



**Indicator Development for Surveillance of Urban  
Emergencies  
(IDSUE)**

**Year 3 Research Report**

**August 2012 to December 2013**

**IDSUE is currently in the third year of a five year study funded by  
the US Agency for International Development – Office of Foreign  
Disaster Assistance**

## Summary

Assessing urban emergencies/crisis and finding effective means of responding to these emergencies has become a major interest and focus for many humanitarian actors given the current rates of urbanization worldwide. Concern is currently undertaking large-scale routine data collection in informal settlements (slums) of Nairobi and other major urban areas in Kenya. The study, now in its third year, has resulted in the collection of baseline household information on WASH, food security, personal security, livelihoods, morbidity, and coping strategies in five informal settlements over eight rounds. This report will summarize findings from our third year in operation, August 2012 to December 2013, which reveals that several domains have the potential to be key indicators of urban crisis onset. These domains, such as income, food security indices, MUAC, personal security/shocks, and the use of coping strategies, show major variation across areas, time, and within communities.

Overall, several themes persist. First, conditions are getting worse in all the areas. However, the rate and magnitude of decline differs between the areas. For instance, more households in all areas of study are reporting higher rates of food insecurity, coupled with a decline in dietary diversity, but some areas are faring worse than others. Bringing us to our second theme; averages mask reality. Although we are seeing worsening conditions in all slum areas, the rate of decline is not equal in all the areas. For example, households in the lowest income quintile report spending over 100% of their 4-week income on food, yet the overall food expenditure average is 63.8%. Closer examination of households in the lowest income quintiles reveals an even more vulnerable population that reports very low income, higher food insecurity rates, less dietary diversity, higher prevalence of illness, more insecurity, and higher use of coping strategies. However, these vulnerable households only account for about 20 to 40% of the overall slum population, which otherwise masks the reality of households living in the most dire of situations. Geospatial analysis reveals that in most of our study areas, the most food insecure and lowest-income households are spatially clustered. This pattern may allow for a more targeted surveillance of the most vulnerable areas, which are also likely to show the first signs of the onset of a humanitarian crisis, in urban informal settlements.

This document is arranged in three major sections. The first section is a general overview of the project and major findings. Preliminary geospatial analysis was performed to determine if areas of vulnerability are evident within the slums. The justification and results of this analysis are presented in the second section, titled '*Geospatial Analysis*'. An intensive questionnaire review was undertaken to determine which questions were important for future surveillance. This analysis is presented in the third section, titled '*Analysis of Indicators by Domain: Questionnaire Review*'. Questionnaires, both the old and the new versions, are included in the appendix as well as detailed results for all of the questions per area (5 informal settlements) and per city (Nairobi and Kisumu).

## Introduction

Rapid world urbanization is currently ongoing and projected to continue, at even higher rates, in the future. In developing nations, such as several in sub-Saharan Africa, rapid urbanization continues amidst stagnating economies. This has resulted in most urban dwellers in these countries living in slums or slum-like settlements. For example, the urbanization rate in Kenya now stands at 4% and about 60% of the urban residents in Kenya live in slums or slum-like conditions. These settings lack the most minimum amenities needed to live a healthy life such as clean running water, proper hygiene and sanitation facilities and sewage systems. Most slum dwellers also lack consistent access to income, relying instead on casual labor or petty trade, the availability of which fluctuates from day to day and week to week (Ruel 2008). High levels of crime and violence are seen in most slums which can erupt into acute conflict as was seen in Kenya in 2008. The high population density of slums coupled with poor or no sanitation and limited access to health services means that slum dwellers face much higher disease burdens than their other urban or rural counterparts (The World Bank 2006). Slum dwellers are also politically disenfranchised; without secure tenure to their land they are vulnerable to sudden eviction.

The factors described above mean that many slum dwelling families exist on the edge of survival and urban slum populations are highly vulnerable to shocks, from price increases, to disease outbreaks, to political unrest, to a more subtle combination of all of these that cause a substantial proportion of these families to tip over the edge and experience a rise in morbidity and mortality.

Despite the recognized risk and growing international commitment to address urban crises, urban environments and actors working in them are still plagued with a dearth of information. Until recently urban areas were often excluded from national and sub-national surveys under the assumption that they would skew data and obscure negative trends in rural areas. Even when they are included, data is rarely disaggregated between wealthier urban neighborhoods and slums, leading to a homogenization that hides the true situation in both areas. Access to slum-specific data alone, however, is not sufficient to solve this problem. The central question that must still be addressed is: **How do we know when a situation has gone from chronic poverty to a humanitarian crisis in an urban slum?**

Current information sources are inadequate to meet the specific needs for an urban slow-onset emergency. Traditional, large-scale data sources such as national household surveys, or a national census are too infrequent to capture rapidly emerging threats and shocks to vulnerable households. In response to increased perceptions on negative coping by households, small scale de-facto household surveys are conducted without any follow-up surveys, often lacking the rigor to understand broader effects on vulnerable communities.

While monitoring for a slow-onset emergency is conducted in rural areas, the practice is almost entirely lacking in urban areas. Traditionally, humanitarian and development actors have focused on deprivation in rural areas. As a result, the sector is faced with a

lack of understanding what, how, and how often to monitor for urban areas. While urban areas are where many economic opportunities exist for the urban poor, these populations also encounter a high degree of risks. Urban dwellers suffer a wide array of shocks and chronic stresses and security threats. Urban populations are larger than rural ones, they are also highly dynamic with new rural migrants, displaced peoples and refugees. These examples are illustrative of how monitoring for urban areas require a different set of metrics (what to measure) and thresholds (how to declare an emergency). The challenge is to develop both metrics and thresholds upon a strong evidence base, as opposed to a normative framework. For humanitarian actors, such a framework can guide when and where interventions are needed.

IDSUE was first conceived through the need to develop a surveillance tool to detect, and respond to, slow-onset urban emergencies. First, metrics and key indicators were conceptualized through focus group discussions into a household questionnaire. The pilot period saw two informal settlements in Nairobi (Korogocho and Viwandani) undergo four rounds of data collection. The questionnaire changed in the first two years depending on the emerging evidence. For Year 3, a new tool was coupled with an expansion of sites which meant larger samples. The questionnaire and indicators remained the same to ensure uniformity for time-series analysis for the third year. It is also worth noting that, there was also weekly market price data collected to assess fluctuating food prices in these areas.

## **Objectives**

The project aims to develop and empirically test a set of emergency indicators suitable for triggering humanitarian response in urban settings. Specifically:

- I. To determine indicators for early detection of humanitarian emergency situations and coping strategies
- II. To develop surveillance systems for detection of early warning signs of a humanitarian emergency/crisis
- III. To identify thresholds/cut-offs/decision algorithms for defining when a situation has reached an emergency/crisis stage

## **Current Status**

As an operational research project, which has been in development for two years, IDSUE has produced a significant amount of data on the urban poor and vulnerable in Kenya. The past year has produced larger samples in more sites, which provides a larger evidence base for analysis.

A majority of the work focused on cleaning, analyzing, and summarizing the extensive baseline data collected so far in an effort to advance knowledge on the key indicators for

the long term surveillance for a slow-onset urban emergency. A review and general overhaul of the questionnaire was also under taken (see attached questionnaire review). While significant gains have been made, more in-depth and nuanced analysis is needed in 2014. The project will move from an understanding of household stresses and coping to a more holistic surveillance system, which will incorporate community and national data, such as census and food price information. Multivariate, geospatial, and in-depth community analysis will be used to build a short and effective urban surveillance system.

Future analysis will be a verification of the questions which remain in the current tool, which will emerge after each subsequent round. It is anticipated that a year from now there can be consensus on the frequency of data collection, the tool, key indicators and thresholds for monitoring. Thus the current analysis is one stage of a longer-term process.

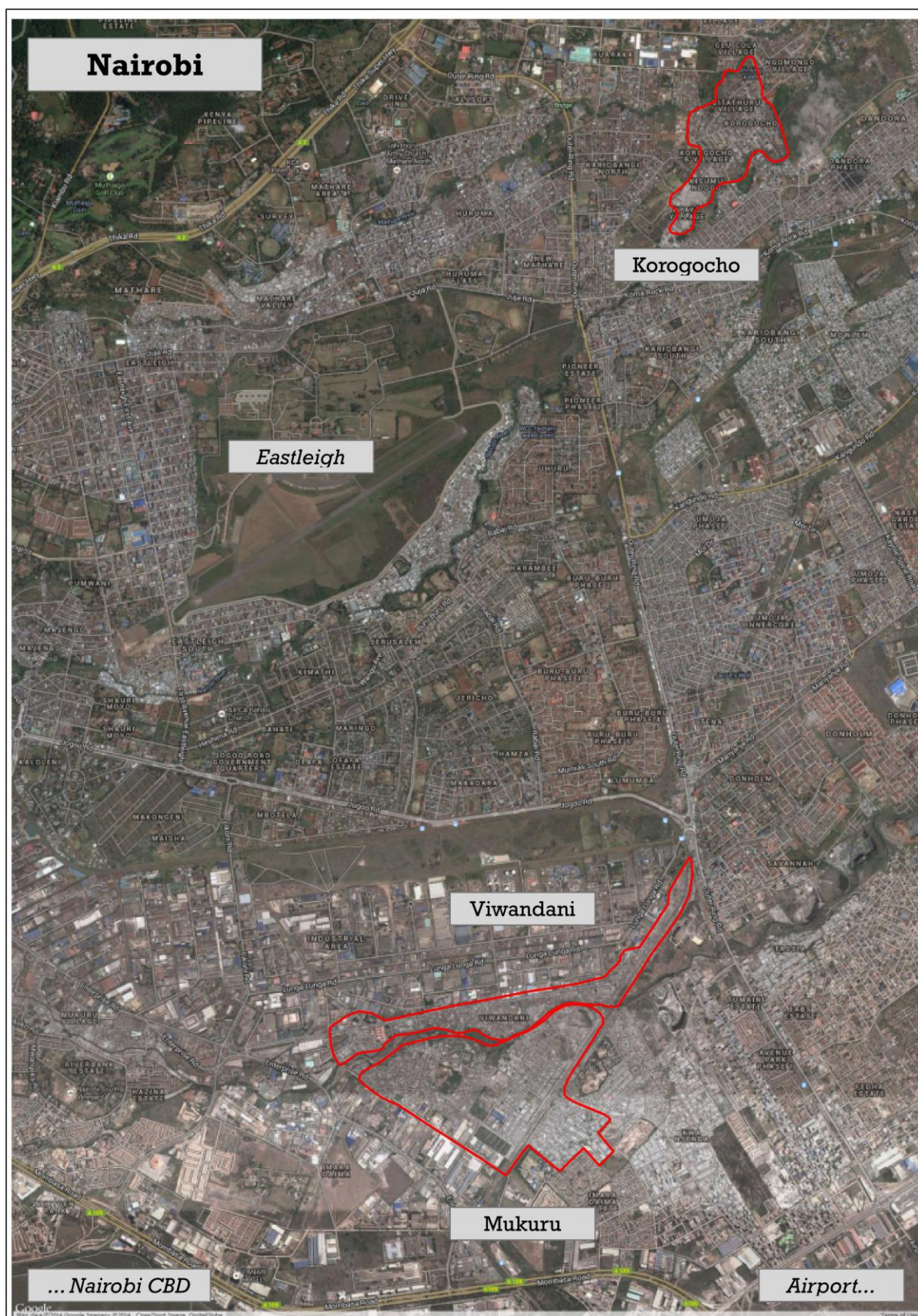
Secondary analysis which will emerge in the form of research papers is ongoing. Such papers such as the urban appropriateness of SPHERE standards are useful to understand how IDSUE thresholds can be used for emergency monitoring and response.

The road forward involves incorporating the knowledge on household coping and key indicators, and now transitioning to a surveillance system. Developing such a system will require agreement, adoption, and coordination with other humanitarian actors working in urban spaces. Therefore, while more operational research around indicators and thresholds remain a priority, incorporating feedback from other actors into IDSUE findings and research is also paramount to ensure the adequate coordination to any potential response and corresponding agreed points of action.

## **Study Area Profiles**

Study sites are located in Nairobi and Kisumu, Kenya. Nairobi, the capital and largest city in Kenya, has 3 million inhabitants (2009 census). Kisumu, located in western Kenya, is the third largest city with 400,000 inhabitants (2009 census).

This report highlights results emerging from Round 5 (August 2012) through Round 8 (November 2013). Rounds 5 through 7 (April 2013) were collected in five informal settlements, three in Nairobi (Figure 1) and two in Kisumu (Figure 2). Round 8 was carried out in an effort to understand the impact of a newly introduced 16% value added tax (VAT) and focused on two study sites in Nairobi; Korogocho and Viwandani.



**Figure 1.** Study sites, Korogocho, Viwandani, and Mukuru, in Nairobi, Kenya.



**Figure 2.** Study sites, Nyalenda and Obunga, in Kisumu, Kenya.

In 2006, UN Habitat estimated that over half the population in Nairobi lived in informal settlements and occupied only 5% of the city's land area. In Nairobi, our study focused on three informal settlements, Korogocho, Mukuru, and Viwandani. Mukuru and Viwandani are adjacent to each other while Korogocho is located about 8.5 km northeast of Viwandani. The KNBS 2009 census estimates 46,136 people/km<sup>2</sup> in Korogocho sub location, 16,802.01 and 7,859 people/km<sup>2</sup> in Mukuru and Viwandani sub locations, respectively (Table 1).

A 2012 Columbia University Earth Institute study estimates that 60% of the population in Kisumu resides in informal settlements. Our study in Kisumu focused on Nyalenda and Obunga, which are located about 8 km apart. Nyalenda is the second largest informal settlement in Kisumu and is divided into two locations. Nyalenda A has the largest population density (8,953), followed by Nyanlenda B (6,886), and Obunga (1,913). In our study, Nyalenda A and B are combined.

**Table 1.** Kenya National Bureau of Statistics (KNBS) gender, household, area (km<sup>2</sup>), and density (people/km<sup>2</sup>) 2009 census data by sub-location.

KNBS 2009 census data sampled at sub-location.						
	Nairobi			Kisumu		
	Korogocho	Mukuru	Viwandani	Obunga (Kanyakwar)	Nyalenda A	Nyalenda B
Area (km <sup>2</sup> )	0.22	8.11	5.71	6.6	3.16	4.71
Households	3,129	49,198	17,926	3,553	8,070	8,561
Density	46,136	16,082	7,859	1,913	8,953	6,886
Male	5,376	71,619	25,823	6,447	14,829	16,189
Female	5,000	58,782	19,058	6,107	13,440	16,241
Total	10,376	130,401	44,881	12,554	28,269	32,430

## Methodology Overview

An exhaustive household listing is created for each of the informal settlements before each sampling period. Due to the dynamic nature of informal settlements, it is important to count the number of household structures before randomized sampling. After household listings the informal settlements are divided into segments and a random sample of households is selected within each segment. Household interviews are recorded via smartphones and all surveys are geo-tagged. Surveys are instantly uploaded to a cloud server where the Concern team can monitor incoming surveys for quality and eventually download them for subsequent analysis. Two settlements in Nairobi (Korogocho and Viwandani) were sampled four times from August 2012 to November 2013. The rest of the areas were sampled three times from August 2012 to April 2013 (Table 2).



**Table 2.** Sampling dates and number of households sampled.

Number of household sampled in Nairobi and Kisumu settlements.						
Round (date)	Nairobi			Kisumu		Total
	Korogocho	Viwandani	Mukuru	Obunga	Nyalenda	
R5 (Apr. '12)	428	459	455	380	407	2,129
R6 (Feb. '13)	553	623	630	314	477	2,597
R7 (Apr. '13)	546	578	582	418	585	2,709
R8 (Nov. '13)	584	581	-	-	-	1,165

The sampling process, from enumerator training to completion, takes approximately 25 days. It starts with enumerator training which takes three days. Segmentation and household listing of the settlements follows and takes 2 days. Household surveys are completed in about 20 days, with approximately 15 enumerators per settlement.

Data is cleaned and analyzed in R, a free software environment for statistical computing and graphics. Chi-square, ANOVA, Pearson correlation, and linear regression tests were used at  $\alpha = 0.05$  to determine if variables differed significantly between areas or changed over time. Post hoc power analysis using medium effect sizes (Cohen 1988) and  $\alpha = 0.05$  showed that our sample sizes (Table 2) provided over 95% statistical power, which is well above the recommended 80% level.

## Major Findings

Approximately 2,500 households were sampled in each round of study, with the exception of round 8 (1,165 households), which focused on only two areas in Nairobi. Korogocho (Nairobi) is the oldest settlement, with households residing there for an average 14 years. Mukuru (Nairobi) and Viwandani (Nairobi) are the most recent settlements, with an average of about 5 to 6 years in each area. Residency times are declining over time in Viwandani, Nyalenda (Kisumu), and Obunga (Kisumu), likely due to a steady migration of people into these areas.

### Livelihoods

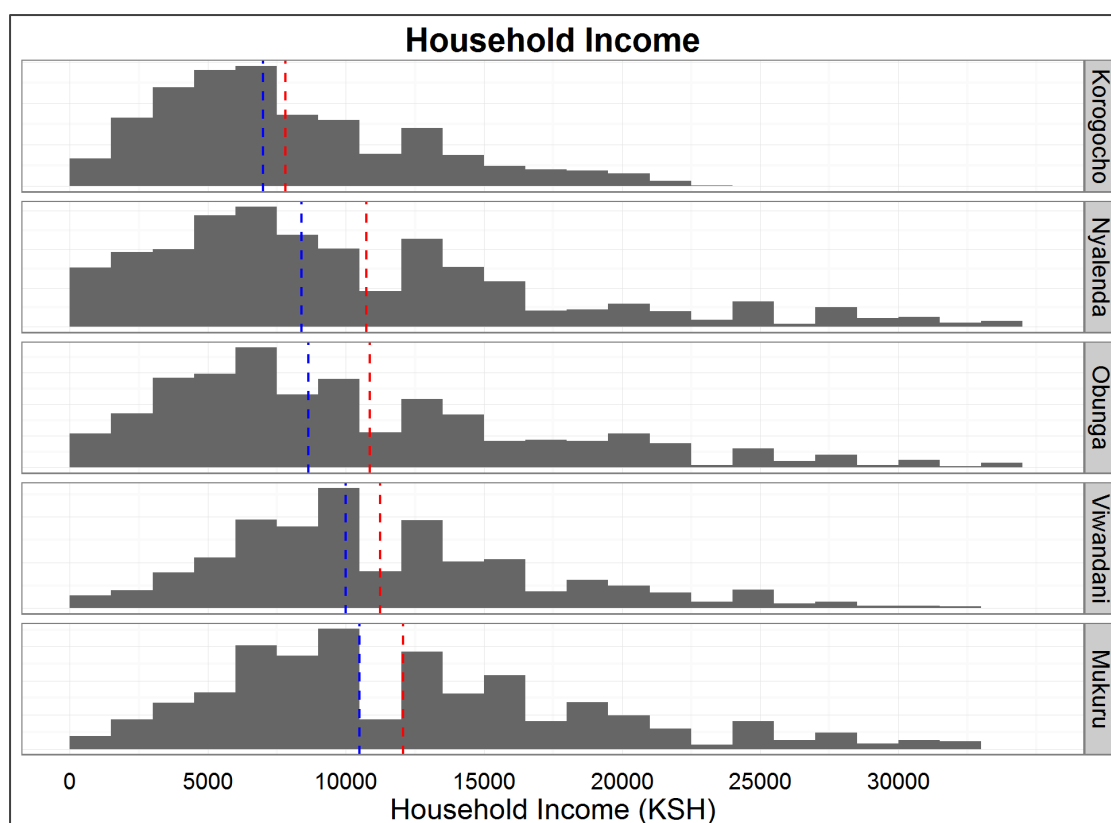
Casual labor is the largest (49%) source of income in all the areas sampled. Monthly salaries (24%) are found mostly in the higher income areas of Mukuru and Viwandani while small businesses (13%), hawking (9%), and use of remittances (1%) are most common in the lower income areas of Korogocho, Nyalenda, and Obunga (Table 3).

During economic downturns, oncoming emergencies, or local fiscal shocks, casual labor and other types of informal employment are most likely to be the first and most affected livelihoods.

**Table 3.** Household livelihoods in informal settlements in Nairobi and Kisumu, Kenya.

Livelihood	Main type of livelihood in areas of study (% households).					
	Nairobi			Kisumu		All Areas
	Korogocho	Mukuru	Viwandani	Nyalenda	Obunga	
Casual	52.0	44.5	49.2	36.8	42.4	48.5
Monthly	9.9	35.4	29.2	28.0	23.4	23.6
Business	16.5	9.7	13.3	17.6	17.2	13.0
Hawking	15.7	6.1	4.6	5.4	5.9	9.1
Remittance	0.9	0.1	0.6	1.2	1.5	0.7
Scavenging	1.7	0.5	0.3	0.1	0.0	0.7
Safety Net	0.1	0.1	0.0	0.0	0.0	0.0
Other	3.2	3.7	2.9	11.0	9.5	4.5

Overall, average household income (sum of all reported incomes within a household) is lowest in Korogocho ( $\bar{x} = 7,806$  KES,  $M = 7,000$  KES) and highest in Mukuru ( $\bar{x} = 12,067$  KES,  $M = 10,500$  KES). The median household income is lower than the average in all the areas, showing that most households earn much less than average. This is more pronounced in the lowest earning study areas of Korogocho, Nyalenda, and Obunga (Figure 3).



**Figure 3.** Household income distribution in Kenya Shillings (KSH). The red line represents the average household income per area and the blue line is the median.

Average household income did not change significantly over time in Korogocho and Mukuru, but is increasing in the other Nairobi site, Viwandani. This is in contrast with

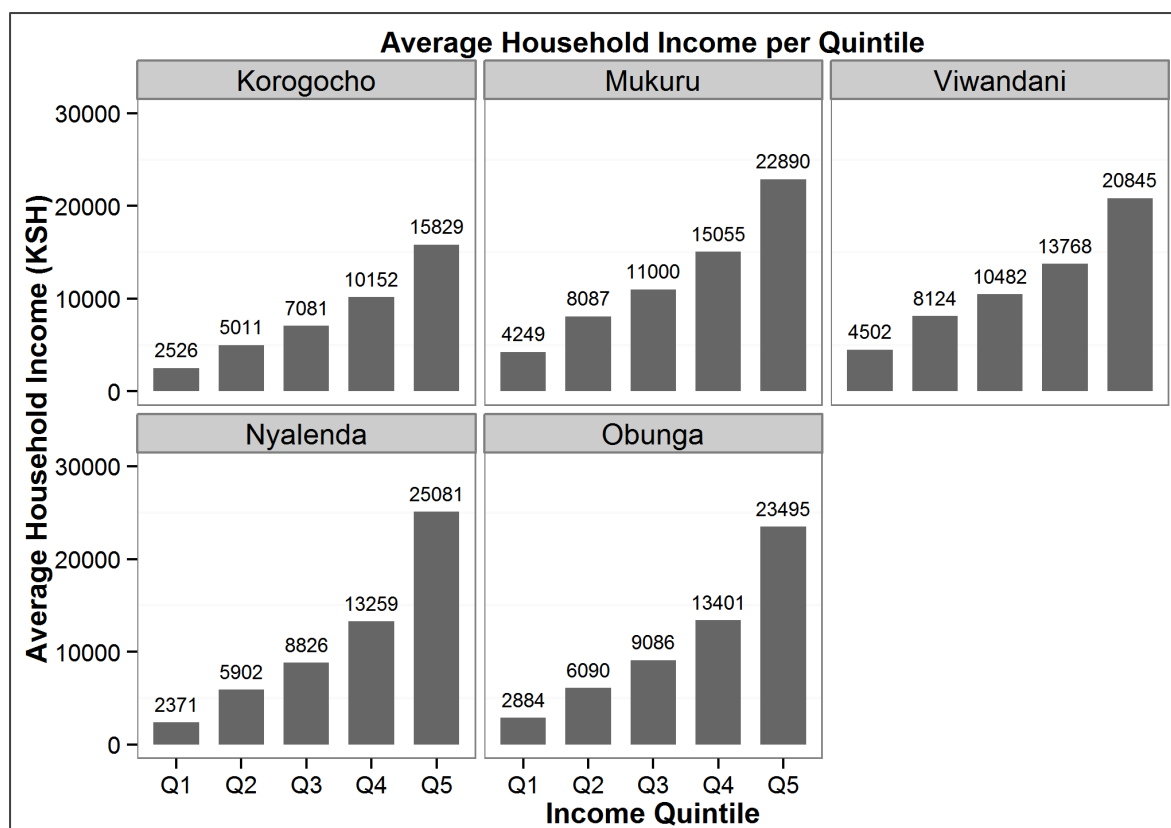
Kisumu (Nyalenda and Obunga) where average household income is declining over time (Table 4).

**Table 4.** Average household income in Kenyan Shillings (KES). (\*) represents significant ( $p < 0.05$ ) change over time.

Average Household Income in Kenyan Shillings (KES)					
Round (date)	Nairobi			Kisumu	
	Korogocho	Mukuru	Viwandani*	Nyalenda*	Obunga*
R5 (Apr. '12)	7232	11702	9794	13767	12964
R6 (Feb. '13)	8061	11951	11786	10246	11090
R7 (Apr. '13)	7932	12492	10333	8954	9108
R8 (Nov. '13)	7897	-	12541	-	-
All Rounds	7807	12067	11232	10747	10871

Income Quintiles

Household income differed significantly between areas and within rounds ( $p < 0.05$ ). Therefore, income quintiles were specifically calculated for each round within each area. Each quintile represents approximately 20% of all the households in each sampling period. Households in the lowest income quintiles earn anywhere from 9.5% (Nyalenda) to 21.6% (Viwandani) of the highest income quintiles household income (Figure 4).

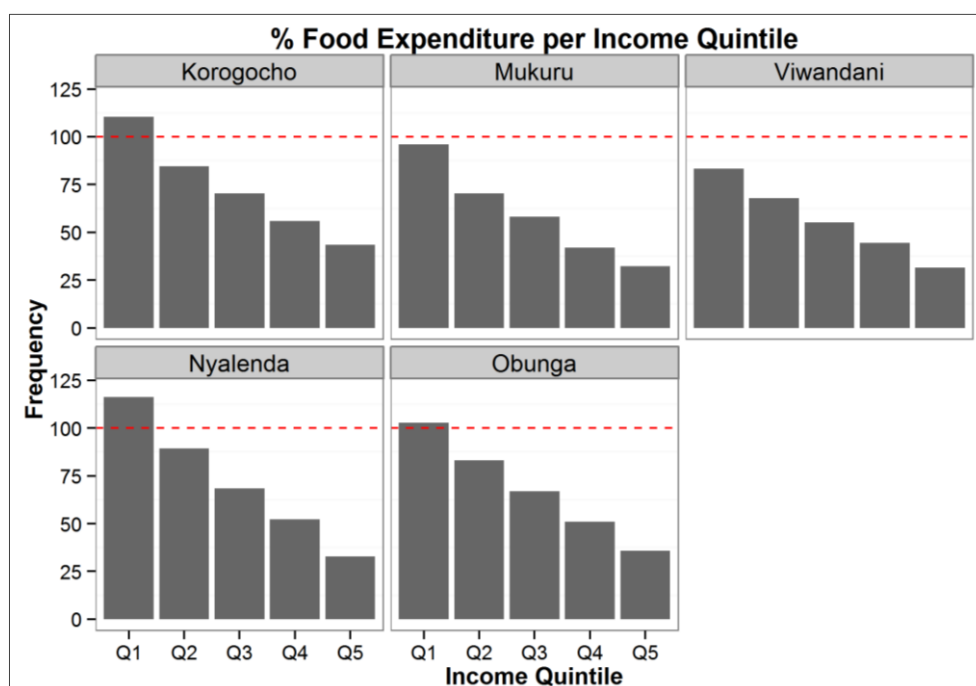


**Figure 4.** Average household income per income quintile in each area. Key to X-axis; Q1: Bottom, Q2: Second, Q3: Middle, Q4: Fourth, Q5: Top.

On average, over 90% of the household income is earned by the breadwinner (highest earner in HH). Most breadwinners in all areas were male ( $\bar{x} = 68.2\%$ ) but this varied greatly within income quintiles, with a majority of female breadwinner households occurring in the lowest income quintiles (Table 5). This trend is troubling since female breadwinners earn significantly less than their male counterparts; earning about 62% of male income in all areas of study.

A similar trend was evident with respect to food expenditure, where households in the lowest income quintiles spent more than they earned on food in a 4-week recall period. Especially in Korogocho ( $\bar{x} = 109.97\%$ ), Nyalenda ( $\bar{x} = 114.15\%$ ), and Obunga ( $\bar{x} = 102.71\%$ ), where households in the lowest income quintile spent over 100% of their income on food (Figure 5). This suggests that the already financially vulnerable households in the lowest income quintiles are borrowing money or taking food on credit.

Households in the lower income quintiles relied more on casual labor, hawking, and scavenging as a source of livelihood. These households also reported more food insecurity, severe hunger, lower dietary diversity, fewer meals/day for children, and more children (6 to 59 mos. old) with global acute malnutrition (Table 5). A higher prevalence of illness, more shocks, more perceived insecurity, and use of avoidance measures were also reported in the lowest income quintiles. A higher proportion of households in the lower income quintiles also used one or more coping strategies, especially use of credit and loans (Table 5).



**Figure 5.** Food expenditure (%) per income quintile in the areas of study. The dotted red line represents 100% income spent on food in a 4 week recall period. Key to X-axis; Q1: Bottom, Q2: Second, Q3: Middle, Q4: Fourth, Q5: Top.

**Table 5.** Livelihood, food security, health, personal security, and coping strategy indicators per income quintile with Q<sub>1</sub> as lowest.

<b>LIVELIHOODS</b>	<b>Income Quintiles (Q<sub>1</sub> : Lowest Income)</b>					
	<b>Average</b>	<b>Q<sub>1</sub></b>	<b>Q<sub>2</sub></b>	<b>Q<sub>3</sub></b>	<b>Q<sub>4</sub></b>	<b>Q<sub>5</sub></b>
Average monthly household income (KSH)	10330	3382	6659	9274	12849	20959
Food expenditure as a percentage of income (%)	63.8	100.2	78.2	63.2	49.3	35.5
Households that depend on casual labour as a source of livelihood (%)	48.5	51.9	52.0	50.3	46.2	41.0
Households that depend on monthly salary as a source of livelihood (%)	23.6	14.4	21.6	26.1	26.9	30.4
Households that depend on business as a source of livelihood (%)	13	10.3	10.2	11.6	15.1	18.4
Households that depend on hawking as a source of livelihood (%)	9.1	12.1	11.4	7.5	7.9	5.9
Households that depend on scavenging as a source of livelihood (%)	0.6	1.6	0.7	0.5	0.3	0.2
Proportion (%) of female bread winners	31.3	50.1	34.6	27.8	21.1	20.6
Proportion (%) of female headed households	26	40.5	31.3	25.2	19.9	18.3
<b>FOOD SECURITY AND NUTRITION</b>	<b>Average</b>	<b>Q<sub>1</sub></b>	<b>Q<sub>2</sub></b>	<b>Q<sub>3</sub></b>	<b>Q<sub>4</sub></b>	<b>Q<sub>5</sub></b>
Households classified as moderately and severely food insecure by HFIAS (%)	75.1	77.4	77.1	75.9	72.8	73.4
Households classified as moderately or severely hungry by HHS (%)	31.8	34.5	32.1	31.8	29.9	29.3
Dietary Diversity (Average number of food groups consumed in 1-week recall period)	5.5	5.2	5.4	5.7	5.7	5.8
Number of meals taken by children (under 18 yrs. old) per day	3	2.8	2.9	3.0	3.1	3.0
Percent of children (6-59 months) with Global Acute Malnutrition (GAM)	2.2	2.5	2.6	2.4	1.6	1.0
Percent of children (6-59 months) at risk of Acute Malnutrition	11.4	10.6	11.6	11.8	12.3	8.6
<b>WATER AND HEALTH</b>	<b>Average</b>	<b>Q<sub>1</sub></b>	<b>Q<sub>2</sub></b>	<b>Q<sub>3</sub></b>	<b>Q<sub>4</sub></b>	<b>Q<sub>5</sub></b>
Proportion of households meeting 15L of water/person/day SPHERE standard	61.4	60.2	63.7	61.9	60.7	60.1
Prevalence of illness in the last 2 weeks (%)	48.2	52.3	50.1	47.2	46.9	44.9
<b>PERSONAL SECURITY</b>	<b>Average</b>	<b>Q<sub>1</sub></b>	<b>Q<sub>2</sub></b>	<b>Q<sub>3</sub></b>	<b>Q<sub>4</sub></b>	<b>Q<sub>5</sub></b>
Households that reported at least 1 shock in the last 4 weeks (%)	16.1	19.7	16.1	16.3	13.6	16.2
Proportion (%) who often felt unsafe/scared in the community in the last 4 weeks	21.6	22.4	23.5	22.6	21.6	23.0
Proportion (%) who have often used avoidance measures in the last 4 weeks	16.7	18.8	17.7	17.4	15.2	18.1
Proportion (%) who rated security as bad and very bad	46.1	52.3	47.4	49.3	45.6	45.3
<b>COPING STRATEGIES</b>	<b>Average</b>	<b>Q<sub>1</sub></b>	<b>Q<sub>2</sub></b>	<b>Q<sub>3</sub></b>	<b>Q<sub>4</sub></b>	<b>Q<sub>5</sub></b>
Proportion (%) who used at least one coping strategy	66	69.2	66.7	66.7	62.5	64.4
Proportion (%) who bought food items on credit	44.7	46.7	44.2	45.9	43.3	43.5
Proportion (%) who took a loan to buy food	20.7	22.9	19.1	20.9	19.4	22.2
Proportion (%) who removed children from school due to lack of school fees	21.6	16.8	20.3	19.3	20.0	25.6

### Household Food Security and Malnutrition

Raw food is the main source of food (95.6%) for households in all study areas. A majority of households are moderately or severely food insecure (75%) according to the Household Food Insecurity and Access Scale (HFIAS). About 30% households report moderate to severe hunger. In Nairobi, food insecurity and household hunger increased over time but declined in Kisumu. Out of 12 food groups, households consumed an average of 5.5 food groups in a 1 week recall period. The Norwegian Refugee Council (NRC)<sup>1</sup> suggests that a household that consumes less than 4 out of the 12 food groups is food insecure. Dietary diversity is declining in both cities, similar to the number of meals children (under 18 years old) have per day.

Middle upper arm circumference (MUAC) was used to determine the nutritional status of children between 6 and 59 months old. MUAC measurements below 125 mm indicate Global acute malnutrition (GAM), which includes cases of severe (SAM: measurements below 115 mm) and moderate acute malnutrition (MAM: measurements between 115 and 125mm). Children with SAM and MAM are referred for treatment or supplementation programs. MUAC between 125mm and 135mm indicate children that are at risk for malnutrition. Children with SAM, MAM, and at risk for malnutrition were found in all study areas across most rounds. However, likely due to the low rate (%) of occurrence, it was difficult to determine a statistically significant trend over time (Table 6).

**Table 6.** Cases (%) of severe and moderate acute malnutrition and % children at risk for malnutrition.

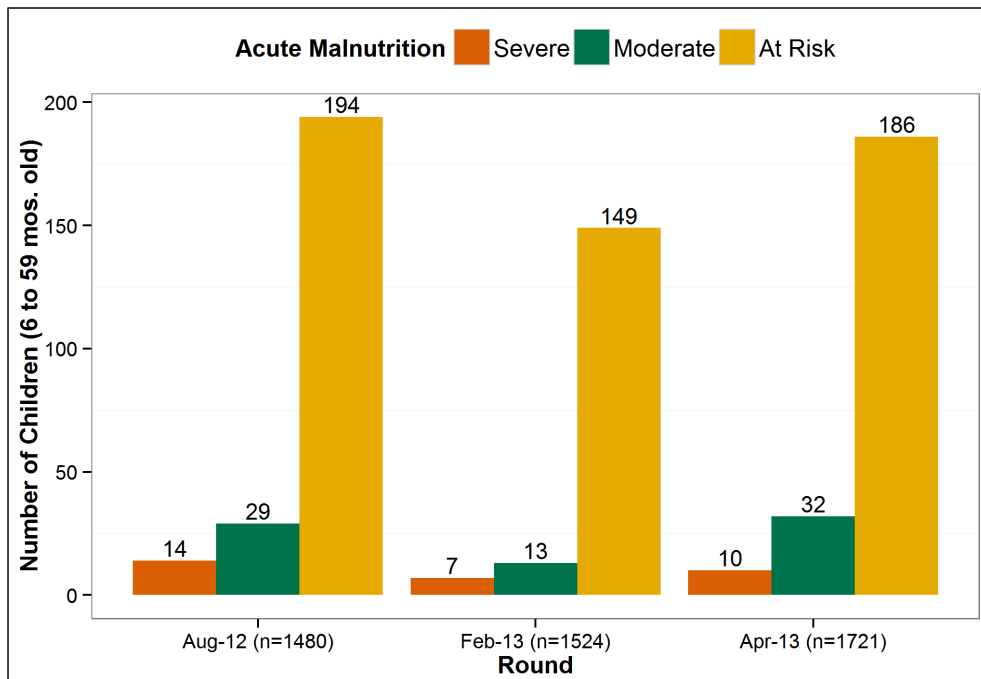
Percent children (6-59 mos. old) with severe, moderate, and at risk for acute malnutrition.												
Area	Severe (SAM)				Moderate (MAM)				At Risk			
	R5	R6	R7	R8	R5	R6	R7	R8	R5	R6	R7	R8
Korogocho	0.56	0.55	1.08	0.52	1.68	1.94	1.36	1.29	8.94	9.14	15.72	11.08
Mukuru	0.00	0.28	0.30	-	0.76	0.85	0.91	-	11.74	11.33	6.06	-
Viwandani	1.07	0.43	0.38	0.00	1.60	0.86	0.76	1.89	15.51	11.16	15.97	12.58
Nyalenda	0.32	0.30	0.23	-	1.95	0.00	2.30	-	9.42	9.97	10.14	-
Obunga	2.48	0.81	0.92	-	3.31	0.41	3.69	-	20.11	6.91	6.77	-

Although the proportion (%) of children between the ages of 6 to 59 months suffering from malnutrition appears to be low, the actual number of children with GAM or at risk for malnutrition is fairly high (Figure 6). Especially in the lower income households and households reporting moderate or severe hunger (Figure 7).

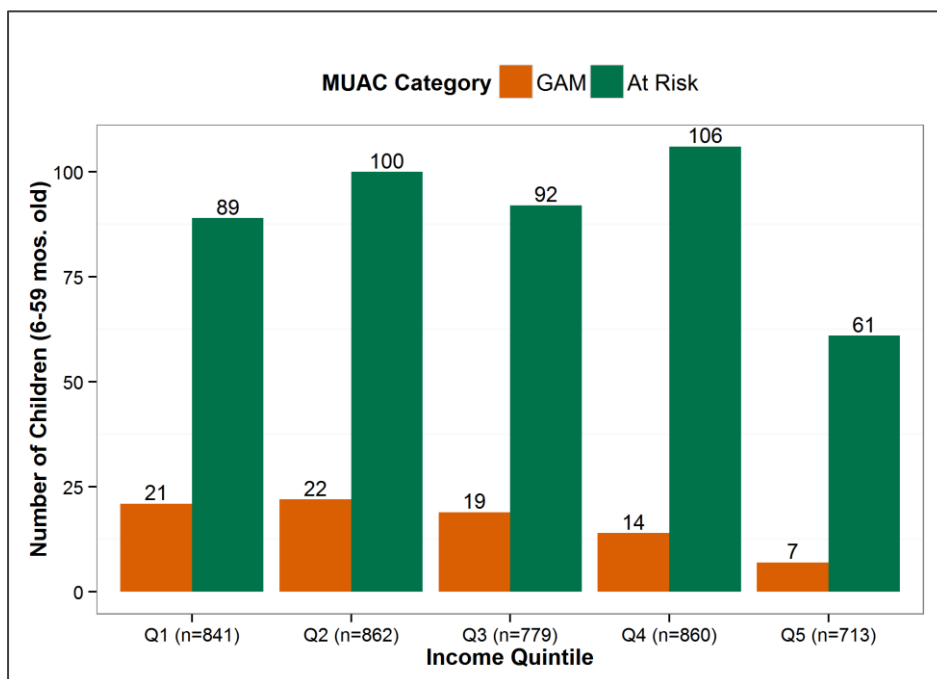
Nutritional status of a population is one of the basic indicators used to assess and declare a humanitarian crisis. GAM is one such indicator where greater than 10% GAM in a population indicates a serious humanitarian emergency and 15% GAM indicates a critical emergency. This threshold was developed and has been effective in mostly rural contexts but has not been updated for large, urban populations. Ten percent of 500 children, i.e. 50 children, is much different than say, 10% of 15,000 children, i.e. 1,500 children. Large, urban populations, especially the poorest subset, barely have the

<sup>1</sup> NRC, 'Field Exchange, Special focus on urban food security and nutrition, Issue 46, September 2013'

facilities or the resources to cope with such absolute numbers. Therefore, it is important re-evaluate the current thresholds for GAM in urban contexts.



**Figure 6.** Number of children (6 to 59 months old) at risk for malnutrition or with severe or moderate acute malnutrition from April 2012 to April 2013 in all study areas.

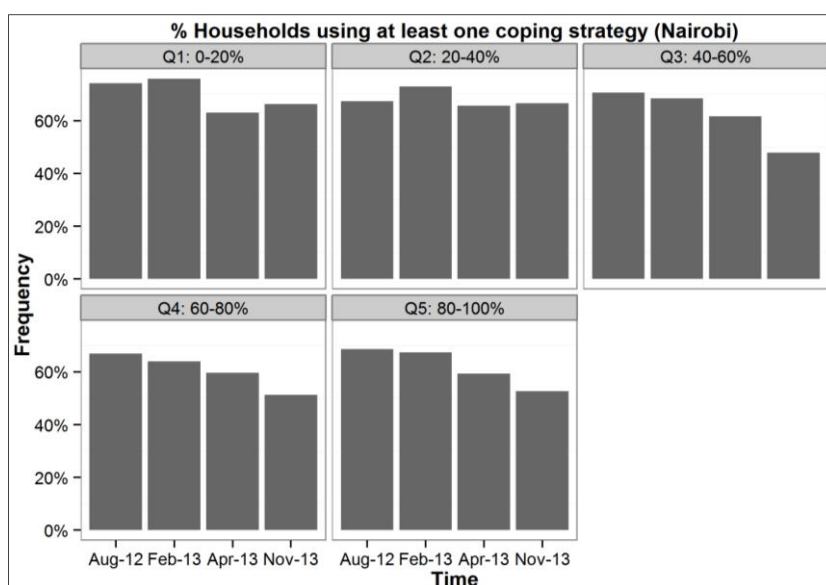


**Figure 7.** Number of children (6 to 59 months old) at risk for malnutrition or with severe or moderate acute malnutrition (GAM) per income quintile in all study areas.

Water and Coping Strategies

A majority of households (89%) use tap water as the main source of drinking water. Most households in all areas meet SPHERE standards for distance to water (less than 500 m or 5 minute walk) and for time queuing for water (less than 30 minutes). Over 60% of households in both cities meet the 15 L of water per person per day SPHERE standard, but that is declining in both cities (Table 7).

Overall, there was a decline in the use of coping strategies in both cities. However, the rate of decline differs between income quintiles. As illustrated in Figure 8, the use of coping strategies in Nairobi only declined slightly in the lower income quintiles (Q<sub>1</sub> and Q<sub>2</sub>).



**Figure 8.** Use of coping strategies per income quintile in Korogocho and Viwandani in Nairobi.



**Table 7. Key findings in livelihoods, food security, water, health, personal security, and coping sectors in Nairobi and Kisumu.**

<b>LIVELIHOODS</b>	<b>Nairobi (Korogocho and Viwandani)</b>					<b>Kisumu (Nyalenda and Obunga)</b>			
	<b>Aug '12</b>	<b>Feb '13</b>	<b>Apr '13</b>	<b>Nov '13</b>	<b>Mean</b>	<b>Aug '12</b>	<b>Feb '13</b>	<b>Apr '13</b>	<b>Mean</b>
Average monthly household income (KSH)	10073	8956	8399	7897	8831	11140	11596	9806	10847
Food expenditure as a percentage of income (%)	72.4	63.5	75.6	71.4	70.7	61.0	54.9	61.2	59.0
Households that depend on casual labour as a source of livelihood (%)	49.2	47.3	48.1	53.6	49.6	51.5	43.8	48.9	48.1
Households that depend on monthly salary as a source of livelihood (%)	16.5	18.4	17.8	7.8	15.1	19.7	31.3	27.2	26.1
Households that depend on business as a source of livelihood (%)	11.3	14.3	15.6	18.3	14.9	13.1	13.8	15.3	14.1
Households that depend on hawking as a source of livelihood (%)	14.9	12.8	10.2	15.1	13.3	10.5	3.6	4.3	6.1
Households that depend on scavenging as a source of livelihood (%)	0.0	1.7	1.0	2.5	1.3	0.0	0.1	0.3	0.1
Proportion (%) of female bread winners	34.6	37.1	39.0	38.5	37.3	28.6	27.1	33.5	29.7
Proportion (%) of female headed households	28.3	31.2	26.9	40.2	31.7	32.8	20.8	16.6	23.4
<b>FOOD SECURITY AND NUTRITION</b>	<b>Aug '12</b>	<b>Feb '13</b>	<b>Apr '13</b>	<b>Nov '13</b>	<b>Mean</b>	<b>Aug '12</b>	<b>Feb '13</b>	<b>Apr '13</b>	<b>Mean</b>
Households classified as moderately and severely food insecure by HFIAS (%)	75.0	78.0	75.0	88.0	79.0	76.0	76.0	72.0	74.7
Households classified as moderately and severely hungry by HHS (%)	31.0	37.0	30.0	51.0	37.3	31.0	33.0	27.0	30.3
Dietary Diversity (Average number of food groups consumed in 1-week recall period)	5.7	5.2	5.2	5.0	5.3	6.0	5.6	5.8	5.8
Number of meals taken by children (under 18 yrs. old) per day	2.8	2.7	2.8	2.5	2.7	3.1	3.1	3.0	3.1
Percent of children (6-59 months) with Severe Acute Malnutrition (SAM)	0.7	0.5	0.8	0.3	0.6	1.5	0.5	0.5	0.8
Percent of children (6-59 months) with Moderate Acute Malnutrition (MAM)	1.7	1.5	1.1	1.7	1.5	2.7	0.2	2.9	1.9
Percent of children (6-59 months) at risk of Acute Malnutrition	11.2	9.9	15.8	11.7	12.2	15.2	8.7	8.7	10.9
<b>WATER AND HEALTH</b>	<b>Aug '12</b>	<b>Feb '13</b>	<b>Apr '13</b>	<b>Nov '13</b>	<b>Mean</b>	<b>Aug '12</b>	<b>Feb '13</b>	<b>Apr '13</b>	<b>Mean</b>
Proportion of households meeting 15L of water/person/day SPHERE standard	67.5	63.4	61.1	69.3	65.3	68.9	67.9	62.0	66.3
Prevalence of illness in the last 2 weeks (%)	53.4	54.0	51.4	49.5	52.1	54.6	52.6	54.5	53.9
<b>PERSONAL SECURITY</b>	<b>Aug '12</b>	<b>Feb '13</b>	<b>Apr '13</b>	<b>Nov '13</b>	<b>Mean</b>	<b>Aug '12</b>	<b>Feb '13</b>	<b>Apr '13</b>	<b>Mean</b>
Households that reported at least 1 shock in the last 4 weeks (%)	12.5	16.8	23.8	21.6	18.7	10.3	10.7	17.4	12.8
Proportion (%) who often felt unsafe/scared in the community in the last 4 weeks	21.9	26.5	25.2	35.4	27.3	16.8	18.8	15.4	17.0
Proportion (%) who have often used avoidance measures in the last 4 weeks	16.4	16.0	17.5	18.0	17.0	18.5	12.7	14.1	15.1
Proportion (%) who rated security as bad and very bad	60.5	55.2	54.0	57.4	56.8	37.4	38.0	44.8	40.1
<b>COPING STRATEGIES</b>	<b>Aug '12</b>	<b>Feb '13</b>	<b>Apr '13</b>	<b>Nov '13</b>	<b>Mean</b>	<b>Aug '12</b>	<b>Feb '13</b>	<b>Apr '13</b>	<b>Mean</b>
Proportion (%) who used at least one coping strategy	69.5	69.4	62.2	58.2	64.8	67.9	72.0	64.4	68.1
Proportion (%) who bought food items on credit	44.9	49.5	41.6	35.6	42.9	44.0	53.9	44.1	47.3
Proportion (%) who took a loan to buy food	16.4	24.2	19.4	13.7	18.4	17.5	29.6	23.2	23.4
Proportion (%) who removed children from school due to lack of school fees	28.6	28.8	17.1	15.4	22.5	23.6	25.7	16.9	22.1

More households, in both cities, are experiencing shocks which range from mugging, floods, burglary, to property destruction (Table 8). Prevalence of illness is declining in Nairobi but has remained steady in Kisumu, with close to half the population reporting illnesses such as fever, coughs, headaches, and diarrhea (Table 9). In most cases, treatment was sought outside the home with a majority of households relying on pharmacies in both cities. However, households in Nairobi used more clinics, while households in Kisumu used hospitals (Table 9).

**Table 8.** Proportion (%) of households that experienced shocks in a 4-wk recall period.

	Nairobi (Korogocho and Viwandani)					Kisumu (Nyalenda and Obunga)			
	Aug '12	Feb '13	Apr '13	Nov '13	Ave.	Aug '12	Feb '13	Apr '13	Ave.
Experienced at least 1 shock (%)	12.5	16.8	23.8	21.6	18.7	10.3	10.7	17.4	12.8
Mugging/Stabbing	50.0	50.9	51.3	56.3	52.1	43.0	51.0	26.6	40.2
Floods	31.7	26.0	33.8	34.1	31.4	19.8	23.0	53.2	32.0
Burglary	24.0	20.8	26.0	20.6	22.9	34.9	25.0	18.5	26.1
Property Destruction	6.7	8.1	7.8	11.9	8.6	23.3	9.0	7.5	13.3
Eviction	1.9	6.9	5.6	18.3	8.2	25.6	6.0	6.4	12.6
Fire	4.8	10.4	4.1	10.3	7.4	11.6	9.0	8.1	9.6
Rape/Sodomy	0.0	1.7	4.8	2.4	2.2	10.5	1.0	0.0	3.8

**Table 9.** Proportion (%) of illnesses and types of treatment sought in 4-wk recall period.

ILLNESSES	Nairobi (Korogocho and Viwandani)					Kisumu (Nyalenda and Obunga)			
	Aug '12	Feb '13	Apr '13	Nov '13	Ave.	Aug '12	Feb '13	Apr '13	Ave.
Prevalence of illness in the last 2 weeks (%)	53.4	54.0	51.4	49.5	52.1	54.6	52.6	54.5	53.9
Fever	45.6	43.4	44.7	29.0	40.7	30.1	29.1	27.1	28.8
Cough	38.8	30.6	34.6	25.4	32.3	22.2	24.1	21.1	22.5
Headache	27.6	27.3	27.5	23.9	26.6	21.9	20.4	25.7	22.7
Diarrhea	22.3	18.9	17.8	19.5	19.6	18.1	15.6	16.0	16.6
Vomiting	7.7	10.2	7.7	7.9	8.4	8.5	5.5	7.2	7.0
Injuries	6.6	7.8	6.6	9.3	7.6	15.5	16.6	15.6	15.9
Diff. Breathing	6.4	6.7	6.6	9.7	7.3	3.8	3.5	4.0	3.8
Convulsions	1.9	3.3	3.1	3.6	3.0	2.6	1.9	1.4	2.0
Measles	0.6	0.7	0.9	2.0	1.1	4.3	2.4	3.8	3.5
Other Illness	19.9	40.4	39.2	41.3	35.2	56.2	62.4	57.2	58.6
TREATMENT	Aug '12	Feb '13	Apr '13	Nov '13	Ave.	Aug '12	Feb '13	Apr '13	Ave.
Sought treatment for illness (%)	91.6	90.5	84.8	84.4	87.9	87.8	83.3	88.0	86.4
Pharmacy/Chemist	34.6	32.0	30.7	26.6	31.0	22.0	22.4	27.3	23.9
Public Clinic	23.1	19.9	26.1	25.0	23.5	8.0	9.3	11.9	9.7
Private Clinic	12.4	15.0	11.9	10.1	12.3	2.8	7.3	5.2	5.1
NGO clinic	12.1	11.3	8.9	11.1	10.8	10.6	13.4	11.8	11.9
Public Hospital	9.1	9.2	11.0	14.0	10.8	31.5	25.6	28.2	28.5
Private Hospital	5.1	7.2	8.6	8.0	7.2	6.1	9.5	7.0	7.5
NGO hospital	3.5	3.3	1.1	1.7	2.4	1.4	0.1	0.3	0.6
Traditional Healer/Herbalist	1.6	2.7	0.9	1.0	1.5	3.6	2.9	1.7	2.8
Other treatments	0.5	1.0	0.9	1.4	0.9	6.2	6.4	2.0	4.9



**Indicator Development for Surveillance of Urban  
Emergencies  
(IDSUE)**

**Geospatial Analysis**

**Version: December 2013**

**IDSUE is currently in the third year of a five year study funded by the US Agency for International Development – Office of Foreign Disaster Assistance**

As we focus on defining key indicators for long-term surveillance of slow-onset urban emergencies, we should consider different avenues for surveillance and analysis. We know that current information sources are inadequate for our needs due to their large scale and infrequent nature. Therefore, along with monitoring a variety of potential indicators on a smaller, more frequent scale, our study will include geospatial analysis. Geographic information systems (GIS) have been used to monitor slow-onset crises such as drought, environmental degradation, and food security issues, especially in rural areas. In these cases, GIS and Remote Sensing (RS) are often used to monitor environmental changes and resource use to predict and monitor the onset and geographic extent of crises. We will apply similar geospatial concepts to monitor potential indicators of slow-onset crises in urban areas. Although the unique spatial arrangement of urban informal settlements (large crowded settlements in small areas) presents a geospatial challenge, it also presents an opportunity for us to understand settlement patterns, resource use/allocation, and other humanitarian issues from a spatial perspective.

In this report, we will show the potential use of one geospatial technique, spatial autocorrelation, to map out the most vulnerable areas, with respect to income and food security, in 5 urban informal settlements in Kenya. Three study sites are located in Nairobi and two in Kisumu (Table 1).

**Table 1.** Kenya National Bureau of Statistics (KNBS) gender, household, area (km<sup>2</sup>), and density (people/km<sup>2</sup>) 2009 census data by sub-location.

KNBS 2009 census data sampled at sub-location.						
	Nairobi			Kisumu		
	Korogocho	Mukuru	Viwandani	Obunga (Kanyakwar)	Nyalenda A	Nyalenda B
Area (km <sup>2</sup> )	0.22	8.11	5.71	6.6	3.16	4.71
Households	3,129	49,198	17,926	3,553	8,070	8,561
Density	46,136	16,082	7,859	1,913	8,953	6,886
Male	5,376	71,619	25,823	6,447	14,829	16,189
Female	5,000	58,782	19,058	6,107	13,440	16,241
Total	10,376	130,401	44,881	12,554	28,269	32,430

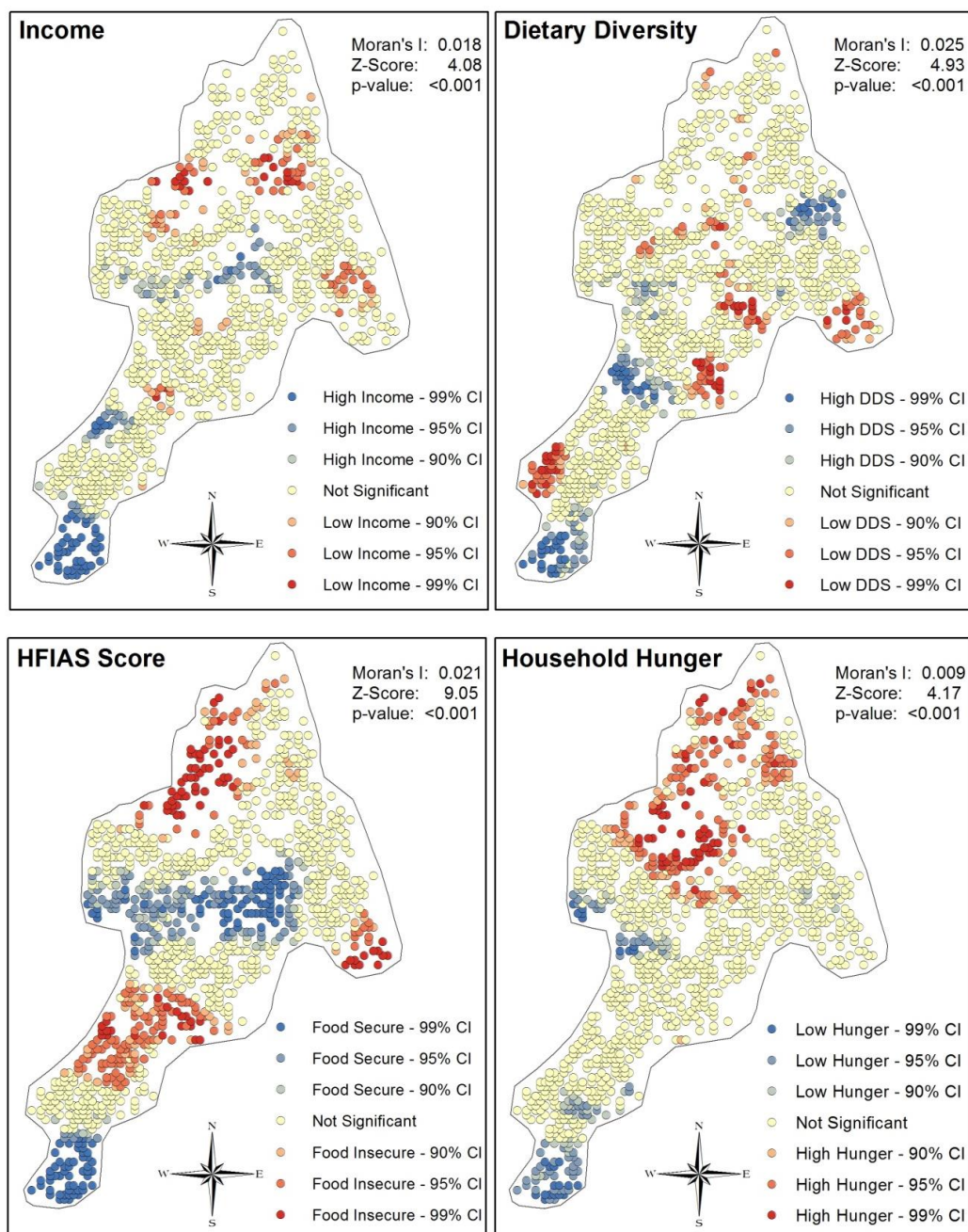
Spatial autocorrelation is a measure of how a set of features and their associated values (i.e. income or any other variable of interest) are distributed in space. Global Moran's I (which ranges from -1 to +1) is an inferential spatial autocorrelation statistic often used to test the null hypothesis that features are randomly distributed. If a group of spatial features and their associated values tend to be clustered in space (positive spatial autocorrelation), Moran's I will be closer to 1. In this case, high values will be in close proximity to other high values while low values will cluster near other low values. If the opposite is true and high values tend to be near low values, and vice versa, Moran's I will be closer to -1 and the data is dispersed (negative spatial autocorrelation).

Global Moran's I was used to estimate the degree of spatial autocorrelation for breadwinner income, household dietary diversity (DDS), household food insecurity

(HFIAS), and household hunger (HHS) in Korogocho, Mukuru, Nyalenda, Obunga, and Viwandani. Hot spot analysis (Getis-Ord  $G_i^*$ ) was then used to show where household with high values or low values, per respective variable of interest, clustered in the local areas. Household data and GPS locations from rounds five (August 2012), six (February 2013), and seven (April 2013) were used for this analysis. However, 45.95% of households in Obunga did not have viable GPS coordinates and were therefore excluded from this analysis. The same was true for 35.67% of households in Nyalenda, 17.46% of households in Mukuru, 6.33% of households in Viwandani, and 2.82% of households in Korogocho.

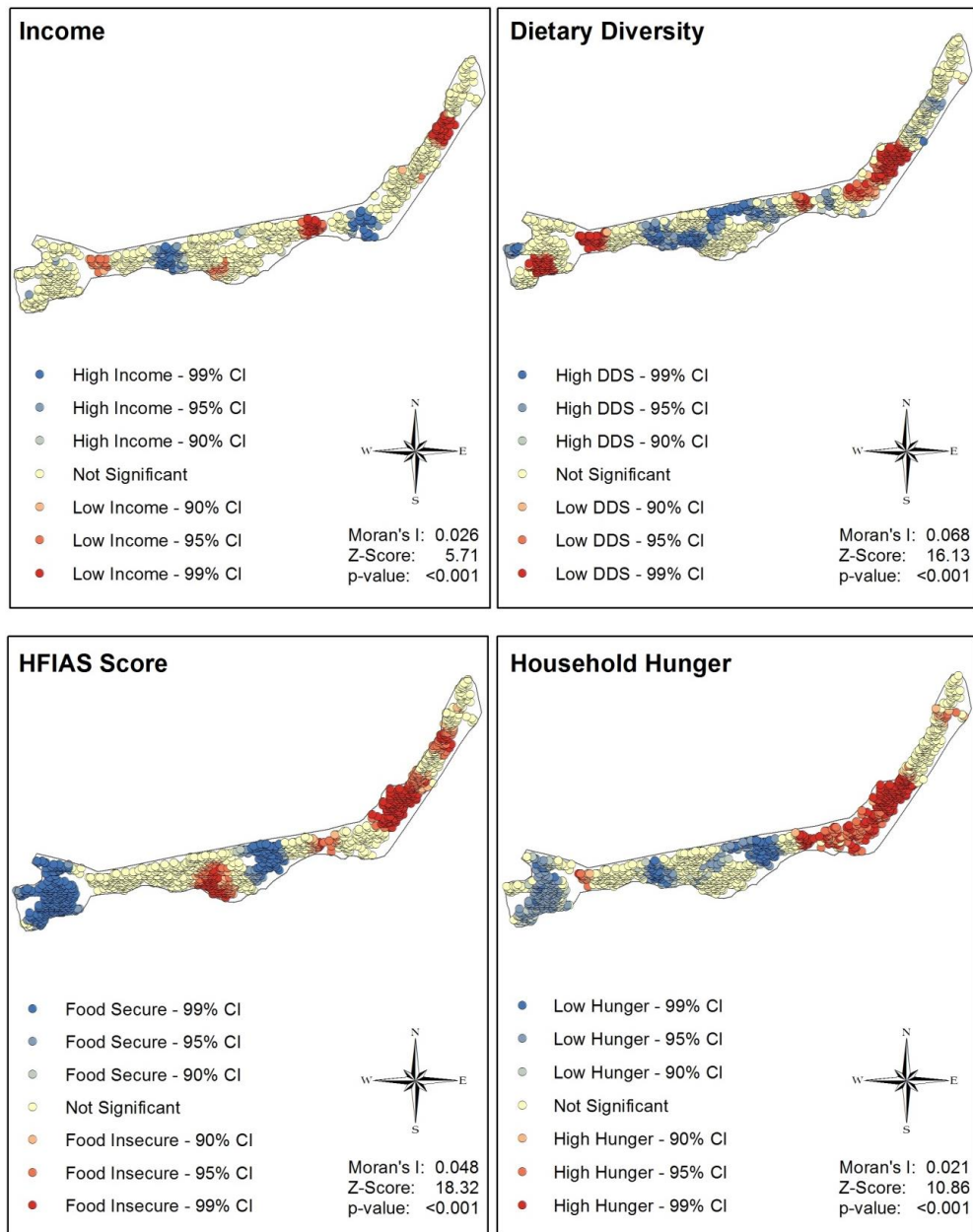
Dietary diversity is determined by the number of food groups, that a household consumed in a 24-hr period. Out of 12 food groups, a higher dietary diversity score is indicative of both a healthier diet and the economic ability of the household to consume a variety of foods. Low DDS values indicate low dietary diversity and high DDS values indicate high dietary diversity. HFIAS is a composite score which measures several aspects of food insecurity and access through a module of questions to the household. Higher HFIAS values (out of 28 possible points) indicate food insecurity while lower values (closer to 0) imply that the household is food secure. HHS is a subset of HFIAS which measures household hunger in food insecure areas. Higher HHS values indicate severe household hunger (out of 6 possible points) and low HHS values (closer to 0) indicate little to no household hunger. It should be noted that all three key indicators are household based measures, as opposed to measures for an individual.

In Korogocho, all variables of interest clustered significantly (Figure 1, z-score > 1.96, p-value < 0.001). Although spatial clustering was most pronounced in the HFIAS score (z-score = 9.05). Households with higher incomes clustered in the southwest corner of Korogocho (blue points in *Income* window of Figure 1). Households with high dietary diversity, low food insecurity, and low household hunger values clustered in this region as well (blue points in Figure 1). The northeast area of Korogocho appears to have an inverse relationship; with lower incomes, more food insecurity, and higher household hunger values (red points in Figure 1). Correlation analysis of these variables revealed that HFIAS and HHS are strongly correlated ( $\rho = 0.75$ ,  $p < 0.001$ ) in Korogocho, which likely explains why clusters of high hunger households were located in the same area as clusters of highly food insecure households. HFIAS and HHS were significantly negatively correlated with income ( $\rho = -0.3$ ,  $p < 0.001$ ;  $\rho = -0.28$ ,  $p < 0.001$ ) and dietary diversity scores ( $\rho = -0.43$ ,  $p < 0.001$ ;  $\rho = -0.46$ ,  $p < 0.001$ ), showing that food insecure households in Korogocho tend to have lower incomes and lower dietary diversity.



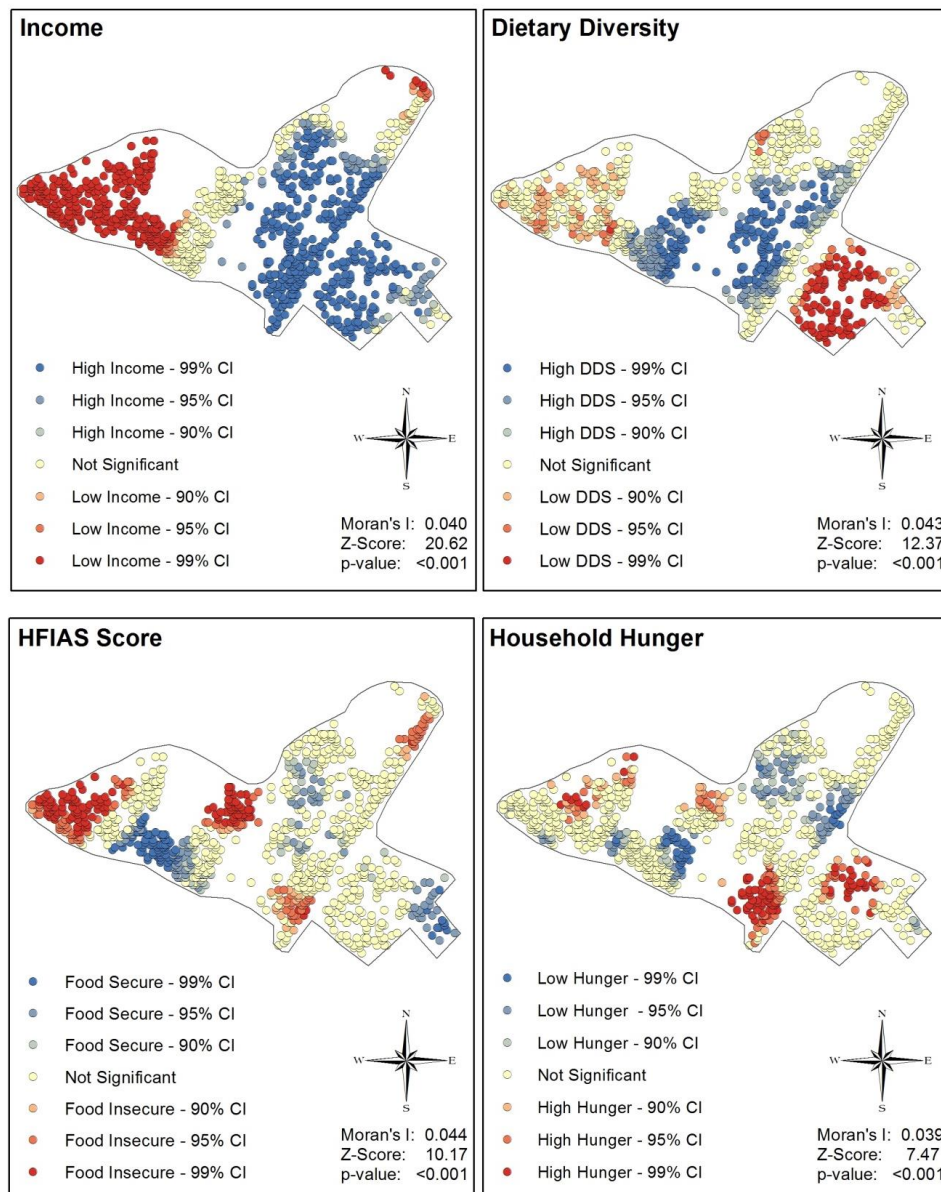
**Figure 1.** Spatial distribution of income, dietary diversity, HFIAS, and HHS in Korogocho, Nairobi.

In Viwandani, all variables clustered significantly (Figure 2, z-score > 1.96, p < 0.001), especially the HFIAS score (z-score = 18.32, p < 0.001). Clusters of high income households that are relatively food secure are distributed throughout the community, the same is true for low income, food insecure households, but the largest cluster is located in eastern Viwandani. Similar to Korogocho, HFIAS and HHS were highly positively correlated in Viwandani ( $\rho = 0.69$ , p < 0.001) and negatively correlated with income and dietary diversity ( $\rho = -0.3$ , p < 0.001;  $\rho = -0.27$ , p < 0.001). While income and DDS were positively correlated ( $\rho = 0.15$ , p < 0.001) in the area.



**Figure 2.** Spatial distribution of income, dietary diversity, HFIAS, and HHS in Viwandani, Nairobi.

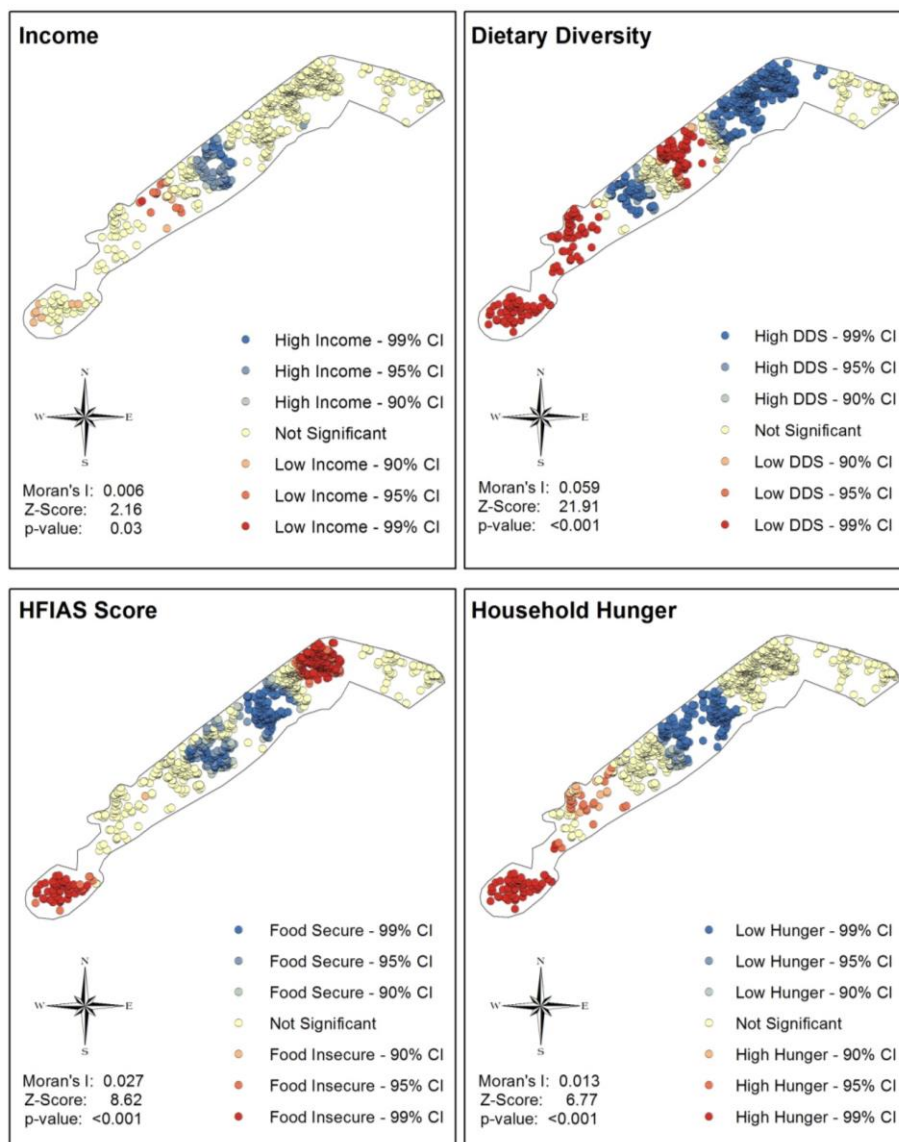
All variables of interest clustered significantly in Mukuru, especially the income variable (Figure 3, z-score: 20.62, p-value < 0.001). Households with lower incomes clustered in the west (red points in Figure 3), while households with higher income clustered in the southeast. However, all three food indices did not appear to follow income trends. Instead, there appear to be clusters of food insecure households spread throughout the area, especially in the far western corner. In fact, income is only slightly correlated with dietary diversity, HFIAS, and HHS ( $\rho = 0.06$ ,  $p < 0.001$ ;  $\rho = -0.24$ ,  $p < 0.001$ ;  $\rho = -0.07$ ,  $p < 0.001$ ), especially compared to the other study areas in Nairobi (Korogocho and Viwandani).



**Figure 3.** Spatial distribution of income, dietary diversity, HFIAS, and HHS in Mukuru, Nairobi.

In Nyanlenda, Kisumu, all variables of interest were significantly clustered, but most pronounced for dietary diversity (z-score = 21.91,  $p < 0.001$ ). It appears that the most food insecure households are clustered in the southwest corner, while the high-income, more food secure homes cluster in central Nyalenda (blue points in Figure 4). HFIAS and HHS are strongly correlated ( $\rho = 0.80$ ,  $p < 0.001$ ) with each other, but negatively correlated with dietary diversity ( $\rho = -0.23$ ,  $p < 0.001$ ;  $\rho = -0.20$ ,  $p < 0.001$ ) in Nyalenda. Income was positively correlated with dietary diversity ( $\rho = 0.16$ ,  $p < 0.001$ ) but negatively correlated with HFIAS and HHS ( $\rho = -0.29$ ,  $p < 0.001$ ;  $\rho = -0.25$ ,  $p < 0.001$ ). It appears that food insecure households in Nyalenda tend to have lower incomes and lower dietary diversity, especially homes in the southwest corner of Nyalenda (red points in Figure 4).

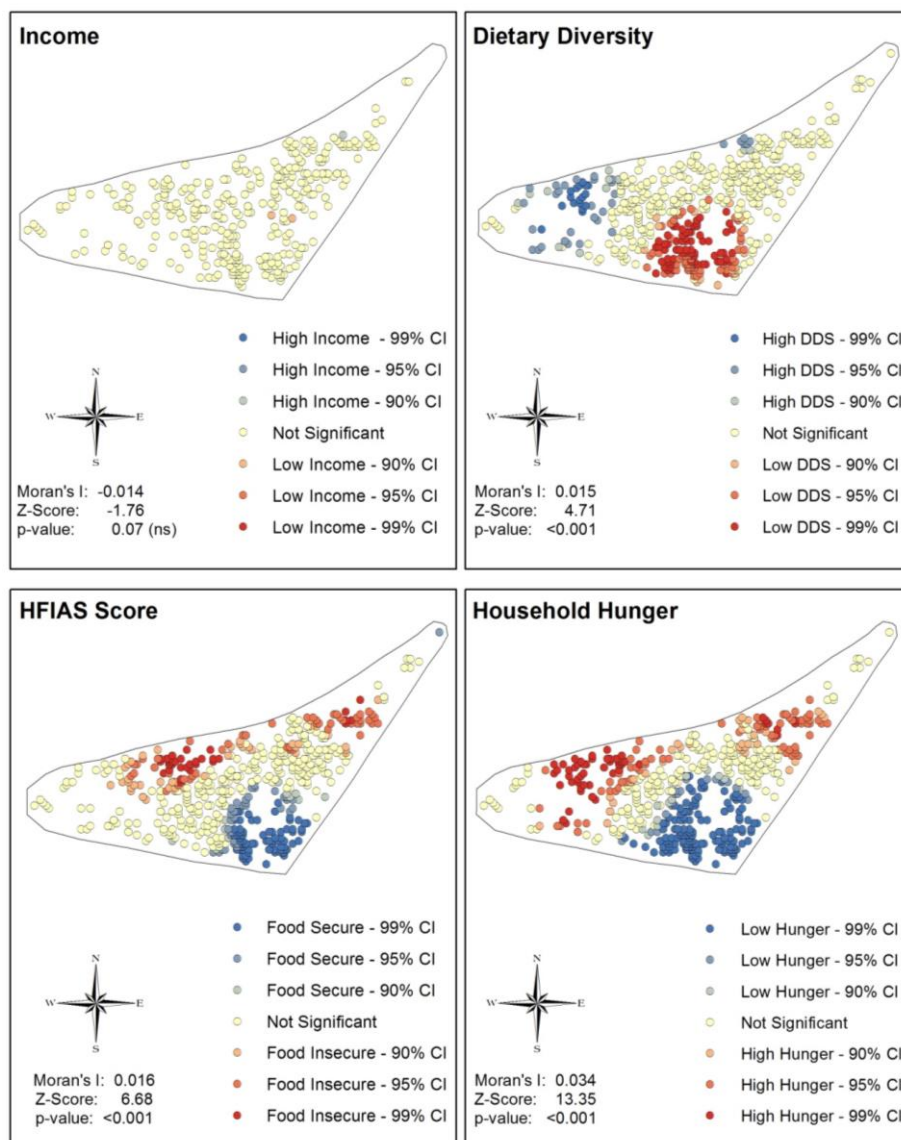




**Figure 4.** Spatial distribution of income, dietary diversity, HFIAS, and HHS in Nyalenda, Kisumu.

In Obunga, Kisumu, all variables of interest, except income (z-score = - 1.76, p = 0.07), were significantly clustered and most pronounced for household hunger (Figure 5, z-score = 13.35, p <0.001). It appears that the most food insecure household clusters are located in the north, yet these clusters report higher dietary diversity scores (Figure 5). There is a cluster of households with low dietary diversity in the southern portion of Obunga, yet these households appear to be food secure and report low household hunger. Correlation analysis reveals that dietary diversity and HFIAS are not significantly correlated ( $\rho = -0.19$ , p=0.10), which might explain this spatial pattern. Although households might be food insecure, they still appear to consume a diverse diet. A similar pattern can be seen in Nyalenda where a cluster of high dietary diversity households reported food insecurity (see northern portion of Nyalenda in Figure 5), yet food secure households reported low dietary diversity. This pattern, which appears mostly in Kisumu, implies that in our study, dietary diversity might not be the best indicator of food security or insecurity. What is evident from the maps and correlation

analysis, suggests that perhaps due to dietary preferences in this area, dietary diversity does not necessarily correlate with food insecurity.



**Figure 5.** Spatial distribution of income, dietary diversity, HFIAS, and HHS in Obunga, Kisumu.

In this preliminary geospatial analysis of income and food security indices, income does not always strongly correlate with food security in informal settlements, however, in some cases, such as in Nyalenda, lower income areas correlate with high food insecurity. The food security indicators, DDS, HFIAS, and HHS, did not always cluster food insecure households in the same area, this suggests that not all three indicators might be appropriate for long term monitoring. Future geospatial analysis will include other potential indicators, such as WASH, and a multivariate approach in determining the most vulnerable areas in informal settlements. Should crisis arise, this baseline geospatial information will also be useful in targeting aid to the most vulnerable areas and understanding the spread and extent of the crisis in these sites.



**Indicator Development for Surveillance of Urban  
Emergencies  
(IDSUE)**

**Analysis of Indicators by Domain: Questionnaire Review**

**Version: December 2013**

**IDSUE is currently in the third year of a five year study funded by the US Agency for International Development – Office of Foreign Disaster Assistance**

## Socio-demographic information

### i. Number of respondents

Data was collected in 5 different sites, 2 in Kisumu (Nyalenda and Obunga) and 3 in Nairobi (Korogocho, Mukuru and Viwandani) in three rounds: Round 5 (August 2012), Round 6 (February 2013), and Round 7 (April 2013). We sampled an average of  $496 \pm 97$  households per round and  $1487 \pm 226$  per area (Table 1).

**Table 1.** Number of households per study area and round

Number of household sampled in Nairobi and Kisumu settlements.						
Round (date)	Nairobi			Kisumu		Total
	Korogocho	Viwandani	Mukuru	Obunga	Nyalenda	
R5 (Apr. '12)	428	459	455	380	407	2,129
R6 (Feb. '13)	553	623	630	314	477	2,597
R7 (Apr. '13)	546	578	582	418	585	2,709

### ii. Household Heads – q1.4b

Household survey questions are answered by the household head or a person designated by the household head to respond on his or her behalf. Overall, 47% of household heads responded to the survey, while the other 53% designated someone to respond on their behalf. Seventy-four percent of HH heads in our survey are male and 26% female, in all areas of study. However, household head gender differs significantly ( $p < 0.05$ ) between areas. Korogocho has the highest amount of household heads (34.1%) while Viwandani reports the lowest amount of female household heads (19.1%).

Of the female-headed households, 82% directly responded to the survey questions while only 34% of male household heads responded to the survey (in over 85% of the cases, their wives responded to the survey on their behalf). Therefore, a majority of our survey respondents are female.

## 1. HOUSEHOLD LIVING ARRANGEMENTS (Table 2)

### 1.1 Household size – q1.17

Household size differs significantly between areas ( $p < 0.05$ ). Nyalenda has the largest average household size ( $\bar{x} = 4.4 \pm 2.26$ ) with Viwandani reporting the lowest ( $\bar{x} = 3.02 \pm 1.55$ ). Household size did not change significantly over time in Nyalenda and Mukuru, but is increasing in Viwandani and declining in Korogocho and Obunga.

The average number of children under 5 years old differs significantly between areas. Obunga reports the highest number of children under 5 years old per household ( $\bar{x} = 1.42 \pm 0.63$ ) with Viwandani reporting the lowest ( $\bar{x} = 1.20 \pm 0.44$ ). Number of children under 5 years old did not change significantly over time in all areas except in Obunga where it declined.

**Review:** Include persons with disability, elderly (over 65 years old), and people living with HIV/AIDS in the next rounds

### 1.2 Length of stay in the site – q1.18

**Rationale:** As a response to various shocks and stresses such as fire, insecurity, evictions, etc., many people move in and out of informal urban settlements (intra-urban migration). Rural-urban migration also takes place often, as more people come to seek a source of livelihood.<sup>2</sup> Such immigrants usually end up in informal settlements due to high costs of housing in formal settlements. Questions 1.18 and 1.19 help to monitor movements in and out of urban slums and could be a possible indicator of shocks and stresses.

**Findings:** Korogocho is the oldest settlement, with households residing there for an average of  $13.9 \pm 11.04$  years. Mukuru and Viwandani are the most recent settlements, with an average of about 5 to 6 years in each area. Residency times are significantly declining over time in Viwandani, Nyalenda and Obunga, likely due to a steady migration of people into these areas.

### 1.3 Place of origin – q1.19

A majority of households in all the areas originate from rural areas (38%), followed by other slum (27%), same slum (19%), and non-slum urban area (16%).

**Review:** Include response 'other country' to include refugees. Add a question to determine why household moved to slums.

### 1.4 Prevalence of acute malnutrition by MUAC – q1.20

**Rationale:** Middle Upper Arm Circumference (MUAC) is an anthropometric measure used for analysis of nutritional status amongst children aged 6-59 months. It is mainly used to detect Severe Acute Malnutrition (SAM), Moderate Acute Malnutrition (MAM) and populations at risk of malnutrition.

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<sup>2</sup> Robert Muggah, "Researching the urban dilemma, 2012," IDRC Canada

**Interpretation of MUAC<sup>3</sup>**

- ✓ MUAC less than 115mm (11.5cm) indicates Severe Acute Malnutrition (SAM). The child should be immediately referred for treatment.
- ✓ MUAC of between 115mm (11.5cm) and 125mm (12.5cm) indicates Moderate Acute Malnutrition (MAM). The child should be immediately referred for supplementation.
- ✓ MUAC of between 125mm (12.5cm) and 135mm (13.5cm) indicates that the child is at risk for acute malnutrition and should be counseled and followed-up for growth promotion and monitoring (*not shown in our figures*).
- ✓ MUAC over 135mm (13.5cm) indicates that the child is well nourished (*not shown in our figures*).

**Findings:** The average number of children with Severe Acute Malnutrition (SAM) across all rounds was highest in Obunga at 5 children (1.5% of children between 6 and 59 months) while the least was in Mukuru, averaging less than 1 child in all rounds (0.21% of children between ages 6 and 59 months). The trend shows an increase in SAM in Korogocho and Mukuru over three rounds, however this is not statistically significant (Table 2). Cases of SAM and MAM are highest in Obunga (14 children in all rounds) and Korogocho (8 children in all rounds).

**Table 2:** Percent of children between 6 and 59 months with severe or moderate acute malnutrition per study area in all rounds.

<b>Percent children (6-59 mos. old) with severe, moderate, and at risk for acute malnutrition.</b>									
<b>Area</b>	<b>Severe (SAM)</b>			<b>Moderate (MAM)</b>			<b>At Risk</b>		
	<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R5</b>	<b>R6</b>	<b>R7</b>	<b>R5</b>	<b>R6</b>	<b>R7</b>
Korogocho	0.56	0.55	1.08	1.68	1.94	1.36	8.94	9.14	15.72
Mukuru	0.00	0.28	0.30	0.76	0.85	0.91	11.74	11.33	6.06
Viwandani	1.07	0.43	0.38	1.60	0.86	0.76	15.51	11.16	15.97
Nyalenda	0.32	0.30	0.23	1.95	0.00	2.30	9.42	9.97	10.14
Obunga	2.48	0.81	0.92	3.31	0.41	3.69	20.11	6.91	6.77

<sup>3</sup> Sphere Handbook, WHO, 2010

## 2. WATER DOMAIN (Table 4)

### 2.1 Main source of drinking water – q2.1

**Rationale:** An improved drinking water source is defined as a type of drinking water facility or water delivery point that by the nature of its design protects the drinking water source from external contamination, particularly fecal matter.<sup>4</sup> These could include any of the following:

- Piped/tapped water into dwelling, plot or yard
- Public standpipe/Public tap
- Protected dug well
- Protected spring
- Rainwater (storage tanks)

This indicator provides a proxy measure both of exposure, in terms of access to safe drinking water and the effectiveness of actions to improve access.

**Findings:** A majority of households in all areas use tapped water as their main source of drinking water (89%). This is especially true in Mukuru, where 97% of the households use tapped water. Nyalenda and Obunga, which are located in close proximity to Lake Victoria also use tapped water (89%) but report more use of 'other' water sources, perhaps referring to the lake. Korogocho and Viwandani reported the highest use of water tanks (13%).

### 2.2 Time to water source – q.2.2

**Rationale:** The Sphere Project<sup>5</sup> suggests that water points should be no more than 500m (or a 5 minute walk) away from the household in order to ensure the household meets minimum water requirements.

**Findings:** Households in all the study sites meet the Sphere Project standard and average less than a 5 minute walk ( $\bar{x} = 3.08$  minutes) with Nyalenda and Obunga reporting the longest walking periods (4.45 and 4.44 minutes, respectively). Households in Nairobi (Korogocho, Mukuru, and Viwandani) averaged about a 2.5 minute walk. Distance to water did not change over time in Nyalenda and Obunga but is significantly declining in Korogocho and Mukuru and slightly increasing in Viwandani.

### 2.3 Queuing time – q2.3

**Rationale and findings:** The Sphere Project<sup>6</sup> suggests that queuing time at water points should be no more than 30 minutes to ensure the household meets minimum water requirements.

**Findings:** Households in all the study sites meet the Sphere Project standard for time spent queuing for water ( $\bar{x} = 7.28$  minutes), with households in Nyalenda reporting the

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<sup>4</sup> UN HABITAT, 2009

<sup>5</sup> SphereProject.org

<sup>6</sup> SphereProject.org

longest queuing time of 11 minutes. Viwandani reported the next highest time (8 minutes) followed by Korogocho (6 minutes), Obunga (5.6 minutes), and Mukuru (5.19 minutes). Queuing times are increasing in Korogocho while declining in Viwandani and Obunga.

#### **2.4 Do you pay for this water? – q2.4**

**Findings:** A majority of households in all of the study areas pay for water (93.3%).

#### **2.5 Quantity of water used per day – q2.6**

**Rationale:** This is an indicator for water supply usually expressed as liters of water available per person per day and only includes safe water in its most stringent definition. Both the Sphere Project and the UN High Commission for Refugees (UNHCR) recommend a minimum of 15 liters of water per person per day.<sup>7</sup> UNHCR further stipulates that 7 liters per person per day is the absolute minimum amount to survive.

**Findings:** On average, people in all the study areas use 20.59 litres of water per person per day. A majority of the households in Nyalenda and Obunga meet the SPHERE minimum standard of 15 liters per person per day. However, more households in Nairobi (Korogocho, Viwandani, and Mukuru) are not meeting this standard. Liters of water used per person per day is declining in Viwandani, Nyalenda, and Obunga while increasing Korogocho.

#### **2.6 Water quality – q2.7**

**Findings:** A majority of households reported clean or very clean water (84%), with households in Kisumu reporting the cleanest water and households in Mukuru reporting the dirtiest. However, the quality of water appears to be declining in Kisumu (Nyalenda and Obunga).

**Review:** This question may not be included in future rounds since this is a subjective question and the quality of water may not necessarily change due to a slow onset emergency; particularly given that most people use piped water. This is however subject to verification in round 8.

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<sup>7</sup> UNHCR, 'Water and Sanitation Indicators, 2010'



### **3. HYGIENE AND SANITATION**

#### **3.1 Type of toilet facility – q3.1**

**Rationale:** Access to improved toilet facilities refers to the percentage of the population with at least adequate access to excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta.<sup>8</sup> WHO classify improved toilet facilities as flush/pour flush (to piped sewer system, septic tank, and pit latrine), ventilated improved pit (VIP) latrine, pit latrine with slab, and composting toilet. This is an important indicator for access to improved sanitation.

**Findings:** Most households in all the study areas use improved toilet facilities: shared flush toilets (78%) and flush trench (10%).

**Review:** The type of toilet facility used during the day (Q3\_1) and at night (Q3\_2) did not differ and was highly correlated ( $r = 0.85$ ). Although there was a higher prevalence of people not using any facilities at night, the major types of facilities used did not change. Therefore, Q3\_2 will be dropped from future surveys.

#### **3.2 Does HH pay for the toilet facility? – q3.6**

**Findings:** A majority of households in Nairobi, especially in Viwandani (75%), pay to use shared flush toilets. However, the same is not true for households in Kisumu (Nyalenda and Obunga) where only 5% pay for toilet use.

#### **3.3 When do you wash your hands? – q3.9**

**Rationale and findings:** This is an indicator for sound hygiene practice in the context of emergencies and disasters. A majority of respondents (72%) washed their hands after visiting the toilet. However, less than half the respondents (43%) wash their hands before eating and a majority do not wash before preparing food (72%) or after eating (79%). Most of the respondents with children did not wash their hands after handling child's waste (72%) or before feeding a child (84%). In general, households in Kisumu (Nyalenda and Obunga) appear to have better hand washing practices than households in Nairobi (Korogocho, Mukuru, and Viwandani).

#### **3.4 Garbage disposal – q3.10**

**Rationale and findings:** Solid waste, if unattended, can pose public health risks such as breeding of flies and rodents, which thrive on solid waste, and the pollution of surface and ground water sources. Slightly more than a third of the households use a garbage service (36%) but another third (32%) report throwing their garbage all over; i.e. they have no specific point to dump waste. The rest of the households dispose of garbage at a dump (26%) or burn it (7%). It is worth noting that a sizeable proportion (20%) of households in Kisumu burn their garbage which is an environmentally unfriendly practice. Kisumu might have a shortage of service providers for garbage collection as only 8% of HHs dump garbage through providers, compared to 45% in the Nairobi study sites.

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<sup>8</sup> WHO, 'Defining indicators on Water and Sanitation, 2009'

**Review:** With regard to urban emergencies, garbage disposal may not change much over time, before there is an emergency. In addition, these services may not be a very good indicator to indicate in advance any deteriorating situation. The question will therefore not be included in the upcoming rounds of data collection.

#### 4. FOOD SECURITY

A household is considered food secure when all people in the household have physical and economic access to enough food to meet the dietary needs necessary for an active and healthy life.<sup>9</sup> Four dimensions, availability, accessibility, utilization and stability, are usually monitored to determine household food security over time. The following food security indices were used to determine household food security in this study.

- a. Household Dietary Diversity Score (HDDS):-** Household dietary diversity refers to the number of different food groups consumed over a given reference period. It is a proxy indicator for household food access because a more diversified diet is associated with a number of improved outcomes in areas such as birth weight, child anthropometric status, caloric and protein adequacy, percentage of protein from animal sources, and household income.<sup>10</sup> There are a set of 12 food groups used to calculate HDDS.<sup>11</sup> HDDS is usually validated by Food Consumption Scores (FCS) to analyze the actual consumption levels for each food group and for each individual household.
- b. Household Food Insecurity Access Scale (HFIAS):-** Indicator used to measure food insecurity and access. The method is based on the idea that the experience of food insecurity (access) causes predictable reactions and responses that can be captured and quantified through a survey and summarized in a scale.
- c. Household Hunger Scale (HHS):-** This is a simple indicator used to measure household hunger in food insecure areas. The HHS is different from other household food insecurity indicators in that it has been specifically developed and validated for cross-cultural use. This means that the HHS produces valid and comparable results across cultures and settings so that the status of different population groups can be described in a meaningful and comparable way—to assess where resources and programmatic interventions are needed and to design, implement, monitor, and evaluate policy and programmatic interventions.<sup>12</sup>

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<sup>9</sup> 'Food Security and Nutrition Indicators,' Center for Development Research, University of Bonn, February 2013

<sup>10</sup> FANTA III, 'HDDS for measurement of HH food access: Indicator guide, 2006'

<sup>11</sup> 1. Cereals; 2. Vegetables; 3. Roots and tubers; 4. Fruits; 5. Meat, poultry, offal; 6. Eggs; 7. Fish and seafood; 8. Pulses, legumes, nuts; 9. Milk and milk products; 10. Oils/fat; 11. Sugar/honey; 12. Others (condiments, tea, coffee)

<sup>12</sup> While the HHS has the advantage of having been validated for cross-cultural use, the HHS also has the limitation of reflecting the more severe range of household food insecurity, which is characterized by food deprivation and actual hunger. The HFIAS, in contrast, is not valid for cross-cultural use, but does reflect a broader range of household food insecurity, and has been shown to produce psychometrically valid results in several contexts, when the four frequency categories (i.e., "no (never)," "rarely," "sometimes," and "often") are combined into three frequency categories (i.e., "no (never)," rarely or sometimes," and "often") for tabulation purposes. The choice about whether to use the HHS or an expanded household food insecurity scale, such as the HFIAS, should be based on a number of considerations, including the purpose for which the data are being collected, as well as the technical and economic resources available for adaptation and administration of the tool and validation research.

#### **4.1 Main source of food for HHs – q4.1**

A majority of households in all areas purchase raw food from markets (96%).

#### **4.2 Number of meals consumed by adults (over 18 years old) – q4.2**

On average, adults consume 2.61 meals per day in all areas. Number of meals adults have per day did not change significantly over time.

#### **4.3 Meals taken outside the home by adults (over 18 years old) – q4.3**

**Rationale and Findings:** Foods consumed outside the home continue to increase as a proportion of household expenditure.<sup>13</sup> Other than measuring HH expenditure, the indicator can be used to measure the energy or caloric content of foods consumed by a HH. Majority of respondents (76%) do not consume food prepared outside the household.

#### **4.4 Consumption of street foods by adults (over 18 years old) – q4.5**

Consumption of street foods is sometimes considered an indicator of food insecurity. Households might resort to cheaper street foods as a means of coping with financial insecurity.<sup>14</sup> Slightly less than half the respondents (40%) consume street foods.

#### **4.5 Number of meals eaten by children (under 18 years old)– q4.6**

Children (under 18 years old) average 2.96 meals per day. Children in Korogocho consume the lowest number of meals (2.73 meals/day) and this is significantly declining over time.

#### **4.6 Meals taken outside the home by adults (over 18 years old) – q4.7**

A majority of children (80%) do not consume foods prepared outside the home.

#### **4.7 Consumption of street foods by children (under 18 years old) – q.4.9**

Similar to their adult counterparts, less than half the children consume street food (37%).

#### **4.8 Household Dietary Diversity Scores (HDDS) – q4.10**

On average, households across all study sites consumed 5.55 food groups out of the 12 used to calculate the dietary diversity score. The Norwegian Refugee Council (NRC)<sup>15</sup> suggests that a household that consumes less than 4 out of the 12 food groups is food insecure. HDDS differed significantly between areas with households in Nyalenda reporting the lowest diversity score (4.4 food groups) and households in Viwandani reporting the highest (6.2 food groups). Dietary diversity is declining over time in all areas except Mukuru and Obunga.

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<sup>13</sup> FEWSNET, WFP, 'CFSVA Urban food security assessment, 2011'

<sup>14</sup> FANTA, 'Food security indicators and framework for use, 2000'

<sup>15</sup> NRC, 'Field Exchange, Special focus on urban food security and nutrition, Issue 46, September 2013'

#### **4.9 Household Food Insecurity and Access Score (HFIAS) – q.4.12 to q.4.18**

A majority of households in all the study areas are food insecure (85%). Close to half the households (48%) report severe food insecurity in a 4-week recall period, while 28% report moderate food insecurity and 9% report mild food insecurity. Over three quarters of households in Korogocho (79%), Nyalenda (77%), Mukuru (76%), and Obunga (76%) report moderate or severe food insecurity. Food insecurity (especially moderate and severe) is increasing in Korogocho; from 75% in August 2012 to 88% in November 2013 while declining in Viwandani (from 75% in August 2012 to 57% in November 2013).

#### **4.10 Household Hunger Scale (HHS) – q4.16, q4.17, q4.18**

A third of households (31%) in all the study areas report moderate or severe hunger in a 4-week recall period. Over a third of households (37%) in Korogocho report moderate or severe hunger followed by Obunga (34%), Nyalenda (33%), Mukuru (32%), and Viwandani which reports the least amount of household hunger (25%). Moderate to severe household hunger is declining in all areas of study except in Korogocho, where more than half the households reported moderate or severe hunger in November 2013 compared to 27% of households in August 2012

**Review:** q4.5, q4.6a, q4.7 and q4.9 will be verified before any further action. Literature review will be helpful in determining the importance of these questions.

## 5. HEALTH AND HEALTH SEEKING BEHAVIOR

**Rationale:** Infection is categorized by UNICEF as an immediate determinant of malnutrition mainly among children. Infections cause a deterioration of nutritional status by depleting the critical body stores of protein, energy, minerals and vitamins. The loss of body stores of these nutrients consequently compromises the immunity status of the children rendering them more prone to infection. This cycle: [malnutrition - infection - further nutritional deterioration - more infections] is synergistic and the combined effect of all of them is more serious than individual effects.<sup>16</sup>

### 5.1 Has any member of your HH been ill in the last 2 weeks? – q5.1 and 5.2

**Findings:** A little less than half (48%) of the households in all areas report illnesses in a 2-week recall period. Of those households, an average of 1.32 people report being ill. Morbidity, which is the proportion of household members reporting illness, is highest in Viwandani (45%) and Mukuru (42%). Nyalenda, Obunga, and Korogocho report 38%, 36%, and 33% morbidity, respectively.

### 5.2 Age of ill persons – q5.3

**Findings:** Obunga (38%) and Korogocho (37%) report the most cases of illnesses for children under 5.

### 5.3 Type of illness – q5.4

**Findings:** Most people suffered fever (38%), cough (31%), headache (30%) and other unspecified illnesses (34%).

### 5.4 Treatment – q5.6

**Findings:** 88% of HHs sought treatment for reported illnesses. Most people across all sites sought treatment in pharmacies. In Kisumu, Nyalenda and Obunga, more people (31% and 35% respectively) sought treatment in public hospitals. This is likely due to access. Obunga is very close to Kisumu's largest public hospital hence the ease of access. Nyalenda, on the other hand, is closer to the Kisumu sub-county hospital.

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<sup>16</sup> Food security in high density urban areas, WFP, FEWSNET, GOK, 2010

## **6. INTERPERSONAL RELATIONS**

### **6.1 Frequency of disputes in the HH – q6.1**

Less than 25% of the households in all study areas report an intra-household dispute in the last four weeks, with Obunga and Mukuru reporting the most (31% each).

### **6.2 Severity of disputes – q6.2**

Of the households that report intra-household disputes, most (81%) report mild disputes, just quarreling, with 15% reporting moderate, verbal abuse and 5% reporting severe, physical abuse.

### **6.3 Frequency and severity of disputes outside of the HH – q6.3 and 6.4**

Only 11% of households report disputes with neighbors, with most disputes happening in Nyalenda (15%) and Obunga (17%). Most of the inter-household disputes were mild (73%) with very few moderate (23%) or severe (5%) cases.

### **6.4 Sharing of food with neighbors – q6.5 and 6.6**

A little over half the households share food with neighbors (55%) or have neighbors share food with them (58%). More households in Nyalenda (56%) and Obunga (58%) share food than in Korogocho, Mukuru and Viwandani. In addition, more households received food from their neighbors in Nyalenda (52%) and Obunga (52%) than in Korogocho, Mukuru and Viwandani.

**Review:** This section should be discussed further to determine its relevance and significance in the context of urban emergencies as there is no really great information coming out, neither does it change.

## **7. PERSONAL AND PROPERTY SECURITY**

### **7.1 Experience of shocks – q7.1 and 7.2**

Overall, 16% of households in all areas experienced 1 or more shocks in a 4-week recall period, with more households in Nyalenda (23%) and Obunga (21%) experiencing shocks. The most frequent shocks were mugging (50%), flooding (28%), and burglary (24%).

### **7.2 Felt scared walking in the community in the last 4 weeks? – q7.3**

Over 66% of households report feeling insecure out the households, especially in Korogocho (79%).

### **7.3 Felt scared being in your house in the last 4 weeks? - q7.4**

Less than half (47%) of the respondents report feeling insecure inside the household with Obunga (60%), Nyalenda (41%), and Korogocho (57%) reporting the highest amounts of insecurity.

### **7.4 Avoidance measures due to insecurity – q7.5**

Over half the households (59%) use avoidance measures, especially in Korogocho (71%).

### **7.5 Security ratings – q7.6**

Close to half the respondents (47%) perceive the security situation as bad or very bad, with a majority in Korogocho (58%).



## 8. HOUSING AND TENURE

### 8.1 Ownership of House

Most households (87%) rent their home.

**Review:** Question 8.3 on number of rooms in house will be dropped since there has not been any meaningful information or change over time.

**Review:** This question can be put in a different section (HH living arrangements) and compared to SPHERE standards on housing.

## 9. HOUSEHOLD LIVELIHOODS

**Rationale:** A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stress and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.<sup>17</sup> The role of livelihoods-based responses following emergencies cannot be over-emphasized. Moreover, disaster affected populations have overwhelmingly identified livelihoods as their greatest recovery priority.

### 9.1 Main source of livelihood – q9.1

**Findings:** The main source of livelihood in all sites is casual labor (46%), followed by monthly salaries (24%). In Korogocho and Viwandani, more than half (52% and 50% respectively) of HHs depend on casual labor. The largest proportion of those who earn a monthly salary are in Mukuru (35%) and Viwandani (28%). Additionally, the largest number of hawkers is in Korogocho (16%). Nyalenda and Obunga lead in the number of those who do business (17% in each area).

**Review:** Add a field for “none” and revise field 1 to read “monthly”.

### 9.2 Number of income earners – q9.2

**Findings:** Mukuru, Nyalenda and Obunga average more income earners (1.3) than Korogocho and Viwandani (1.2).

### 9.3 Age of bread winner income earners – q9.3

**Findings:** Average age for income earners ranges from 31 years old in Mukuru to 37 years old in Korogocho.

### 9.4 Sex of bread winner income earners – q9.4

**Findings:** Most (68%) of breadwinner (highest earning) income earners are male. The proportion of female breadwinners is highest, at 37%, in the lower-income areas namely Korogocho, Nyalenda, and Obunga. Women earn significantly less than their male counterparts in all study areas, especially in Obunga (41% of male breadwinners salary), Mukuru (49% of male breadwinners salary), and Viwandani (52% of male breadwinners

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<sup>17</sup> UNDP, ISDR, ‘guidance note on recovery,’ 2010

salary). The lowest-income areas, Korogocho and Nyalenda, have a narrower gender gap in income, females in both areas earn about 62% of male income.

#### **9.5 Source of breadwinner income – q9.5**

**Findings:** The main source of breadwinner income in most households is casual labor at 47%, followed by monthly earnings (salary) at 25% and businesses at 14%.

**Review:** The findings here are similar to 9.1 above; question needs further verification before changing.

#### **9.6 Highest level of school completed by breadwinner – q9.5c**

**Findings:** On average, Korogocho has the lowest level of schooling, class 8, followed by Obunga, with a class 9 average, while the rest of the areas average a class 10 (form 2) education level.

#### **9.7 Who is the breadwinner? – q9.6**

**Review:** this question should be re-worded and perhaps moved to section 1 under 'respondents' particulars.'

#### **9.8 Mode of payment for breadwinners – q9.7**

**Findings:** Most breadwinners (52%) in all the study sites earn daily wages, with Korogocho (75%), Obunga (58%), and Nyalenda (57%) reporting the most households earning a daily wage.

**Review:** Question to be verified and re-phrased

#### **9.9 Breadwinner income levels – q9.8**

**Findings:** The average breadwinner income ranged from 7,059 KSH in Korogocho to 10,751 in Mukuru. The median breadwinner income in all areas was lower than the mean, suggesting that a majority of the population earned less than the average in all areas of study. Breadwinner incomes in Kisumu (Nyalenda and Obunga) appear to decline over the rounds.

Household income trends (all reported income in the household, not just the breadwinner) were very similar to the breadwinner income trends.

#### **9.10 Number of hours worked per day by the breadwinner – q9.9**

**Findings:** On average, breadwinners work about 9 hours per day in all the study areas.

#### **9.11 Number of days worked per week by the breadwinner – q9.10**

**Findings:** On average, breadwinners work about 6 days per week in all the study areas.

## **10. USE OF VARIOUS COPING STRATEGIES**

Coping strategies measure the things that people do when they cannot access basic human needs, or when they are faced with emergencies, stresses and shocks. Changes in coping strategies are an indicator of their experience of various emergencies and the severity of those emergencies.<sup>18</sup>

**Findings:** Over 75% of households in all study sites report using one or more coping strategies in a 4-week recall period. More households in Obunga (82%), Nyalenda (80%), Korogocho (80%), and Mukuru (79%) use coping strategies, with only 59% of households in Viwandani reporting the same.

### **10.1 Have you purchased food on credit? - q10.1**

Over 46% of households purchase food on credit with a majority of these households in Mukuru (52%) and Korogocho (51%).

### **10.2 Have you taken a loan to buy food or other essential goods? – q10.1a**

On average, 23% of households take loans to buy food or other essential goods, with the majority in Obunga (31%) and Nyalenda (27%).

**Review:** This question needs a review of how it is asked, to capture the intention of formal loans and not the informal borrowing as may have been the case during data collection. Modification will be done in the coming rounds.

### **10.3 Have you had to remove any of your children from school due to lack of school fees? – q10.2**

On average, 23% of households have had to remove their children from school due to lack of school fees and other school related costs. The largest percent of these are in Nyalenda (41%) and Obunga (34%), while the least was in Viwandani (9%).

### **10.4 Has any HH member left/moved due to lack of resources to maintain them? – q10.3**

11% of households report that a member has left the home or moved elsewhere due to lack of resources to maintain them. Most of these were in Mukuru (16%), Nyalenda (15%), and Obunga (11%).

### **10.5 Has any HH member gone begging for food or money? – q10.4**

6% of households report that a member has gone out begging for food or money, mainly in Mukuru (10%) and Korogocho (7%).

### **10.6 Have you or HH member traded sex for money or had multiple sexual partners? – q10.5 and q10.6**

Only 2% and 3% of households report a member having sex for money or multiple sexual partners as a coping strategy respectively.

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<sup>18</sup> WFP, USAID, CARE, 'Field methods manual, Coping strategies index, 2008'

**Review:** Given the sensitivity of these two questions, the responses may not be very informative, hence the need to remove them from coming rounds of data collection.

**10.7 Do you know anyone in the community who had sex for money – q10.7**

29% of respondents say they know someone who trades sex for money, mainly in Obunga and Korogocho (39% and 36% respectively).

**Review:** Perhaps this was a psychological question related to q10.5; hence the response was higher than in similar questions. This coping strategy may not be necessary in the next rounds of data collection.

**10.8 Have you stolen food or money to buy food and do you know someone who has done the same? – q10.8 and q10.9**

Overall, 2% of households report a member stealing food or money to buy food. On the other hand, 22% knew someone in the community who had done so.

**Review:** Similar to q10.7 above, this question is sensitive, which affects the way people answer it; hence the responses could be biased. The question will be modified or done away with completely.

**10.9 Have you received food from a neighbor/friend/relative – q10.10**

34% of the households receive food or money from a neighbor/friend/relative in all study sites, with most of them in Obunga (42%), Mukuru (40%), and Nyalenda (39%).

**Appendices**

Appendix A: Round 5 (August 2012) through 8 (November 2013) questionnaire.

Appendix B: Revised questionnaire for future rounds.

Appendix C: Detailed results per area and round.

Appendix D: Detailed results of low-income formal settlements in Nairobi (from August 2012), and informal settlement results per city (Nairobi and Kisumu) and round.