents	(%) percentage of respondents
Clarius gariepinus (Mumi)	2	2
Fried *Haplochromis nubilus* (Wiu)	17	14

Haplochromis nubilus (Fulu)	3	3
Nile perch	59	49
Nile perch (Mgongo Wazi)	12	10
Obambo(Dried tilapia, Mumi)	4	3
Ongin Pasi	1	1
Rastrineobola argentea (Omena)	91	76
Tilapia	40	33

Rastrineobola argentea (Omena) was consumed up to 5 times per week in 2 households (Table 11). The consumption ofTilapia is on the rise with the introduction of fish from China, which is a hybrid of tilapia and the common carp. It is relatively cheap and is often mixed with local tilapia. The respondents, however, complained that the "China fish" as it is popularly known is tasteless and the distinguishing features are the head which is more tapered than that of the local tilapia pointed and the skin which is darker compared to the local tilapia.

Table 11: Frequency of eating fish (N=120)

Fish eaten	Number of times fish eaten per week				
	1	2	3	4	5
Clarius gariepinus (Mumi)	1	1	0	0	0
Fried Haplochromis nubilus (Wiu)	5	6	6	0	0
Haplochromis nubilus (Fulu)	2	1	0	0	0
Nile perch	28	20	8	0	0
Nile perch (Mgongo Wazi)	1	2	5	1	0
Obambo(Dried tilapia, Mumi)	1	3	0	0	0
Ongin Pasi	0	0	1	0	0
Rastrineobola argentea (Omena)	23	28	29	6	2
Tilapia	26	10	2	0	0

An average FVS, ie. The mean number of different food items consumed from all possible items eaten was calculated and a mean FVS of 15.49 (standard deviation (SD) 2.7) was found. This calculation took into consideration the other food items used to prepare meals such as Sugar, salt, cooking oil/fat, tomatoes and onions and also water which people drink an contains minerals. Table 12 and Figure 1 below show the number of households and the frequency of the FVS with the highest score being 20 and the lowest being 9 respectively.

Table 12: The Food Variety Score (N=120)

FVS	Frequency	Percent	Valid Percent	Cumulative Percent
10	5	4.2	4.2	4.2
11	11	9.2	9.2	13.3
12	5	4.2	4.2	17.5
13	10	8.3	8.3	25.8
14	4	3.3	3.3	29.2
15	13	10.8	10.8	40.0
16	17	14.2	14.2	54.2
17	23	19.2	19.2	73.3
18	19	15.8	15.8	89.2
19	7	5.8	5.8	95.0
20	5	4.2	4.2	99.2
9	1	.8	.8	100.0

Total	120	100	100	
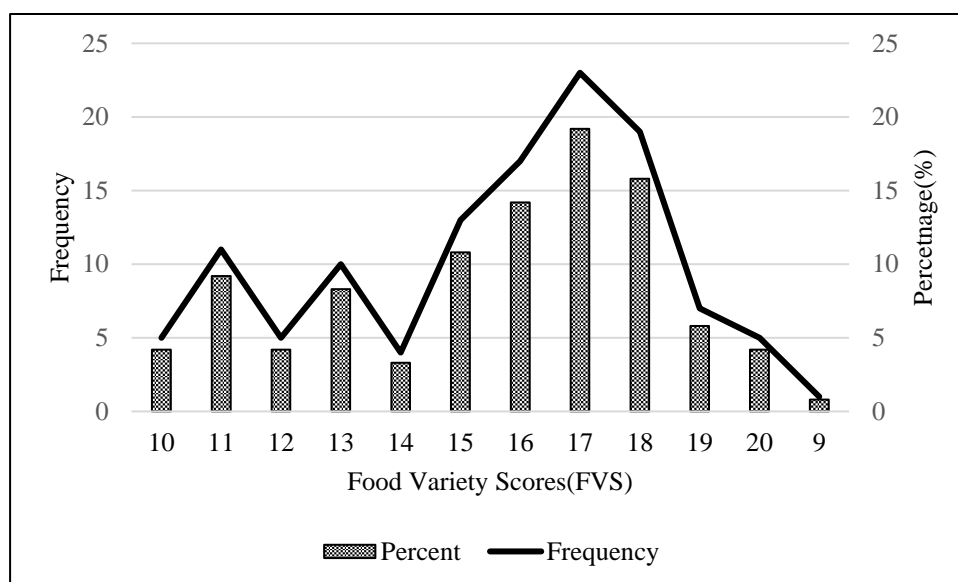
Figure 1: The Food Variety Score (N=120)

To measure food security, proxy indicators, Food Consumption Scores (FCS)was used. The FCS is based on:

- The dietary diversity looked at the number of food groups a household consumed over a reference period
- The food frequency looked at the number of days on which a particular food group was consumed, measured over a 7 day recall period
- The relative nutritional importance of different food groups; achieved by allocating pre-denied FAO weights to the different food groups.[1]

The steps taken to calculate the FCS are found below:

1. Group food items in the specified food groups (condiments not included)

2. Sum all the consumption frequencies of food items within the same group

3. Multiply the value of each food group by its weight (see table)

4. Sum the weighted food group scores to obtain FCS

5. Determine the households food consumption status based on the following thresholds:

FCS	Profiles
0-21	Poor
21.5-35	Borderline
> 35	Acceptable

Source: WFP (2008).

The FCS was found to be 40 (Table 13) which is acceptable and calculated as follows:

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[1] The weights are assigned by the WFP (2008) based on the calorific value of food items. See Table A.1 in Annex.

Table 13: Computing Household Food Consumption Score (N=120)

FOOD ITEMS (examples)	Food groups (definitive)	Weight (definitive) (A)	Days food is eaten in past 7 days (B)	Score (AxB)
Maize, maize porridge, rice, sorghum, millet pasta, bread and other cereals	Main staples	2	7	2
Cassava, Irish potatoes and sweet potatoes, other tubers, plantains				
Beans. Peas, and groundnuts	Pulses	3	1	3
Vegetables, leaves	Vegetables	1	1	1
Fruits	Fruit	1	0	0
Beef, goat, poultry, pork, eggs, and fish	Meat and fish	4	2	8
Milk, yogurt and other dairy products	Milk and other dairy products	4	5	20
Sugar and sugar products, honey	Sugar	0.5	6	3
Oils, fats, and butter	Oil	0.5	6	3
Spices, tea, coffee, salt, fish power, small amounts of milk for tea.	Condiments/spices	0	6	0
	Household food consumption score			FCS=40

Source: WFP 2008

Note: Key informants and the focused group discussions confirmed that the main staples are consumed at every meal however it was difficult to determine the number of days that each staple was consumed. It resulted in a high number of missing responses from the survey. The calculated value for carbohydrates is 1 but the actual value, 7.

Table 14: Rating of the quality of food consumed by respondents (N=120)

Food	Rating of food quality			
	Very good	Good	Fair	Bad
Beans	0	5	0	0
Black nightshade	0	12	2	0
Brassica oleracea var. acephala (Kandhira)	0	0	1	0
Cassava	0	1	0	0
Chapati	0	4	0	0
Chips	0	3	2	0
Cowpeas	0	4	1	0
Eggs	0	4	1	0
Fish	0	8	2	0
Kales	2	14	4	1
Mandazi	0	1	0	0
Meat	0	2	0	0
Crotalaria brevidens (Mitoo)	0	1	0	0
Nile perch	1	7	5	0
Nile perch (Mgongo Wazi)	0	3	0	0
Porridge	0	1	0	0
Rastrineobola argentea (Omena)	0	10	7	1
Rice	1	7	4	0
Spider weed	0	2	3	0

Sweet potatoes	0	2	0	0
Tea	1	2	2	2
Tilapia	0	2	1	0
Ugali	4	64	25	0
Vegetables	0	0	1	0

The income and financial status profoundly influence which foods are eaten within the households. Most of the persons interviewed have small income thus are likely to look for the most low-priced food and will make the same basic family meals and purchase less expensive prepared foods. The ethnic and cultural background also plays a crucial role in influencing the food choices as most people interviewed were Luos and thus prefer fish. Food can differ widely from culture to culture. The most apparent factor that makes people choose one food over another is its taste. Food that tastes good is justifiably appealing, although what is measured tasty may differ widely from person to person. The age of an individual also determines what one eats. This was shown by a household eating food based on the kids' preferences in Table 15.

Food accessibility talks about the availability and affordability of foods. Those who live with families will have access to those foods that are purchased and prepared by the person given this duty. Those who are the principally purchase and prepare the food have more control over what foods are purchased and how they are prepared. Also noteworthy are ease and method of preparation and availability.

Table 15: Number of respondents identifying factors affecting the preference for particular foods (N=120)

Foodstuff	Nutritional needs	Cost	Cost+ Availability	Cost+ Availability +	Cost+ Cooking preferences	Cost+ Preparation time	Availability	Cooking preferences	Seasonality	Preparation time	Kid's preference
Beans	1	0	0	0	0	0	2	0	0	0	0
Black nightshade	1	8	0	1	1	0	5	0	3	0	0
Brassica oleracea var. acephala (Kandhira)	0	1	0	0	1	0	1	0	0	0	0
Cassava	0	1	0	0	0	0	0	0	0	0	0
Chapati	0	9	0	0	0	0	2	1	0	0	1
Chips	0	2	0	0	0	0	1	0	0	1	1
Cowpeas	1	6	0	0	0	0	2	0	0	0	0
Eggs	0	5	0	0	0	0	1	1	0	1	0
Fish	6	8	0	1	0	0	0	0	0	0	0
Githeri	0	1	0	0	0	0	1	0	0	0	0
Kales	1	29	1	0	0	0	12	3	0	0	0
Maize	0	3	0	0	0	0	0	0	0	0	0
Mandazi	0	1	0	0	0	0	1	0	0	0	0
Meat	1	4	0	0	0	0	0	0	0	0	0
Millet	0	2	0	0	0	0	0	0	0	0	0
Crotalaria brevidens (Mitoo)	0	1	0	0	0	0	0	0	0	0	0
Nile perch	2	13	1	0	0	0	8	0	0	0	0
Nile perch (Mgongo Wazi)	0	3	0	0	0	0	1	1	0	0	0
Porridge	0	1	0	0	0	0	1	0	0	1	0
Rastrineobola argentea (Omena)	2	16	1	1	1	0	9	0	0	0	0
Rice	2	8	1	0	0	1	9	1	0	1	1
Spider weed	1	8	0	0	0	0	2	0	0	0	0
Sweet potato	0	3	0	0	0	0	0	0	0	0	0

Tea	0	6	0	0	0	2	0	0	0	0	0
Tilapia	0	2	0	0	0	0	0	1	0	0	0
Traditional vegetables	0	1	0	0	0	0	0	0	0	0	0
Ugali	11	71	8	0	0	1	12	0	0	0	0
Vegetables	0	3	0	0	0	0	1	0	0	0	0

Many household members of respondents reported to the consumption of institutional or hotel foods. Figure 2 shows the percentage of households where members eat meals or snacks outside the home. Most of these are children learning in schools with school feeding programs and people working outside the home and cannot make it back for lunch.

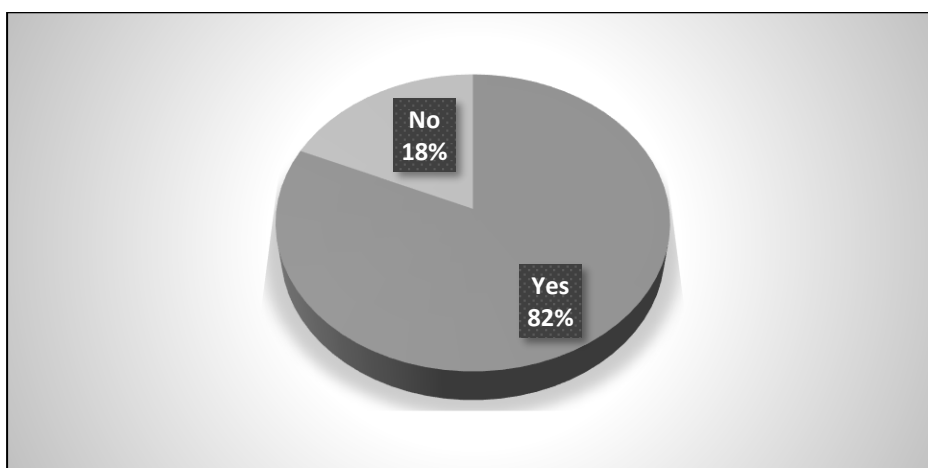*Figure 2: Percentage of households where members eat meals or snacks outside the home (N=120)*

Figure 3 shows the results of the one-month food recall. The respondents reported that the household would not have enough food was the most often worry experienced by respondents. However, it is clear that the respondents did not have many problems with household members sleeping hungry.
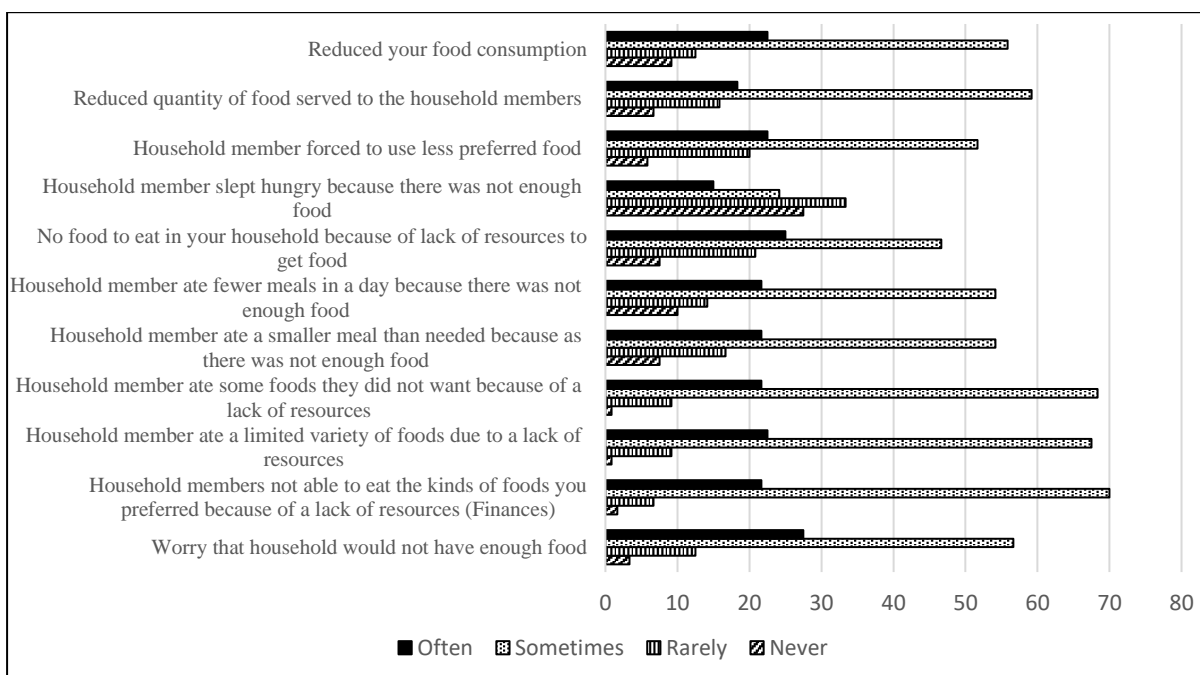

Figure 3: One-month food recall (N=120)

Farming is a significant activity of some households in the slums and its environs as it supplements the food consumed within these households. 29% of the respondents reported to engaging in farming as shown in Figure 4 below.
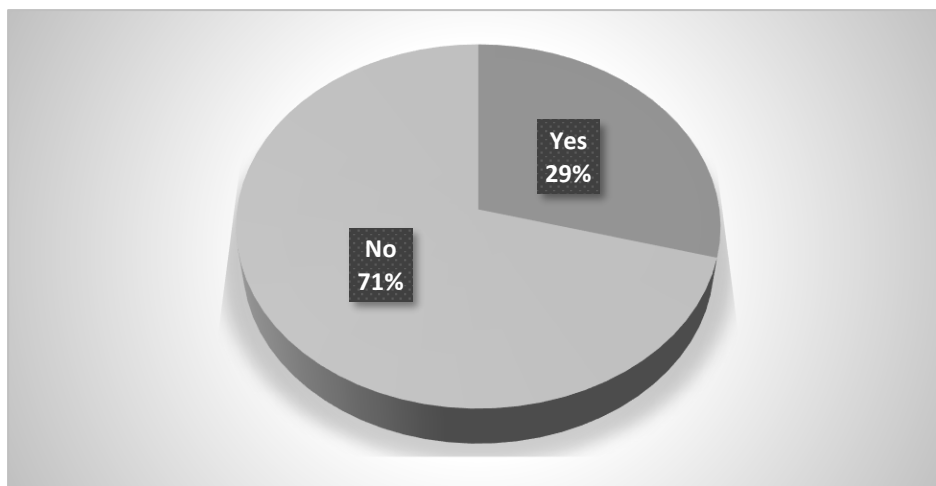
Figure 4: Percentage of respondents with farming within the slums and its environment (N=120)

Table 16 below shows the approximate value in Kenya shillings of some crops grown in the slums and its environs. Most of the crops are grown in small farms along the railway riparian land in Obunga and the wetlands in Namthoe. There is some irrigation, but most of the water used is of inferior quality mostly contaminated with raw sewage.

Table 16: Approximate value of food crops harvested by respondents who farm in the slums and its environment (N=120)

Crop grown	Value (Kenya shillings) and number of respondents			
	< 500 KES	600-1000 KES	1100-5000 KES	> 5000 KES
Arrowroots	0	1	0	0
Beans	0	1	2	2
Black nightshade	4	3	1	2
Cassava	0	1	1	0
Corchorus olitorius (Mrenda/Apoth)	1	0	0	0
Cowpeas	3	4	6	1
Crotalaria brevidens	1	0	1	0
Kales	1	6	3	4
Maize	2	1	7	4
Millet	0	0	1	0
Rice	0	0	0	1
Sorghum	0	1	0	1
Spider weed	4	1	5	4
Spinach	0	1	0	0
Tomatoes	0	0	0	1
Vegetables	0	1	0	1

There are very few respondents growing crops purposely for commercial use only as reported during the household interviews. As shown in Table 17 most of the food crops are grown for both commercial and subsistence use.

Table 17: Crops grown for subsistence and commercial purposes (N=120)

	Subsistence	Commercial	Subsistence and commercial
Arrowroots	1	0	0
Beans	4	0	3
Black nightshade	5	0	4
Cassava	0	1	1
Corchorus olitorius (Mrenda/Apoth)	1	0	0
Cowpeas	7	1	9
Crotalaria brevidens (Mitoo)	3	0	0
Kales	5	0	14
Maize	5	0	11
Millet	0	0	1
Rice	0	0	1
Sorghum	1	0	1
Spider weed	6	1	10
Spinach	0	0	1
Sugarcane	0	0	1
Sweet potatoes	0	0	1
Tomatoes	0	0	1
Vegetables	1	0	2

2.3 Groups and group activities

40 respondents belong to 38 groups out of which 22 are involved in Table banking. A few groups deal directly with food and food processing namely: Tang'chon women group which markets eggs, Jonyanya which markets tomatoes and Umbrella and Obunga Dry fish which markets fish. The friends group, Dak lich and Kumerauka Tupambazuke Self-help group deal with farming activities. The reasons given by respondents for not joining groups are shown in Figure 5 below
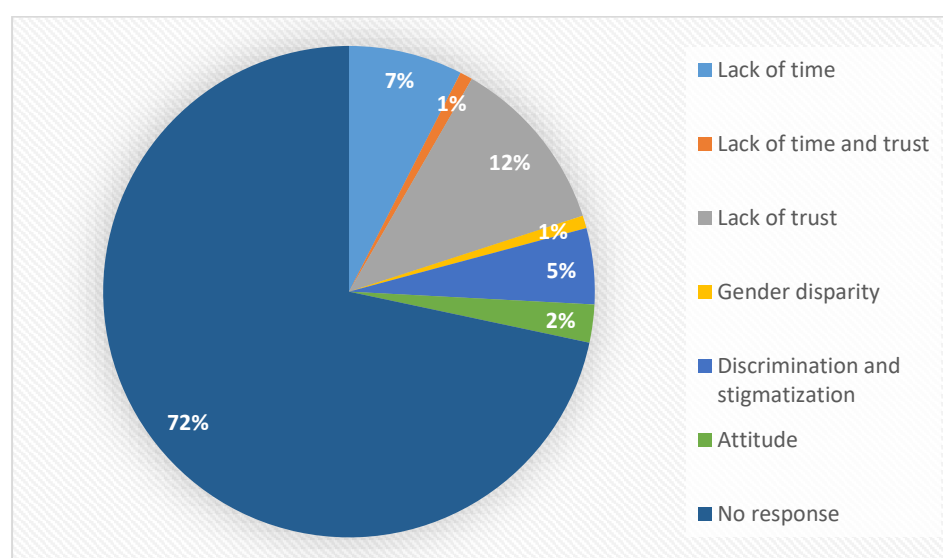

Figure 5: Reasons given by respondents for not joining groups (N=120)

3.0 Results from the key informant interviews and focused group discussions

The four most common foodstuffs consumed by the households in Obunga and Nyalenda, as mentioned in the KII and FGDs are:
1. Ugali
2. Vegetables
3. Skeleton Nile perch- Mgongo wazi

4. Omena.

The prices of the commodities fluctuate depending on seasonality. Other factors that affect the prices of foodstuff are the lifestyle of the consumer and the source of the food. Lifestyle encompasses the habits, attitudes, tastes, moral standards, economic level, etc., that together constitute the mode of living of an individual or group. The economic level of most of the slum dwellers is very low. This means that they cannot afford expensive foodstuffs and thus prefer buying cheap food. Most of their meals also depend on the earnings of the day and are therefore not planned. Majority of families with young children pay food vendors for the children's lunch as they cannot afford to cook 3 meals a day and only cook supper when the whole family is together. These meals include; chips, chapatti with soup/beans, mandazi with beans/soup or githeri (maize and beans). Some people in the slum area some even stated that they only eat meat on special occasions like weddings, funerals, etc. Also important to note is the fact that the slum dwellers thrive on a 'kitu kidogo' economy where foodstuffs are sold in small quantities such as meat for Kshs 20/=, Cooking oil for Kshs 10/=, Kerosene for Kshs10/=, etc. and a family can survive on Kshs 150/= per day.

The small-scale food production in Obunga and Nyalenda is usually through irrigation, and the sources of water in Nyalenda is through the spring and River Wigwa, though the source of water in Obunga is still not well defined. The quality of the water was said to range from fair to poor with the general sanitation being very poor both in Obunga and Nyalenda. Photo 1 shows vegetables planted along drainage with effluents. Soil and water pollution impact on food safety which represents an important threat to human health. Untreated or inadequately treated municipal sewage is a major source of groundwater and surface water pollution in the slums of Obunga and Nyalenda. Sewage carries microbial pathogens that are the cause of the spread and disease. Most of the water used for irrigation in the study area is a discharge of untreated waste, industrial effluent and run-off from drainages. Table 16 below shows the responses given by farmers doing irrigation on the water quality based on their assessment of colour, smell and source.

Table 18: Water quality based on their assessment of colour, smell and source.

Source of water for irrigation	Not doing irrigation	Water quality based on their assessment of colour, smell and source				Total
		Very good	Good	Fair	Bad	
	90	0	0	0	0	90
Breweries	0	1	1	1	0	3
Dam	0	0	2	0	0	2
Kibos River	0	0	1	0	0	1
River	0	0	0	1	1	2
River Auji	0	0	0	1	0	1
River Ayanga	0	1	0	0	0	1
River Burloo	0	0	0	1	0	1
River Nyamasaria	0	0	1	0	0	1
Spring	0	0	0	2	0	2
Stream	0	0	0	1	0	1
Tap water	0	1	1	0	0	2
Trench	0	0	1	1	0	2
Wigwa River	0	0	6	5	0	11
Total	90	3	13	13	1	120

Plate 1: A farm with trenches used for irrigation in Nyalenda Slums

Plate 2: A farm with cowpeas intercropped with kales in Namthoe

Food sources vary with most of the food coming from outside the slums (see Table 17). This could explain the high prices of foodstuffs since the transportation costs are factored into the selling price. Grains come from the neighbouring countries of Uganda and Tanzania. Fruits such as mangos, oranges, and pawpaws come from Marakwet County despite the fact that the study area is having a conducive climate for the production of the same.

Table 19: Sources of food as given in the KII and FGDs (N=120)

Common food consumed	Sources	Quality	Price
Vegetables (Kales)	Kibuye; Kisii, Sondu, Molo and Limuru	Good	Moderate
Fruits	Kibuye; Limuru and Marakwet	Good	Moderate
Green Maize	Kibuye; Molo, Eldoret, Nandi	Good	High
Grains	Bungoma, Kibuye; Tanzania, Uganda,	Good	High

Some of the most common food-related diseases that have been reported in these informal settlements include; typhoid fever, cholera, diarrhea, dysentery, and worms like hookworms, whipworms, roundworms, amoebiasis and stunted growth in children.

According to the key informants, the following were suggestions made on how to improve the quality of foodstuffs consumed in these areas:

1. Using improved low-cost production technology such as the vertical and horizontal gardens.
2. Enforcement of Public health-related legislation
3. Improve the quality of water used for irrigation
4. Food processing to add value
5. Permanent workers to be employed to take charge of sanitation in Kibuye, Obunga, and Nyalenda.
6. Services in hotels and other food outlets should be supervised by trained county officers to safeguard the sanitation process in those areas. Many hotels in the slums and Kibuye market do not have the proper capability of food handling and preparation.
7. Food such as Omena if not well prepared transmits tapeworms hence should be well cooked.
8. Food should be thoroughly washed and cleaned before cooking.
9. Improve on sanitation
10. Enforcement of Public health-related legislation
11. Improve on quality of water used for irrigation
12. Capacity building on local farmers on production
13. Empower the households on behavior change on their health

Suggestions on means of improving food processing

1. Commencing outlets medical examination to food handlers and processors
2. Provision of protective clothing
3. Economic empowerment on VSL and other micro finances.

The level of training required for food production and the level of people involved in training should be high.

There is a need for capacity building on food production, food handling, food marketing and food preservation.

The following stakeholders were suggested to carry out capacity building in the following areas:-

Food production- Ministry of health, NGOs, e.g., UMANDE TRUST who deal with WASH

Food marketing- County Government department of Trade and industry

Food handling- Public Health Organisation (PHO)

Food packaging and processing- PHO, HCDA

Other key stakeholders involved:

- SUSWATCH
- CARE-KENYA
- OXFAM
- PLAN INTERNATIONAL
- BAMATO CBO
- SANA INTERNATIONAL

4.0 References

World Food Programme (2008) 'Food consumption analysis: calculation and use of the food consumption score in food security analysis. Available online: http://vam.wfp.org

Annex

Annex 1 : Weights Assigned to 12 Food Categories

	FOOD ITEMS (*examples*)	Food groups (definitive)	Weight (definitive)
1	Maize , maize porridge, rice, sorghum, millet pasta, bread and other cereals	Main staples	2
	Cassava, potatoes and sweet potatoes, other tubers, plantains		
2	Beans. Peas, groundnuts and cashew nuts	Pulses	3
3	Vegetables, leaves	Vegetables	1
4	Fruits	Fruit	1
5	Beef, goat, poultry, pork, eggs and fish	Meat and fish	4
6	Milk yogurt and other diary	Milk	4
7	Sugar and sugar products, honey	Sugar	0.5
8	Oils, fats and butter	Oil	0.5
9	spices, tea, coffee, salt, fish power, small amounts of milk for tea.	Condiments	0

Source: WFP (2008)

Annex 2 : Coordinates for Nyalenda A

Salome Anyango Otieno	Nyalenda A	-0.12351	34.75762
Jackline Nyamasi	Nyalenda A	-0.12430	34.75858
Millicent Adhiambo	Nyalenda A	-0.12274	34.75919
Jackilne Auma Odongo	Nyalenda A	-0.12145	34.75994
Irene Atieno Owino	Nyalenda A	-0.12268	34.75822
Ineah Otieno	Nyalenda A	-0.12060	34.76331
Irene Brenda Vallary	Nyalenda A	-0.12006	34.76230
Dina Wasike	Nyalenda A	-0.12047	34.76256
John Otieno	Nyalenda A	-0.12040	34.76255
Wilfrida Akoth Akacha	Nyalenda A	-0.11804	34.76157
Jenifer Ndolo Nyamega	Nyalenda A	-0.12192	34.76416
Sharon Atieno	Nyalenda A	-0.12192	34.76420
Maureen Atieno Juma	Nyalenda A	-0.12282	34.76279
Maureen Akinyi Aboge	Nyalenda A	-0.12433	34.76087
Mary Owino	Nyalenda A	-0.12431	34.76085
Millicent Auma Akoko	Nyalenda A	-0.12369	34.75486
Joyce Odeny	Nyalenda A	-0.12528	34.75548
Dorcas Aluoch	Nyalenda A	-0.12611	34.75608
Damaris Odhiambo	Nyalenda A	-0.12390	34.75587
Pamella Atieno	Nyalenda A	-0.12299	34.75622
Austine wetungu Nakitare	Nyalenda A	-0.12109	34.76427
Prisca Auma Ojwang	Nyalenda A	-0.12067	34.76395
Dancan Washington odhiambo	Nyalenda A	-0.12085	34.76376
Helem Akoth Obongo	Nyalenda A	-0.12143	34.76459
Elizabeth Odongo	Nyalenda A	-0.12081	34.76309
Magret okoth	Nyalenda A	-0.12266	34.75329
Magret Ojiwa	Nyalenda A	-0.12345	34.75374
Sheril Genga	Nyalenda A	-0.12405	34.75408
Millicent Atieno	Nyalenda A	-0.12495	34.75373
Jacklene Akinyi Okise	Nyalenda A	-0.12446	34.75435

Irene Awuor	Nyalenda B	-0.11743	34.76087
Mary Atieno	Nyalenda B	-0.11658	34.76187
Pamela Juma	Nyalenda B	-0.11613	34.76162
Serfa Jeremiah	Nyalenda B	-0.11661	34.76249
Rose Ouma	Nyalenda B	-0.11680	34.76296
Beatrice Okoto	Nyalenda B	-0.11689	34.76306
Dorothy Adhiambo	Nyalenda B	-0.11715	34.76277
Rosa Juma	Nyalenda B	-0.11752	34.76279
Everlyne Atieno	Nyalenda B	-0.11764	34.76253
Margaret Onyango	Nyalenda B	-0.11888	34.76242
Penina Atieno	Nyalenda B	-0.11945	34.76316
Sharon Onyango	Nyalenda B	-0.11916	34.76339
Lilian Oluoch	Nyalenda B	-0.11916	34.76416
Paul Odhiambo	Nyalenda B	-0.11596	34.76445
Dorcas Ogai	Nyalenda B	-0.11596	34.76405
Lavina Akinyi	Nyalenda B	-0.12100	34.75808
Jane Adhiambo	Nyalenda B	-0.12081	34.75704
Grace Akinyi	Nyalenda B	-0.12094	34.75713
Carolyne Akinyi	Nyalenda B	-0.12109	34.75728
Beatrice Atieno	Nyalenda B	-0.12177	34.75693
Nyalenda Phamacy	Nyalenda B	-0.11958	34.75669
Mary Akinyi Adhiambo	Nyalenda B	-0.12103	34.75555
Grace Obonyo	Nyalenda B	-0.12117	34.75499
Irene Tovoko	Nyalenda B	-0.12192	34.75542
Jane Adhiambo Ochieng	Nyalenda B	-0.12228	34.75530
Benter Atieno Jaoko	Nyalenda B	-0.12230	34.75569
Phenny Awuor Auma	Nyalenda B	-0.12270	34.75625
Carol Taka	Nyalenda B	-0.12019	34.75972
Disho Were	Nyalenda B	-0.12142	34.75909
Mary Otieno	Nyalenda B	-0.12335	34.75844
Maureen Odhiambo	Nyalenda B	-0.12503	34.75863
Sipros Odede	Nyalenda B	-0.12065	34.75913
Goretti Akoth	Nyalenda B	-0.11356	34.77194
Joice Akinyi	Nyalenda B	-0.11302	34.77093
Susan Adhiambo	Nyalenda B	-0.11226	34.77063
Esther Ounga	Nyalenda B	-0.11144	34.77159
Eunice Atieno	Nyalenda B	-0.11300	34.76981
Eunice Achieng Ratibu	Nyalenda B	-0.11187	34.76804
Emmaculate Awuor Ogoda	Nyalenda B	-0.11209	34.76767
Olga Atieno Ogada	Nyalenda B	-0.11331	34.76818
Phoebe Anyango	Nyalenda B	-0.11370	34.76898
Lilian Atieno Otieno	Nyalenda B	-0.11482	34.76979
Christine Okoth	Nyalenda B	-0.11570	34.77076
Lilian Atieno Otieno	Nyalenda B	-0.11308	34.76893
Mary Ochieng Muga	Nyalenda B	-0.11286	34.76834
Beatrice Nyangueso	Nyalenda B	-0.11213	34.76830
Christine Akinyi	Nyalenda B	-0.11163	34.76796
Mary owino	Nyalenda B	-0.11205	34.76908
Viginia Anyango	Nyalenda B	-0.11209	34.76934
Mercy Achieng	Nyalenda B	-0.11167	34.76990
Elizabeth Akoth	Nyalenda B	-0.11180	34.77066
Grace Anyango	Nyalenda B	-0.11211	34.77135
Mary Odhiambo	Nyalenda B	-0.10997	34.77144
Carolyne Atieno	Nyalenda B	-0.10993	34.77081
Mwana Hawa Wakasa	Nyalenda B	-0.11068	34.77071
Jennifer Ochieng	Nyalenda B	-0.11027	34.76942
Pamela Odondo	Nyalenda B	-0.11146	34.76881

Pamela Akinyi	Nyalenda B	-0.11339	34.76742
Sharon Atieno	Nyalenda B	-0.11284	34.76651
Beatrice Agedi	Nyalenda B	-0.11400	34.76627
Norah Onditi	Nyalenda B	-0.11436	34.76557
Caroline Aoko	Nyalenda B	-0.11365	34.76585

Annex 4:Coordinates for Obunga

Treeza1	Obunga	-0.07923	34.76335
Treeza2	Obunga	-0.07895	34.76346
Treeza3	Obunga	-0.07843	34.76345
Treeza4	Obunga	-0.07813	34.76321
Treeza5	Obunga	-0.08081	34.76305
Edward1	Obunga	-0.07888	34.76408
Edward2	Obunga	-0.07816	34.76375
Edward3	Obunga	-0.07800	34.76570
Edward4	Obunga	-0.07625	34.76365
Edward5	Obunga	-0.07863	34.76278
Lilian Otieno	Obunga	-0.07593	34.76644
Beryl Ochieng	Obunga	-0.07625	34.76531
Catholic Church	Obunga	-0.07742	34.76355
Mildred Atieno	Obunga	-0.07836	34.76700
Raphael Muga	Obunga	-0.08073	34.76865
Qulent Otieno	Obunga	-0.08096	34.76568
Karen Akumu	Obunga	-0.07947	34.76465
Monica	Obunga	-0.07948	34.76191
Seline	Obunga	-0.08015	34.76099
Grace	Obunga	-0.08058	34.76103
Kezia Atieno	Obunga	-0.08247	34.75930
Xxxxx	Obunga	-0.08195	34.76013
Xxxxx	Obunga	-0.08134	34.76017
Beatrice Obungu	Obunga	-0.08027	34.76146
Mary Opiyo	Obunga	-0.08008	34.76250
Joab1	Obunga	-0.07856	34.76343
Joab2	Obunga	-0.07960	34.76331
Joab3	Obunga	-0.08010	34.76273
Joab4	Obunga	-0.08088	34.76140
Joab5	Obunga	-0.08140	34.76346

Annex 4:Coordinates for Obunga

Treeza1	Obunga	-0.07923	34.76335
Treeza2	Obunga	-0.07895	34.76346
Treeza3	Obunga	-0.07843	34.76345
Treeza4	Obunga	-0.07813	34.76321
Treeza5	Obunga	-0.08081	34.76305
Edward1	Obunga	-0.07888	34.76408
Edward2	Obunga	-0.07816	34.76375
Edward3	Obunga	-0.07800	34.76570
Edward4	Obunga	-0.07625	34.76365
Edward5	Obunga	-0.07863	34.76278
Lilian Otieno	Obunga	-0.07593	34.76644
Beryl Ochieng	Obunga	-0.07625	34.76531
Catholic Church	Obunga	-0.07742	34.76355
Mildred Atieno	Obunga	-0.07836	34.76700
Raphael Muga	Obunga	-0.08073	34.76865
Qulent Otieno	Obunga	-0.08096	34.76568
Karen Akumu	Obunga	-0.07947	34.76465
Monica	Obunga	-0.07948	34.76191

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Seline	Obunga	-0.08015	34.76099
Grace	Obunga	-0.08058	34.76103
Kezia Atieno	Obunga	-0.08247	34.75930
Xxxxx	Obunga	-0.08195	34.76013
Xxxxx	Obunga	-0.08134	34.76017
Beatrice Obungu	Obunga	-0.08027	34.76146
Mary Opiyo	Obunga	-0.08008	34.76250
Joab1	Obunga	-0.07856	34.76343
Joab2	Obunga	-0.07960	34.76331
Joab3	Obunga	-0.08010	34.76273
Joab4	Obunga	-0.08088	34.76140
Joab5	Obunga	-0.08140	34.76346

Annex 5: Important landmarks

New York/ Kidstar ECD Center	Nyalenda B	-0.11333	34.76558
SDA Church Kachok	Nyalenda B	-0.11296	34.76648
Pentecostal Deliverance Church	Nyalenda B	-0.11134	34.76863
Church	Nyalenda B	-0.11183	34.77043
Mary Mill Stall	Nyalenda B	-0.11292	34.76850
Kowino Health Centre	Nyalenda B	-0.11412	34.76915
Sub-county Government Office	Nyalenda B	-0.11387	34.76876
Kowino Market	Nyalenda B	-0.11363	34.76852
Nyaore Market Centre	Nyalenda B	-0.11181	34.76818
Vocational Training Centre	Nyalenda B	-0.11312	34.76973
Abios Shop	Nyalenda B	-0.11168	34.77143
Roho Church	Nyalenda B	-0.11273	34.77072
New Lilian Shop	Nyalenda B	-0.11358	34.77037
White House Junction	Nyalenda B	-0.11419	34.77193
Grocery/Shop	Nyalenda B	-0.12076	34.75927
Bungu Protected Spring	Nyalenda B	-0.12494	34.75855
Telcom Booster	Nyalenda B	-0.12359	34.75869
Youth Hotel	Nyalenda B	-0.12105	34.75916
Medistar Pharmacy	Nyalenda B	-0.12003	34.75980
Pand Pieri Health Centre	Nyalenda B	-0.11853	34.75817
World Grace Ministry Church	Nyalenda B	-0.12234	34.75540
Kilo Junction	Nyalenda B	-0.12114	34.75491
Harvest Church	Nyalenda B	-0.12097	34.75535
Mengo Garden Building	Nyalenda B	-0.12191	34.75662
Baptist Church	Nyalenda B	-0.12045	34.75753
Ka water Poshomill & Grain Market	Nyalenda B	-0.11620	34.76274