2015

Cash Transfer to Schools Nairobi County Informal Settlements Market Assessment

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Executive Summary

In collaboration with the Government of Kenya - and in particular the County Government of Nairobi - WFP is exploring to introduce a cash-based, locally procured school feeding model in the informal settlements of Nairobi by September 2015, in the 94 primary schools in seven different informal settlements of the city currently being supported by WFP. This model will empower local stakeholders, boost the local economy, and potentially translate into cost savings. Cash will be disbursed into school accounts and each individual school will procure the school meals basket each term in the nearby markets, with a preliminary start date for implementation being September 2015.

While plenty of secondary information exists on food prices and supply chain dynamics in Nairobi, this data is limited to the large market hubs. Prior to this assessment there was limited information on prices or supply chain structures for the informal settlements markets.

Objectives of the Assessment

The overall objective was to establish the capacity of Nairobi informal settlements markets to supply the food basket of the Nairobi County school meals programme throughout the school year.

The aim was to provide a comparative gauge of the feasibility and risks associated to the implementation of cash-based interventions to schools. This was be done by analyzing:

- How food is being made available in Nairobi County, how markets are structured, and which actors contribute to their functioning;
- To what extent the different types of markets and traders are able to respond to the increase in demand that can be expected from a transition towards a cash-based interventions.

Methodology

Analysis was based on the study of both primary and secondary sources. The existing relevant literature was reviewed in preparation for the assessment so as to ensure primary data collection would build on, and complement existing sources of information. Primary data was collected using trader survey and key informants questionnaires (including market committees and local government officials).

Eight main markets were surveyed; Gikomba, Kangemi, Kawangware, Kibera (Toi), Korogocho, Mukuru, Muthurwa and Wakulima. **35 wholesalers and 6 key informant groups were interviewed. Three market and supply chains** were covered and analyzed separately: Cereals and pulses (the staples); Vegetables and Fruits (fresh produce) and Processed commodities chain.

Key Findings

The markets in Nairobi County informal settlements markets are well structured. There are enough actors across the value chain to ensure a consistent supply of food commodities year round. No major barriers to entry were noted in the staples and processed commodity supply chains. The fresh produce market structure has a number of intermediaries; there are no barriers to entry at the farm gate level or assembly point. However, there are barriers to entry at the urban market centers, where cartels of brokers provide the link between wholesalers and retailers. Poor road infrastructure introduces additional transaction costs. These factors unnecessarily cause price spikes for a majority of the fresh produce and may occasionally make these produce inaccessible (unaffordable) to the Nairobi informal settlements schools - owing to the limited budgetary allocation.

The markets are well integrated with other markets in the producing areas and across the borders; mainly due to a good transport infrastructure. There is thus flow of food commodities – through trade - from the surplus-producing areas and other supply sources such as other countries – especially Tanzania and Uganda - through cross-border trade. Prices correlation and co-integration analysis showed that the Nairobi market is strongly correlated and co-integrated with other markets such as Nakuru, Eldoret, Mombasa, Kitale and Kisumu. Granger causality tests also revealed that price shocks (changes) are transmitted from some markets to others. Supply shock in one region can enhance integration of spatially located markets, as shock can be easily transmitted from one market to the other thus **reducing price spread between the two markets**. This will mean more suppliers to the distant markets (in this case Nairobi markets) and thus ensuring consistent flow (supply) of food commodities year round, so the Nairobi schools would not encounter food availability problems.

The conduct of the markets generally displayed competitive behavior, prices are set by negotiations except in the fresh fruits and vegetable market chain where in many cases, brokers and transporters determine the market price for each fresh produce consignment delivered, accounting for the purchase price, cost of assembly and transportation costs, and thus to some extent hold the market power. This cartel-like behavior most of the times leads to unfair competition and may unnecessarily increase prices of fresh produce, thus making them inaccessible (budget wise) to Nairobi informal schools – this increases the basket cost and consequently the transfer value.

As at the time of the study, food commodity prices were within the normal seasonal trend, however, these commodities seasonally fluctuate depending on production cycles. An annual price seasonality analysis – for Nairobi markets - indicated that prices for maize are normally at the highest starting May to July, while the lowest prices are recorded in February to March and September to October, following the harvests from the Western, rift valley, central and eastern Kenya regions. Beans prices are normally high starting March to May and lowest price is in February following the harvests in the rift valley region and in July after harvest in the central Kenya region. As for vegetables and fruits, cabbage prices in Nairobi show a seasonal low in December and a seasonal high in April. Potato prices show seasonal lows in July/August and

highs in April. Oranges show a low in July and high in September. Onions show a low in September and a high in May. These seasonal lows are mostly influenced by high availability.

For the Nairobi schools, the choice to purchase a particular food commodity will most likely be influenced by the period of price seasonal lows. However, atypical (non-seasonal) price spikes (high increase) will lead to a rise in the schools' food basket cost, necessitating an upward adjustment of the transfer value.

Majority of the interviewed traders have adequate capacity to supply the Nairobi informal settlements schools. 100 percent of the interviewed traders mentioned they would be able to increase their supplies under their existing cost and structure. They also reported that they have capacity to expand their business – especially with greater access to credit, good transport and market infrastructure and proper security.

Cost efficiencies for cash –vs. in-kind transfer modalities: Cost-efficiency is defined in this study the relationship between the programme's full costs and its outputs. The procurement arrangements during the period of assessment (April, 2014) was as outlined below.

- Cereals: 70% internationally procured bulgur wheat; 20% regionally procured maize and 10% locally procured maize
- Pulses: 100% internationally procured yellow split peas
- Vegetable oil: 100% internationally procured
- Salt: 100% locally procured

As per the above procurement arrangement, the WFP in-kind costs for the full basket were **higher** than the market costs by **24** percent. The result is an indication that it would be cost effective for schools to purchase from the local markets as compared to WFP purchasing, handling and delivering to the schools. However, the in-kind and market costs are expected to periodically change, because of seasonal price variations, as well as different procurement arrangements.

Recommendations

The current food basket made of in-kind food meets one third of the child's kilocalorie needs and provides approximately 700kcal/day. Using market data from April 2015, an analysis of the current basket was conducted and found that the ration would cost **8.92 KES/child/day** if locally procured. The basket, while meeting macronutrients, is lacking in micronutrients. Other food basket options – with fresh foods included - were also analyzed and presented for consideration - during implementation - as outlined in section 9.0 of the report.

A pilot utilizing fresh foods would provide valuable insight on the opportunity to diversify school children's diets. Documented lessons around serving sizes, food safety, frequency of delivery and storage capacity could help inform GOK policies for inclusion of fresh foods for schools.

The choice of a particular fruit or vegetable will need to change depending on availability and times of seasonal price lows. School level storage and handling arrangements – especially hygiene standards – will also be key in determining the type of fresh produce to purchase.

Atypical (non-seasonal) price spikes (high increase) may lead to a rise in the schools' food basket cost, necessitating an upward adjustment of the transfer value. The frequency of revision should take into consideration these seasonal and non-seasonal price increases.

It is recommended that both in-kind and cash ODOC cost estimates - when available – be integrated and then conduct a more comprehensive cost-efficiency analysis. That would provide a more accurate picture of the comparative costs of running the programme.

Government price data collection was discontinued in the informal settlements markets, due to budgetary constraints. It is hence recommended to continue advocating for the resumption of this service of price monitoring in the key informal settlements markets. More specifically, the market information system (MIS), currently under development by the Ministry of Agriculture with financial support from WFP, should meet the price information requirements of the HGSMP, i.e. uninterrupted collection of wholesale prices for the main commodities in the key resupply markets and the informal settlements markets within Nairobi County.

Traders and key informants reported that certain external factors need to be put in place - by the national and county government and other stakeholders - so as to help the traders increase supply if demand increases, the key factors include:

- Improved transport infrastructure from the producing areas of Kenya and within the informal settlements,
- Greater access to credit for traders,
- Improved security on the roads and within the markets and,
- Additional market infrastructure complete with storage facilities as well as increased trading space with the formal markets. Standards of hygiene need urgent improvement; especially for fresh produce sections.

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Acknowledgements

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1.0 Introduction

1.1 Background

The Government of Kenya and the United Nations World Food Programme (WFP) have jointly supported the implementation of the National School Meals Programme since 1980 in food insecure regions of Kenya namely; targeted support in semi-arid areas with high food insecurity, full coverage of all public schools in the arid Counties and targeted schools in the informal urban settlements of Nairobi.

In Nairobi, WFP has been supporting school feeding in seven of the poorest and most vulnerable settlements since 2001: Kangemi, Kawangware, Mathare, Kibera, Kariobangi, Mukuru and Makandara. Currently a daily school lunch is provided to 82,000 pre-primary and primary school children in 92 public primary and non-formal community schools that meet the agreed targeting criteria. The school meals are a crucial incentive for children to enroll in school, attend regularly and be able to concentrate and learn in class.

WFP's focus is to support the National and County Governments to have sustainable School Feeding Programmes, while improving quality, coverage and sustainability. Linking school feeding to local agricultural production is a critical element in supporting a sustainable transition and one that can create wider economic outcomes for small scale producers and traders. In 2009, the Ministry of Education, Science and Technology (MOEST) and the World Food Programme (WFP) agreed on a transition strategy to pursue greater national ownership and sustainability of the programme through the Government led Home Grown School Meals Programme (HGSMP). Since 2009, more than 800,000 students across 17 counties have been transitioned to the Government-led HGSMP.

1.2 Rationale for the Survey

In collaboration with the Government of Kenya - and in particular the County Government of Nairobi - WFP is exploring to introduce a cash-based, locally procured school feeding model in the informal settlements of Nairobi by September 2015, in the 94 primary schools in seven different informal settlements of the city currently being supported by WFP. This model will empower local stakeholders, boost the local economy, and potentially translate into cost savings. Cash will be disbursed into school accounts and each individual school will procure the school meals basket each term in the nearby markets, with a preliminary start date for implementation being September 2015.

While plenty of secondary information exists on food prices and supply chain dynamics in Nairobi, this data is limited to the large market hubs. There is limited information on prices or supply chain structures for the informal settlements markets, where schools in those areas are likely to source some or all of their food requirements.

Furthermore, WFP and the Government have agreed that in urban areas, where access to fresh food items is better and the supply chain management challenges can be controlled, WFP

proposes to pilot a diversified school meals menu to include nutritious, locally produced fresh food items. For an informed decision on the fresh food items to be included into the school meals food basket, wholesale price data for fresh food items in informal settlements markets will be obtained through this assessment, as currently not available through secondary sources. The assessment will also shed light on the sources and supply chain for these fresh foods.

The resulting analysis will be primarily utilized within WFP to inform programming, and also disseminated externally to share information and possibly provide inputs into other partners' strategies to shift to cash-based school feeding in Nairobi and other urban areas.

1.3 Objectives

The overall objective was to establish the capacity of Nairobi informal settlements markets to supply the food basket of the Nairobi County school meals programme throughout the school year.

The specific objectives of the assessment were to provide an understanding of:

- The consistency of food availability in informal settlements markets
- Traders' capacity to meet increase in demand generated by the cash transfer to schools
- Wholesale price data and price scenarios for different commodities in the current school meals food basket utilized by WFP, and appropriate transfer values per different food basket scenarios
- The cost-efficiency of the planned cash transfer to schools compared to other forms of assistance (e.g. in-kind food).
- Costing the price of food basket options, including fresh foods

The aim was to provide a comparative gauge of the feasibility and risks associated to the implementation of cash-based interventions to schools. This was be done by analyzing:

- How food is being made available in Nairobi County, how markets are structured, and which actors contribute to their functioning;
- To what extent the different types of markets and traders are able to respond to the increase in demand that can be expected from a transition towards a cash-based interventions.

The availability of food in the market will be assessed first through the study of the market structure and supply chains, i.e. how food is being made available in the informal settlements markets; and secondly through the analysis of a number of proxy indicators of market integration, including a price correlation analysis.

The second level of analysis will be an estimation of the traders' capacity to meet the increases in demand generated by cash interventions without disproportionate increases in prices; which would not only affect the schools beneficiary caseload, but the entire informal settlements population. Research indicates that a moderate increase in prices is a determinant of traders' willingness and therefore a factor to increase local food supply. But for vulnerable food consumers an increase in basic food prices implies both a reduction in food consumption, a

reduction in the consumption of other goods, and often a switch to less preferred but less expensive foods.

Cost-efficiency is defined in this study as the relationship between the programme's full costs and its outputs. It refers to an analysis of the costs and benefits of alternative transfer modalities in monetary terms, in order to use available resources as efficiently and effectively as possible.
Based on the findings, recommendations will be formulated with respect to the feasibility of cash-based interventions in the Nairobi County informal settlements' schools.

1.4 Methodology

Analysis was based on the study of both primary and secondary sources. The existing relevant literature was reviewed in preparation for the assessment so as to ensure primary data collection would build on, and complement existing sources of information.

Primary data was collected using trader survey and key informants questionnaires (including market committees and local government officials). Data collection was conducted by 9 enumerators from April 21 to April 24, 2015. Interviews with traders were conducted using electronic data collection devices. Two WFP staff supervised the field work throughout the duration of the data collection.

Eight main markets were surveyed; Gikomba, Kangemi, Kawangware, Kibera (Toi), Korogocho, Mukuru, Muthurwa and Wakulima. **35 wholesalers and 6 key informant groups were interviewed.** Interviews were conducted in four main types of wholesale outlets: permanent shop in a complex, permanent stand-alone shop, open air and shops/kiosks. The type of shop is a proxy indicator of storage capacity, type of business expenditure such as rent, daily rates and also in a way signifies stability of business. Figure 1 shows the types of shops where the

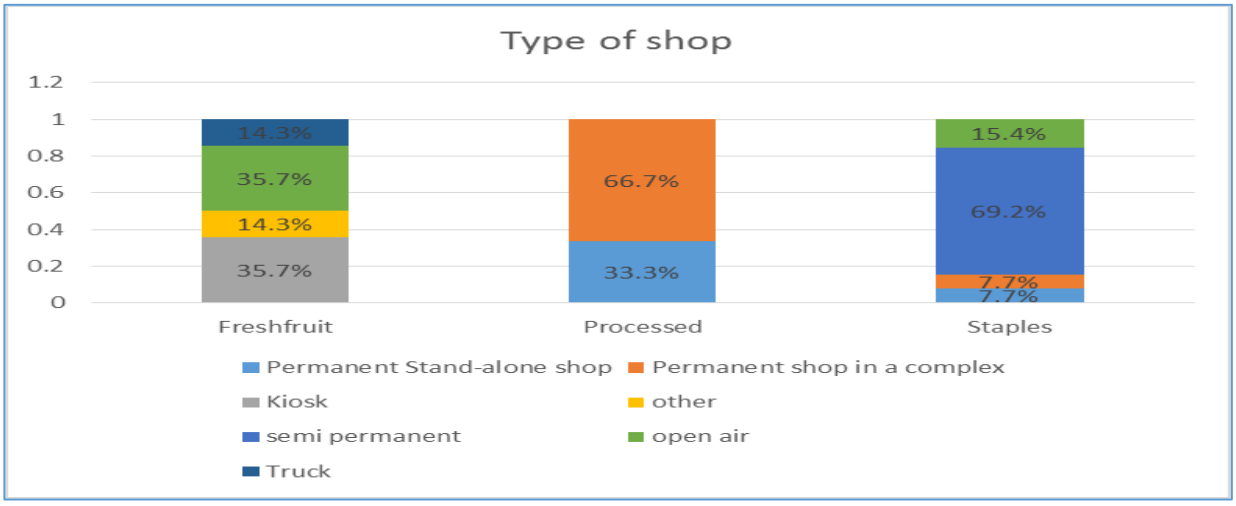

Figure 1: Type of shops. Source: Traders' questionnaire

interviews were conducted and provide a picture of the most common wholesale outlets in the informal settlements markets.

Three market and supply chains were covered and analyzed separately:

- Cereals and pulses (the staples) market chain: Maize, local rice, sorghum, beans, green grams, and cowpeas).
- Processed commodity chain: Salt, vegetable oil, maize flour, wheat flour, sugar, imported rice and cooking fat.
- Vegetables and fruits (fresh produce) chain: Cabbages, avocado, potatoes, sukumawiki (kales), onions, tomatoes, bananas, carrots, oranges and mangoes.

The interviews were conducted with the aim of obtaining a balanced representation of traders and commodity categories. Based on the fact that similarities in supply chains and market structures exist within each of the informal settlements markets, data for the eight markets visited was analyzed collectively. Data was analyzed using MS Excel and SPSS.

1.5 Research Limitations

Some wholesalers declined to be interviewed even after proper introduction session - by the enumerators - about the purpose and scope of the assessment. Majority of traders were also not easily forthcoming with information concerning costs, prices and profits. Hence, where information was provided, it had to be taken with great caution. Triangulation was done through comparison with similar information available in the literature. This prevented, for example, the calculation of profit margins. Further to that, traders' responses can sometimes be biased by a number of factors such as the perception of potential business opportunity, or the fear that the information could be used by fiscal authorities or competitors.

2.0 Overall Food Availability Context in Kenya

The aim of this section is to provide a picture of the overall food availability situation in Kenya, and whether the current production and import trends would suffice to meet the increased demand generated by a potential market intervention in the Nairobi County informal schools.

At the national level, food availability is a combination of domestic food production, domestic food stocks, commercial food imports and food aid. Food availability in Nairobi County is likewise influenced by national policies and international agreements.

In Kenya, food availability has over time been understood in terms of cereal supply, and food security in terms of having enough maize. Per capita food availability has declined by more than 10 percent over the last three decades[1]. Most Kenyans still subsist on diets based on staple crops (mainly maize) that are lacking in nutritional diversity. Most Kenyans rely on markets for some or all of their food needs. While most of the poor live in rural areas, the number in urban areas is rising fast.

According to the Ministry of agriculture, amongst the key constraints to domestic production are: declining soil fertility, high input prices, losses due to pests and diseases, climate change,

[1] *Kenya National Food and Nutrition Security Policy, Agricultural sector coordination unit (ASCU), 2012*

inappropriate land use and inadequate access to credit. Agricultural production systems in Kenya are largely rain fed, making them vulnerable to the threats of droughts and floods. The Ministry further states that continuous cultivation of soils, loss of forest cover and over-emphasis on maize production have led to a decline in soil fertility and yields, in areas with relatively high production potential. However, there is still great potential to increase the area under production since lands are often unexploited due solely to high input costs. Irrigation and water management techniques in these areas hold great potential in this regard.

A significant proportion of the food produced is lost due to post-harvest spoilage and wastage, including in some cases from toxin causing micro-organisms. Losses are often substantial for grain and produce (fruits and vegetables) along with spoilage of animal products including milk, meat and fish. According to the Ministry of agriculture, losses of stored maize are estimated to be a staggering 30 to 40 percent per annum. Inadequate storage constitutes a public health threat when people consume spoiled food, causes supply fluctuations and exacerbates prices, all of which are key causes of food insecurity and malnutrition.

There is little on-farm and off-farm processing of products in rural areas. Kenya lacks sufficient infrastructure for effective transport, storage, refinement, preservation, distribution and marketing of many foodstuffs.

The maize seasonal calendar below (figure 2) shows the main harvest periods in Kenya. Although the two producing seasons influence prices, the main driving factor in this regard is the long rains maize harvest in the grain basket.

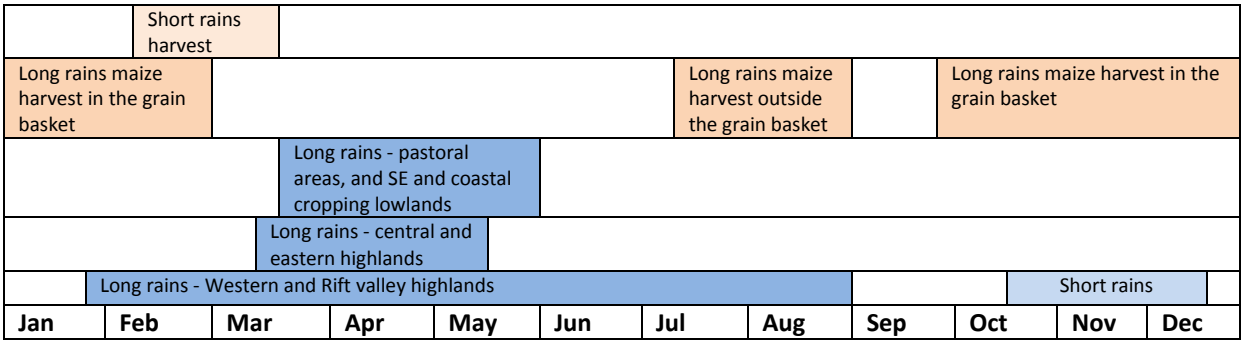

Figure 2: Kenyan seasonal calendar. Source: WFP Kenya, VAM unit

Kenya produces around three million tons of maize per year; about 15 percent is sold directly to the National Cereals and Produce Board (NCPB) and large millers. According to the State Department of Agriculture, the national maize stocks stood at 1.56 million metric tons by end of January 2015. Taking into account the monthly per capita consumption of 0.3 million metric tons, the available stocks would last through June 2015, with a surplus of 0.03 million metric tons thereafter. Continued importation of maize and early long rains harvested crop from the South Rift, would ensure adequate availability of maize after June 2015[2].

[2] *Kenya Food Security Steering Group (KFSSG) – 2014 Short Rains Assessment Report*

Domestic maize production has increasingly lagged behind population growth, especially in urban areas, where the population is growing at four percent per annum. Since 2000, it has become clear that Kenya has a structural deficit in maize production, even in a bumper harvest year. This deficit has increased to about ten percent of production since 2005.

Most of this deficit is filled by imports, both formal (official) and informal, from Uganda and Tanzania - which are generally regarded as having lower costs of production than Kenya and competitive access costs to some of Kenya's population centers. Kenya is normally able to import sufficient maize to meet its needs from the two countries at prices below those in world markets.

2.1 Cross-border Trade

Greater Horn of Africa (GHA) Region Trade
Multi-country import is common in Kenya, which receives beans from Rwanda and maize from Malawi and Zambia. Maize is the most traded commodity in the GHA region followed by beans, rice, sorghum and bananas (Awuor, 2007)

Temporal distribution of production: In the GHA staggered harvest periods provide opportunities for trade. For example, harvests of maize, beans, and sorghum in Uganda and Tanzania are available in June and July, immediately preceding the main Kenya harvest. Thus grain from these two countries flows onto Kenyan markets at a critical periods. The seasonal calender **(Annex I)** shows the harvesting seasons in the GHA region.

Uganda-Kenya Trade
Maize, beans, bananas, and oilseeds are the main primary agricultural commodities traded between these two countries. The food security linkages between Kenya and Uganda are among the strongest in the GHA region. Primary agricultural commodities usually flow from Uganda to Kenya. Four major border points handle both the official and unofficial trade in crop commodities between Kenya and Uganda: Busia, Malaba, Suam, and Lwakhakha[3].

Tanzania-Kenya Trade
Maize, rice, and beans are the main staple foods traded between these two countries. Agricultural trade between Kenya and Tanzania historically has been very strong. Tanzania has made much progress in its infrastructure, which has widened the food sources for the Kenyan market. It is now normal for maize from Southern Tanzania, parts of Malawi, and Zambia to reach the Kenyan markets of Nairobi and South-eastern and coastal areas. The main border points between Kenya and Tanzania include: Horohoro, Taveta, Rombo, Namanga, and Sirari. Foodstuffs move through all of these points, as well as across Lake Victoria. Maize remains the principal commodity imported into Kenya from Tanzania, followed by beans, fish, rice, root crops, and sugar (Awuor, 2007). **Annex II and III** show the production and market flow maps for maize and beans (season 1) in parts of the GHA region.

[3] *Review of Trade and Markets Relevant to Food Security in the Greater Horn of Africa, A special report by the Famine Early Warning Systems Network (FEWS NET), Awuor T., 2007.*

2.2 Government Policies on Production and Trade

According to Food and Agriculture Organisation (FAO) review of food and agricultural policies in Kenya (2005-2011), several policy measures have been put in place to address the driving factors of agricultural market incentives and disincentives in Kenya with the Main Objective of "Transform Kenya's agriculture into a profitable, commercially oriented and internationally and regionally competitive economic activity"[4].

Measures supporting the consumers:

- Social safety nets e.g. food assistance to schools and community

Policies supporting the producers:

Strong Government presence and control of produce and input prices. E.g. price stabilization and producer support prices for maize, through four main actions:

- Increasing imports by the National Cereals and Produce Board (NCPB) for the strategic grain reserve (in 2008 import of 270,000 MT of maize),
- Supply of maize to millers at fixed prices (in 2008, the price was fixed at Ksh. 21 per kg, equivalent to a 50 percent subsidy),
- Fixing the purchasing price of maize, which in 2011 reached Ksh. 33/kg, equivalent to double the market price; and
- Input subsidies on a continuous basis, mainly for fertilizer, in the form of direct payment to farmers or free distribution.

Government policy attention shift to trade measures:

- The positive shift of East African countries towards more regional cooperation that led to the East Africa Common Market Protocol for free movement of goods
- However during food shortage; Kenya made several attempts to protect national food security through export bans and reduction of import tariffs, mainly on maize, rice and sugar.

Investment policies:

- Kenya's budget allocation to the agriculture sector ministries has been rising in response to the commitment made at the 2003 Maputo Declaration of allocating 10 percent of the national budget to agriculture.
- The total allocation in nominal terms rose 122 percent from 2006 to 2011. However, relative to total government expenditure, the average share of agricultural expenditure was just 6.3 percent over that period. This share could increase in the coming years to meet the aspirations in the Kenya Vision 2030.

[4] *Review of Food and Agricultural Policies in Kenya 2005-2011. FAO Monitoring African Food and Agricultural Policies (MAFAP). Kenya Country Report, 2013.*

3.0 The Nairobi County

The city of Nairobi with its administrative area of approximately 700 km^2 is the capital of the Republic of Kenya and also a Centre of administration, politics, economy and culture of Kenya. The city is bounded by Kajiado County on the South and south west, Kiambu County on the north and North West and Machakos County on the east and south east. Such adjacent areas are now absorbing increasing population and economic activities. See **annex IV** for Nairobi County map.

According to Kenya Population and Housing Census conducted in 2009, the total population of Kenya was approximately 38,610,000, and that of Nairobi City was approximately 3,138,000, accounting for 8.1% of the national population. The average population density excluding Nairobi National Park, which occupies 117km^2 or 16.8% of the city's total area, is 5,429 per km^2. The Central Division and Kamukunji Division located at the Centre have a much higher density than others in excess of 20,000 per km^2. The population growth rate of the Greater Nairobi has been considerably higher than that of Kenya. The average annual growth rate of the Greater Nairobi was 4.2% from the 1989 census to the 1999 census and 4.0% from the 1999 census to the 2009 census, while that of Kenya was 3.0% in both periods. The dominant reason for the difference is thought to be the high in-migration rate of the city[5].

Much of Nairobi's urban area is classified as the informal settlements, driven by the rapid population growth and the urban poverty. Nairobi's rapid growth increased demand for land and led to inappropriate land allocation, forcing poor to settle in fragile and unsavory areas where they face hardships due to lack of proper housing and public services and where they are vulnerable to environmental change. Urban poverty, lack of employment opportunities, and inadequate urban planning also conspired in gradual growth of informal settlements in Nairobi since city's founding. In the early 1990s, it was reported that over half of the city's population lived in those informal settlements (JICA, 2014).

According to a Nairobi County Education sector taskforce report (2014), "the population of school going-age children is raising fast. The population of pre-school children was estimated to be 274,301 in 2015 and is expected to rise to 295,961 in 2017. Primary school-going population was estimated to be 493,586 in 2012 and 596,868 in 2017, with girls accounting for 51 percent. However, by July 2014 only 193, 053 children were enrolled in the 205 public primary schools in the County, meaning that more than half of the eligible population is out of school" (Education taskforce report, July 2014 p. 5)[6]

The Nairobi County informal settlements school mapping exercise conducted by WFP in March, 2015 within the 94 - WFP/GOK - supported public primary and non-formal community schools recorded a total enrollment of 81,764 out of which 6,426 pupils were in pre-primary and 75,338 in primary schools. Girls accounted for 51 percent of the total enrollment.

[5] *The Project on Integrated Urban Development Master Plan for the City of Nairobi in the Republic of Kenya. Japan International Cooperation Agency (JICA). May, 2014.*

[6] *Education Taskforce Report on Performance Improvement in Public Schools, Nairobi County, July 2014.*

4.0 Market Structure in Nairobi County

4.1 Most Commonly Traded Commodities per Market Chain

The traders were also asked to rank their commodities in terms of volumes traded. The most commonly traded foods per market chain - in order of importance - are 1) Cereals and pulses: beans, maize, local rice, green grams, sorghum and cowpeas; 2) Vegetable and fruits: potatoes, sukumawiki (kales), onions, tomatoes, avocados, bananas, cabbage, carrots, oranges and mangoes 3) Processed commodities: maize flour, wheat flour, sugar, imported rice, cooking fat, salt and vegetable oil.

In the cereals and pulses supply chain, beans is the most important legumes, followed by green grams and cowpeas Maize is the most important cereal followed by local rice and sorghum. Potatoes and Sukuma wiki (kales) are the most important vegetables, while Avocados, bananas and oranges are most important fruits in the vegetables and fruits supply chain.

4.2 Supply Chains in Nairobi County

Cereals and Pulses Supply Chain

Most of the Kenyan maize production comes from the Western and Mount Kenya regions. Wheat is mainly produced in the Southern Rift Valley. The production of rice in Kenya is limited and mostly confined to two irrigation schemes: Mwea in the central region and Ahero in the Western region. Local production of beans is also concentrated in the Western and Mount Kenya regions, mostly overlapping with the maize producing areas. Figure 3 shows the typical maize supply chain in Kenya. Other grains (sorghum, rice, millet), as well as the pulses (especially beans) supply chains tend to be similar.

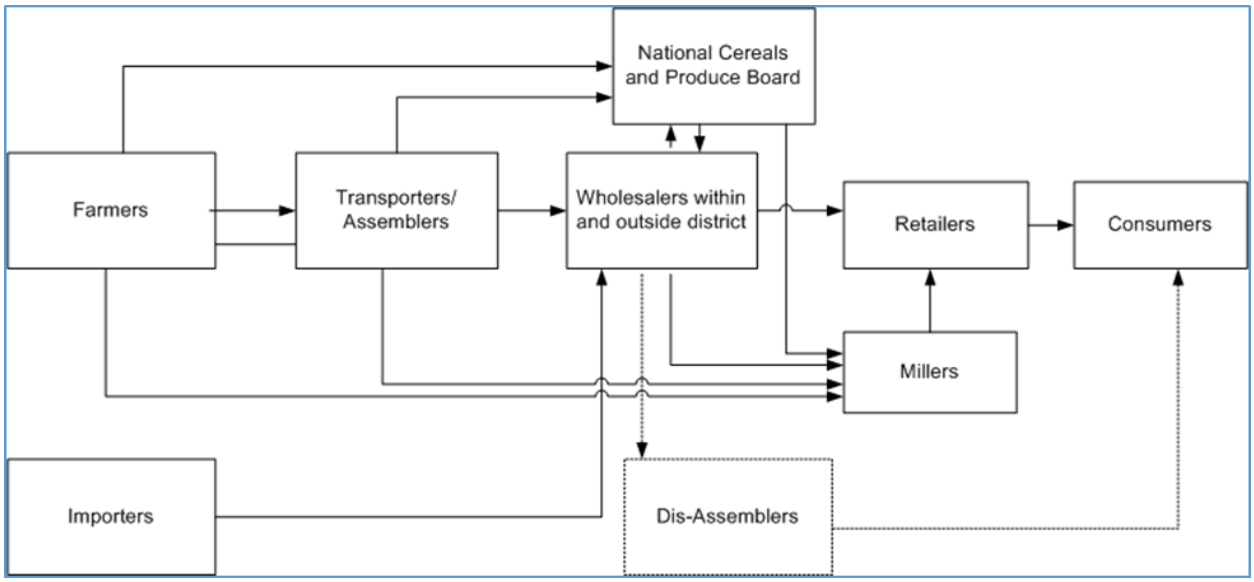

Figure 3: Typical maize supply chain in Kenya

Once the maize is harvested, treated and ready for sale, the farmer sells to the highest bidder depending on available options in the market. The highest bidder differs according to time and season. In surplus season, the government's NCPB offers better deals to farmers and in times of low harvest, private millers pay higher prices. But an average farmer who has no proper storage facilities to store her/his produce for sale later is forced to sell immediately after harvesting in order to settle cash-flow necessities within the household. At farm gate, the maize is either sold to a transporter or directly to assemblers who are usually fellow farmers or village mates. The village assembler collects larger volumes of maize even by buying from bicyclists, donkeys and hand-carts. The assembler waits for the wholesaler who is usually located in the next urban setting. The assembler releases the maize to the wholesaler who transports it mostly towards and into the deficit areas and sells to either retailers or millers. The retailer eventually sells to the consumers in small quantity per 2 kg tin. When the wholesaler decides to sell to the miller, the millers mill the maize and pack it into various quantities destined for the retail chains.

In the informal grain markets, the dis-assemblers break down the quantities to manageable and easily afforded weights. The disassemblers retail the maize in various markets and also take the grains to hammer millers for milling and later sell to consumers per kg. In all these movements of maize grains and maize flour, the transporter plays a central role all along the supply chain.
The scenario changes when the farmer and or the wholesaler decide to sell the grain to NCPB. The NCPB keeps the maize in its stores and releases it in times of scarcity to ease off high prices. The wholesaler also supplies the informal grain markets.

Grain re-supply within Nairobi County: Traders reported that **Nyamakima market** is the most important Cereals and pulses re-supplier hub. It's however important to note that some large wholesalers in the informal settlements markets reported that they too source directly from the Rift Valley and Central Kenya regions and Uganda (Busia) and Tanzania (Namanga).

Vegetables and Fruits Supply Chain

According to a survey done by the Tegemeo institute of agricultural policy, the geographical pattern of sales of individual fruits and vegetable crops is reasonably concentrated. For example, nearly half of Irish potatoes sold into Nairobi are produced in Nyandarua County, most of this in Olkalou and Kinangop locations. Nearly 80% of tomatoes come from Kirinyaga County, primarily from Mwea; much of the rest comes from the Loitoktok area of Kajiado County. Cabbage sales are heavily concentrated in the Kinangop area of Nyandarua County. Banana production is more spread, though with heavy concentrations in Kisii and Nyamira (about a one-third share), and Meru and Kirinyaga (nearly 60%). Mango sales are the most dispersed, ranging from Meru, through Embu and Machakos to Makueni, and also Kitui[7]. Traders reported that during times of low supplies in Kenya Tanzania (onions) and Uganda (bananas) are very important sources.

[7] *Assessment of Kenya's domestic horticultural production and marketing systems and lessons for the future, Tschirley, D., & Ayieko, M., Tegemeo institute of agricultural policy and development, WPS 32/2009.*

For potato producers, the marketing structure has a number of intermediaries. There are no barriers to entry at the farm gate level or assembly point. There are rural brokers who are useful for the assembly of potatoes from farms, and they work hand in hand with transporters, who in turn work with urban brokers. There are barriers to entry at the urban market centers, where cartels of brokers provide the link between wholesalers and retailers. The marketing chain of potatoes has several actors who unnecessarily increase the transaction costs of ware (fresh) potato along the chain without adding value to the product due to their cartel-like behavior. Poor road infrastructure introduces additional transaction costs[8].

Fruits and vegetables re-supply within Nairobi County: Most of the above produce is funnelled through one of five wholesale markets in Nairobi County before making its way to retail market stall and kiosk owners, along with a small amount that goes to hawkers, *dukas*, and green grocers. **Wakulima market** continues to hold a majority share in wholesale transactions in the city, but the system has become more decentralized over time, driven by congestion and lack of maintenance at Wakulima, and increasing populations on the periphery of the city.

Key actors in the supply chain include small and medium farmers, rural assembler/wholesalers who bulk product in rural areas and transport it to Nairobi, urban wholesalers operating primarily within the city, and market stall and kiosk owners selling at retail[9].

Annex V and VI shows the structure of fresh vegetables and fruits production and marketing into Nairobi County.

Processed Food Commodities Supply Chain

Processed commodities traded in Nairobi County (sugar, maize and wheat flour, vegetable oil, packed milk, rice, tea etc.) are mostly manufactured in the industrial processing zones within the Nairobi city and Machakos Counties (Athi-river region). Salt is mostly produced in the coastal district of Malindi.

Processed commodities re-supply within Nairobi County: From the company factories, commodities are handed over to company's appointed distributors / dealers who distribute to the wholesalers.

4.3 Transport to and Within Nairobi County

The importance of transport in the supply chains and the availability of food cannot be overstated. The seven and 12 tons trucks are the most utilized modes of transport in all the supply chains. As shown in figure 4, the 28 metric tons truck is more preferred by traders in the processed and cereals and pulses chains; due to the large volumes handles. Traders own 2 ton vans, public transport (busses and *matatus*) and motor cycles are used for smaller consignments.

[8] *Market Structure and Price: An empirical analysis of Irish potato markets in Kenya. Laibuni, N. M. and John M. Omiti, J. M. (2014)*

[9] Assessment of Kenya's domestic horticultural production and marketing systems and lessons for the future, Tschirley, D., & Ayieko, M., Tegemeo institute of agricultural policy and development, WPS 32/2009.

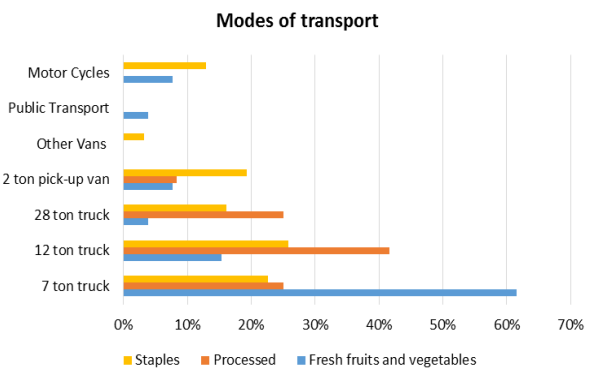

Figure 4: Modes of transport. Source: Trader's

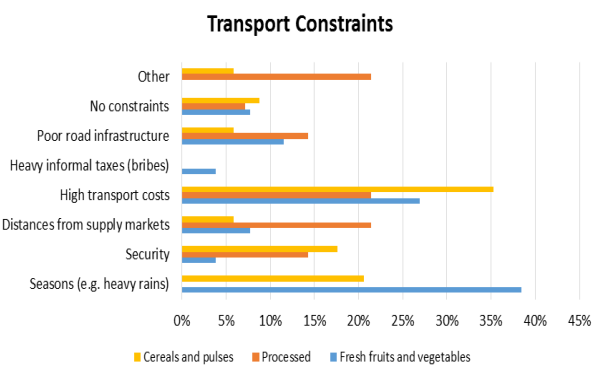

Figure 5: Transport Constraints. Source: Trader's

By far, the most important constraints to trade reported in Nairobi have to do with high transport cost, poor road infrastructure and the long distances from the source markets. During the rainy seasons impassable roads in the producing areas affects fresh fruits, vegetables, cereals and pulses supplies; generally transport through unpaved roads multiplies the time required to ferry the commodities and increases the need for vehicle repairs. Other constraints include commodity diversions and theft common in processed and cereals pulses chain. See figure 5.

4.4 Constraints to Trade and Availability

The main trade barriers reported by traders in the cereals and pulses chain were lack of enough storage, unstable demand and lack of access to credit. Fresh fruits and vegetables traders reported main constraints as inadequate access to credit, lack of supplies and irregular supply quantities. Main constraints for processed commodity traders were lack of supplies, inadequate access to credit and lack of enough storage. See figure 6. Other common constraints were high transport costs, poor roads and security – for the cereal and pulses traders.

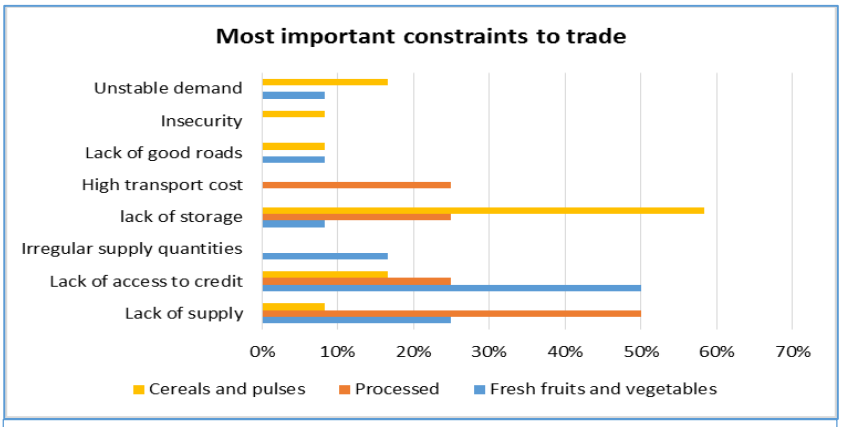

Figure 6: Constraints to trade. Source: Trader's questionnaire

5.0 Market conduct

5.1 Catchment Area for Clients (Use of the markets)

Most customers are from within the same informal settlements where the market is located and also few informal settlements around the market. Some few customers are from the sub-county where the markets are located and some larger wholesalers serve the entire county – especially the fresh fruits and vegetables traders of Kawangware and Kangemi.

5.2 Role of Wholesaling - competition

Wholesalers are a determinant of the efficiency of the supply chains. They purchase food items from producers, importers and middlemen/distributors for sale to retailers. Some wholesalers also operate as retailers. Due to their extensive vertical networks, their role is fundamental in the transport of food from surplus regions to the deficit regions. Most wholesalers in Nairobi County are specialized; trading separately in cereals and beans, processed foods or fruits and vegetables.
Owing to the short distance between the Nairobi re-supply hubs (Nyamakima and Wakulima) and also due to the established transport system and wholesalers specialization as described above, there are fewer wholesalers per retailer in the Nairobi informal settlements markets. These wholesalers also tend to deal with a slightly fewer number of commodities, thus reducing effective competition within the respective supply chains.

The limited role of wholesaling in the informal settlements markets can undermine local traders' response capacity and increase the risk of collusion, hoarding and price increases. However, these risks are normally mitigated by the short distance to the hub re-supply markets and established transport system, thus favorable access by consumers from the informal settlements.

There are no restrictions to the entrance of new traders in the staples and processed commodities market chains. Traders with established structures (shops/kiosks) have to obtain a license from the Nairobi City County and pay annual fees and this process usually takes only a few days.

According to the key informants, the only difficulty to open a new business can be allocation of space in the fresh fruits and vegetable markets by the market committees. Open air trade of fresh fruits and vegetables is usually more unregulated than the one in shops and kiosks. The Key informants recounted that there is a sufficient number of transporters in the market, and hence competition is not a factor that negatively influences the final price of commodities.

Pricing Strategies (Trader behavior)

Price negotiations are one of the good indicators for proper market functioning, as they indicate fair trading practices. Price setting by few traders is a sign of collusion and is not a fair practice to the consumers, as it mostly sets prices against prevailing market forces of supply and demand. In order to assess the traders' negotiating power and hence their vulnerability to price shocks, they were questioned on how the purchasing price of food commodities is usually determined. As per the traders' perceptions, it appeared that wholesalers in the processed commodity chain have a higher capacity to influence prices. 85%, 57% and 33% of the traders in the staples, fruits and vegetables and processed commodity chains respectively reported that prices are determined through negotiations. As opposed to this, prices are determined by the wholesalers, as reported by 67%, 21% and 8% of the traders in processed, fruits and vegetables and staples commodity chains respectively. See figure 7 above.

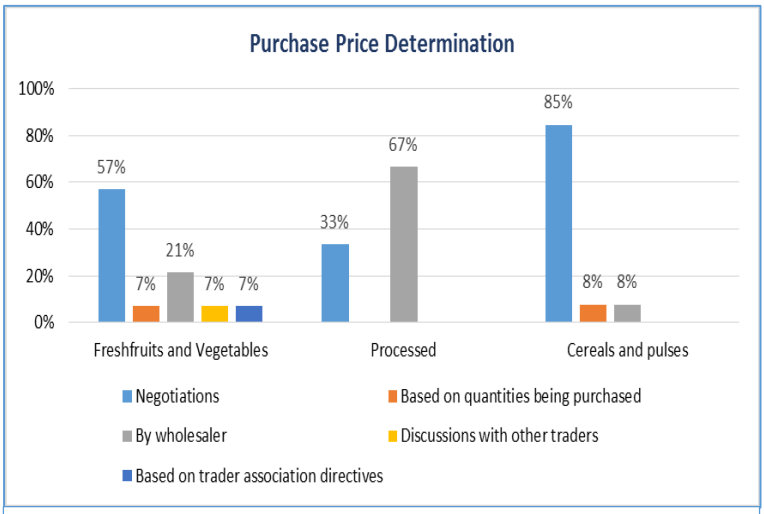

Figure 7: Price determination. Source: Trader's Questionnaire

According to Omiti and Laibuni (2014), in many cases, brokers and transporters determine the market price for each potato consignment delivered, accounting for the purchase price, cost of assembly and transportation costs, and thus to some extent hold the market power. While some key informants in the informal markets reported collusion in price setting by wholesalers dealing with fruits and vegetables, the number of wholesalers in the supply markets is sufficient to guarantee adequate competition levels.

6.0 Market Performance

6.1 Price Seasonality Analysis

Agricultural commodities typically show a strong seasonal pattern in production, with supplies which come off the farm during one or perhaps two distinct periods of the year having to meet relatively stable demand over the course of the entire year. This seasonal pattern in production can give rise to strong seasonal patterns in price movements, with low prices during and shortly after the harvest, rising to peaks just prior to the next harvest. Understanding this price

seasonality, the typical timing and levels of seasonal highs and lows, and the reliability of each, is a key task for anyone wishing to understand the market for an agricultural commodity[10].

The **Seasonal Index (SI)** for a specific month during a specific year shows by what percentage the price for that month lied above or below the prices of the surrounding 12 months. The Grand Seasonal Index (GSI) is a single value for each month of the year reflecting the average amount by which prices during any given month lied above or below their surrounding prices (for this assessment the period starting 2006 to 2015). The GSI always fluctuates around a value of 1.0, it is the measure of seasonality.

Without imposing formal statistical tests, a common rule of thumb in interpreting GSI values is to conclude that a fairly robust seasonal high is reached whenever the GSI value is at least one standard deviation above a value of 1.0, and that a robust seasonal low is reached whenever the GSI values is at least one standard deviation below a value of 1.0 (Mathenge & Tschirley, 2006). See **annex VII**, which shows how the seasonal indices were calculated.

Maize and Beans Seasonal Indices

Wholesale price data (2006-2015) from the Ministry of Agriculture, Livestock and Fisheries (MoALF) was used to compute the seasonal and grand seasonal indices. As shown in figures 8 and 9, the GSI for maize indicates that prices are normally at the highest starting May to July. The lowest prices are recorded in February to March and September to October, following the harvests from the Western, rift valley, central and eastern Kenya regions. Beans prices are

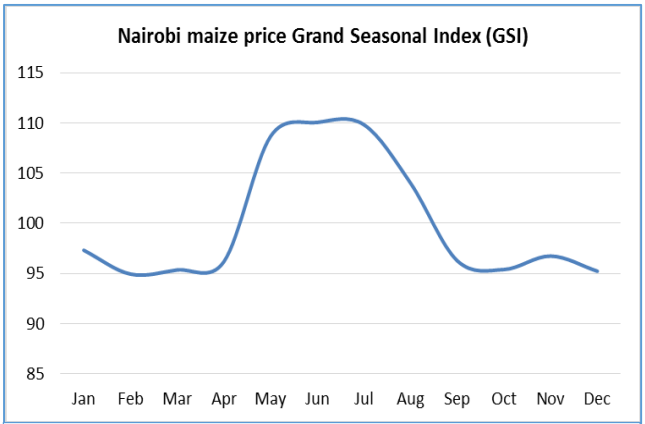

Figure 8: Maize GSI. Source: GoK - MoALF

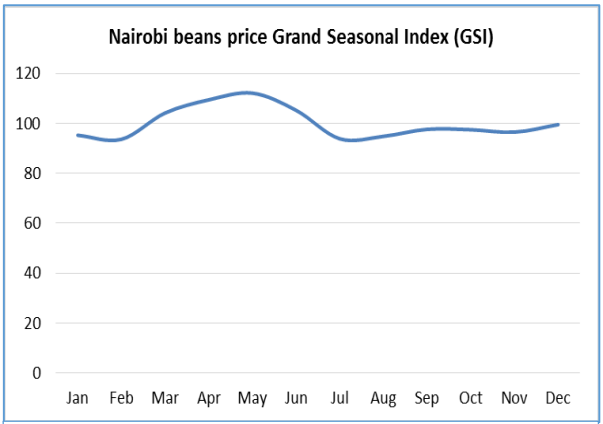

Figure 9: Maize GSI. Source: GoK - MoALF

normally high starting March to May and lowest price is in February following the harvests in the rift valley region and in July after harvest in the central Kenya region.

[10]*Seasonal analysis of selected fresh fruit and vegetable prices at wholesale level in key urban markets of kenya, Mathenge, M., and Tschirley D., Tegemeo Institute of Agricultural Policy and Development, Working Paper No. 22, May 2006.*

Vegetables and Fruits Seasonal Indices

According to a study by Tschirley and Mathenge (2006) which analysed seasonality of selected fruits and vegetables prices in key urban markets in Kenya, Cabbage prices in Nairobi show a seasonal low in December and a seasonal high in April. Potato prices show seasonal lows in July/August and highs in April. Oranges show a low in July and high in September. Onions show a low in September and a high in May. **Annex VIII** shows the summary statistics for wholesale price seasonality of seven Fresh Fruits and Vegetable crops in Nairobi.

6.2 Market Integration - Price Integration Analysis

Market integration is defined as the existence of efficient and timely trade flows between two geographically separate markets. A necessary but insufficient condition for that to occur is that is that commodity prices in markets respond to one another or move in the same direction, i.e. price signals are transmitted between markets. When markets are well integrated food commodities flow from one market to another (surplus to deficit areas) thus influencing food availability, and consequently enhancing the overall market functioning. Market integration analysis is carried out through a combination of price integration analysis and also analysis of proxy indicators of market integration.

Market price transmission is generated by the rational economic behavior of traders who, in situations of competitive and integrated markets, exploit commercial opportunities by buying food commodities in markets where prices are low to sell them when and where they can make a profit. The basic principal of this type of analysis is the assumption that the closer the changes in prices experienced on two markets, the more integrated the two markets can be considered.

A necessary and sufficient condition for market integration is that food effectively moves between markets in response to imbalances in supply and demand. In other words, price integration is not sufficient to conclude whether or not markets are integrated. The existence of price transmission between markets does not necessarily mean that trade flows between them. From an analytical perspective, this means that food commodities price integration analysis has to be complemented with the analysis of proxy indicators of market integration: seasonal availability of food, transport capacity, constraints to trade, competition levels etc.

The analysis of price patterns in this section is based on monthly price series from 2006 to 2015 for Nairobi, Eldoret, Kisumu and Mombasa. The price data originates from the Ministry of Agriculture Livestock and Fisheries Development. Figures 10, 11 and 12 show the Pearson correlation coefficients between the selected markets.

	Nairobi	*Eldoret*	*Kisumu*	*Mombasa*
Nairobi	1			
Eldoret	0.957882	1		
Kisumu	0.957795	0.930784	1	
Mombasa	0.951856	0.930022	0.952587	1

Figure 10: Maize price correlation between selected markets

	Eldoret	*Kisumu*	*Nairobi*	*Mombasa*
Eldoret	1			
Kisumu	0.853154	1		
Nairobi	0.875810	0.853978	1	
Mombasa	0.815614	0.82813	0.904929	1

Figure 11: Beans price correlation between selected markets

	Nairobi	*Eldoret*	*Kisumu*
Nairobi	1		
Eldoret	0.7637310	1	
Kisumu	0.7771097	0.77255	1

Figure 12: Potato price correlation between selected markets

A correlation coefficient of 0.6 is the theoretical threshold that determines a strong price correlation, and hence a relatively good market integration. This means that the Nairobi market is strongly correlated with Eldoret, Kisumu and Mombasa for the cereals (maize) and pulses (beans), as well as for the fresh produce (potatoes) market chains, hence these markets are well integrated. The beans price correlation results agree with the results of a study done by Mayaka (2013)[11]; which measured the extent of dry beans market integration between surplus and deficit markets in Kenya. These markets were, Nairobi, Nakuru, Eldoret and Kitale markets. The bivariate co-integration test used in the study showed that, all markets were co-integrated and thus there was supply of dry beans from surplus markets to deficit markets.

Granger causality test confirmed that five market links (Nairobi-Nakuru, Nairobi-Eldoret, Nakuru Eldoret, Nakuru Kitale and Eldoret-Kitale) exhibited independent causality, revealing that none of the five market links granger caused each other. Though the five market links were found to be independent, it was concluded that under special conditions such as inventory holding, price signals could be instantaneously transmitted from one market to another thus one market would help predict price in the other market leading to granger causality. Nairobi-Kitale market links on the other hand showed bidirectional causality thus their ability to granger cause one another. This implied that, these markets experience shorter response period for shock transmission between them, justifying symmetric price transmission between them (Mayaka, 2013).

According to Mayaka (2013) a supply shock in one region can enhance integration of spatially located markets as shock can be easily transmitted from one market to the other as was the case with Nairobi-Kitale market links thus reducing price spread between the two markets. If smallholders can have information concerning such shocks (price changes in different markets), it can be enable them to access better markets and better prices for their produce. It can also empower them to access better-paying markets thus taking advantage of opportunities that exist in distant dry bean markets.

7.0 Traders' Capacity to Meet Increase in Demand

This section of the report aims to provide an understanding of traders' capacity to meet the increases in demand that are expected to be generated by potential cash interventions without disproportionate increases in prices. Increases in prices due to cash interventions will not only affect the beneficiary caseload, but the entire vulnerable population living within the market catchment areas overlapping with the targeted geographic areas. In a context of general inflation, consumers tend to accumulate; which increases demand and traders tend to hoard, thus decreasing supply. Both behaviors tend to have further inflationary consequences. For

[11] *An assessment of dry beans market integration in selected markets in Kenya, Mayaka V., 2013*

vulnerable food consumers an increase in basic food prices implies both a reduction in food consumption, a reduction in the consumption of other goods, and often a switch to less preferred but less expensive foods. Research indicates however, that a moderate increase in prices is a determinant of traders' willingness and therefore a factor to increase local food supply[12].

7.1 Analysis of Proxy Indicators of Traders' Response Capacity

The following section includes a basic comparison of a set of variables that serve as proxy indicators for traders' response capacity.

Access to Credit

Most of the traders finance their supplies from the sales of commodities to clients. Access to credit is low, only 21 percent of traders in the informal settlements markets have access to some form of credit[13]. See figure 13.

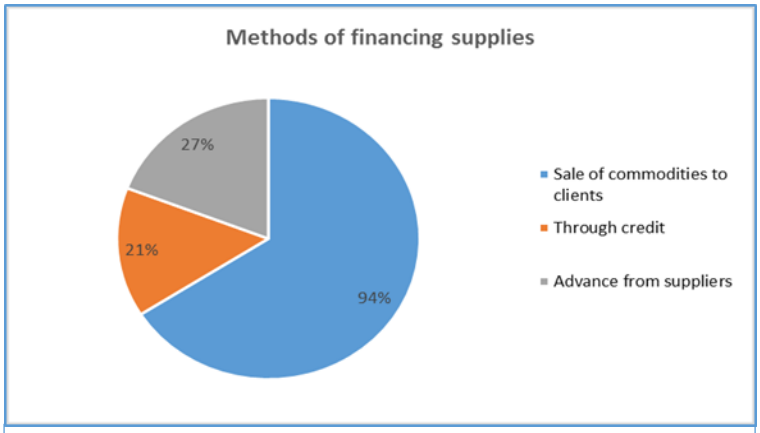

Figure 13: Methods of Supply financing. Source: Traders' Questionnaire

Figure 14 below shows the different types of credit traders regularly use as a percentage of the total number of traders interviewed. The most common source is trader associations and merry go rounds (table banking). There is notable use of banks and Savings and Credit Cooperatives Societies (SACCOs), especially for traders in the processed and staples chains.

[12] *Market analysis to assist selection between response options in conditions of food insecurity, Alessandro De Matteis, 2010*

[13] *Percent in the charts add to more than 100 because traders were allowed to provide multiple answers to the question about modes of transport*

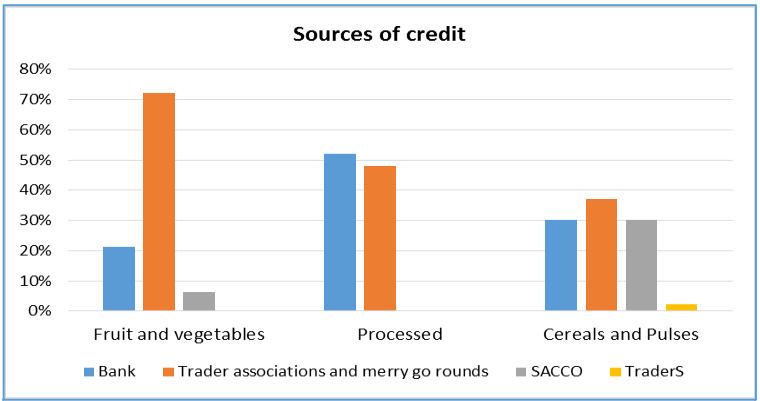

Figure 14: Sources of credit. Source: Trader's Questionnaire

As shown in figure 15 below, the proportion of stock taken on credit by the traders. Overall processed commodities are purchased on credit more than the fruits and vegetables (fruits and vegetables) and staples (cereals and pulses). This is mainly due to the distributor trader arrangements, in which the commodities are advanced by the supplier and trader repays after sales while restocking.

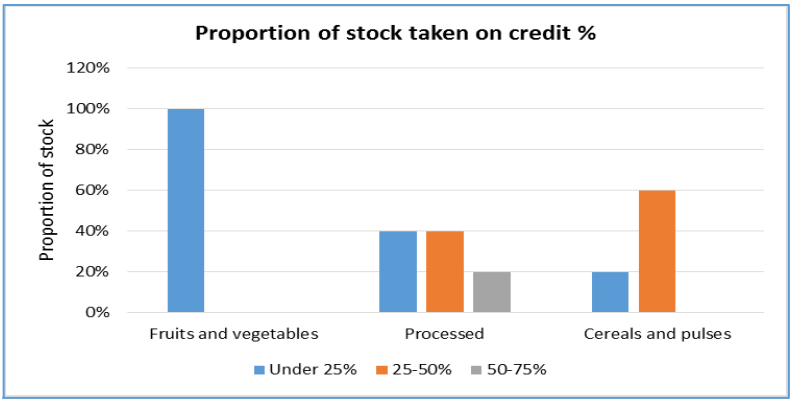

Figure 15: Stock proportion taken on credit. Source: Trader's Questionnaire

Extension of Credit to Customers

Overall seventy-six percent of the interviewed traders extend credit to their customers. The table below shows the proportion of traders by supply chain. On average, Staples and fruits and vegetables traders appear to be the supply chains with the highest proportion of traders selling on credit. This is largely attributed to the nature of customers whereby wholesalers in the larger informal settlements markets (especially Kangemi and Kawangware) also supply other wholesalers within their sub-county and Nairobi County at large. See figure 16.

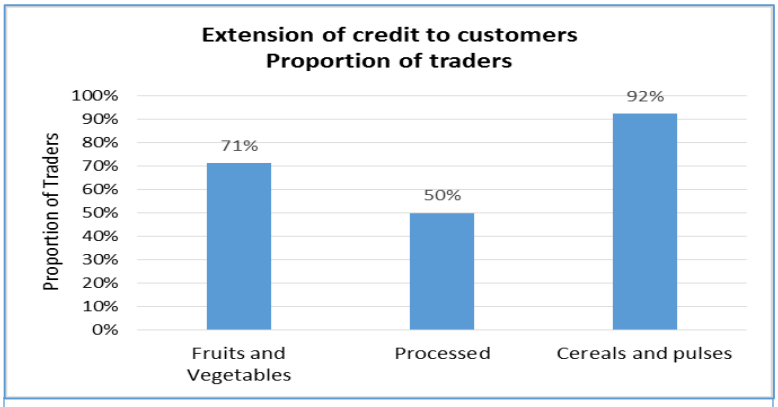

Figure 16: Extension of credit. Source: Trader's Questionnaire

Storage Capacity

The storage capacity of traders was assessed in terms of number of days of supply they can store. As expected, due to the poor storage infrastructure perishable foods are stored for a shorter period than the durable commodities such as cereals, pulses or processed foods. It was noted that processed commodity chain traders have lesser storage space than the cereal and pulses chain traders, this can be partly attributed to the larger volumes that cereal and pulses traders hold at a time; due to the seasonality of supply, there is need for pre-positioning. See figure 17.

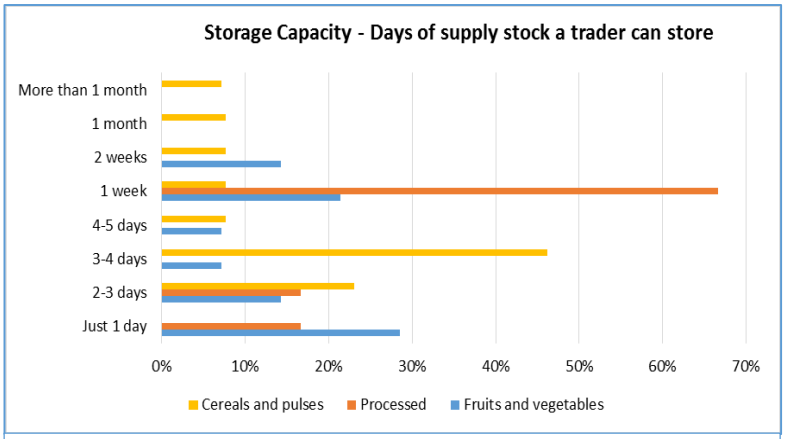

Figure 17: Storage capacity: Source: Trader's Questionnaire

Access to Market Information

Hundred percent of the interviewed traders in the processed and staple foods chain and seventy nine percent in the fruits and vegetables chain mentioned they have access to some form of market information. As shown in figure 18, the types of market information accessible to traders were on: prices, food quality, transport costs and volumes available.

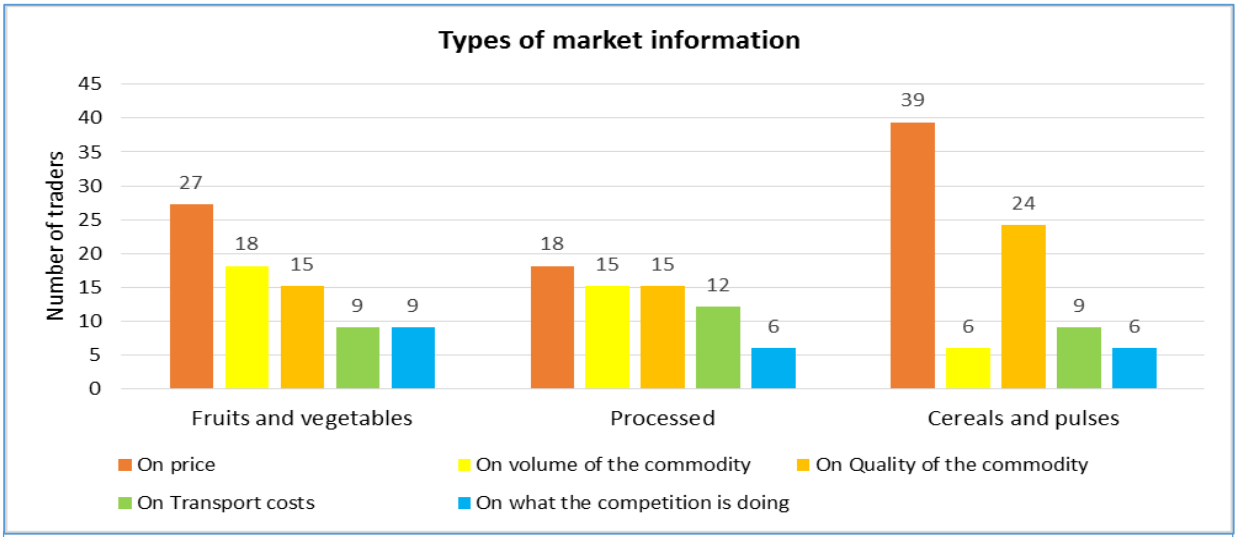

Figure 18: Market information types. Source: Trader's questionnaire

The most important sources of information for traders in the informal settlements markets are suppliers and wholesalers, mobile phone updates, the radio and traders' associations.

Resupply Capacity

As expected, the resupply schedules of perishable products are much more frequent than those of more durable commodities. The majority of the fruits and vegetables traders resupply their stock daily, others once or twice a week. Processed commodities chain traders reported that they are also resupplied daily, once or twice a week. Majority of staples chain traders resupply once a week, or twice a week and up to once a month depending on the storage space. While a frequent resupply schedule is indicative of readiness to increase supplies, it also reveals a poor storage capacity. As mentioned earlier, reportedly some large cereals and beans traders have the capacity to stock supplies in preparation for supply cuts during the rains, which is advantageous in view of the planning of market based interventions. Figure 19 shows the differences in resupply time per market chain.

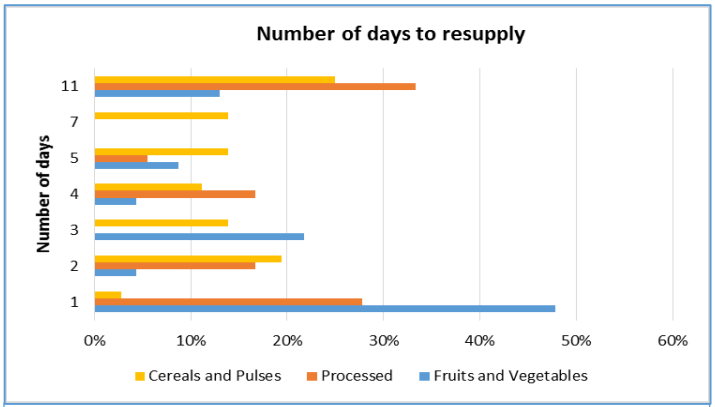

Figure 19: Resupply period. Source: Trader's questionnaire

On average, 84 percent, of the traders mentioned they have an alternate source of supply for their most important commodities. As shown in figure 20 the proportion of traders with alternative sources of supply. The staple commodity chain had the highest proportion of traders with alternative sources of supply. Traders dealing with fruits and vegetables resort to different supply sources during the rainy and the dry seasons. The rest of commodities are, in most of the cases, supplied by the same source throughout the year.

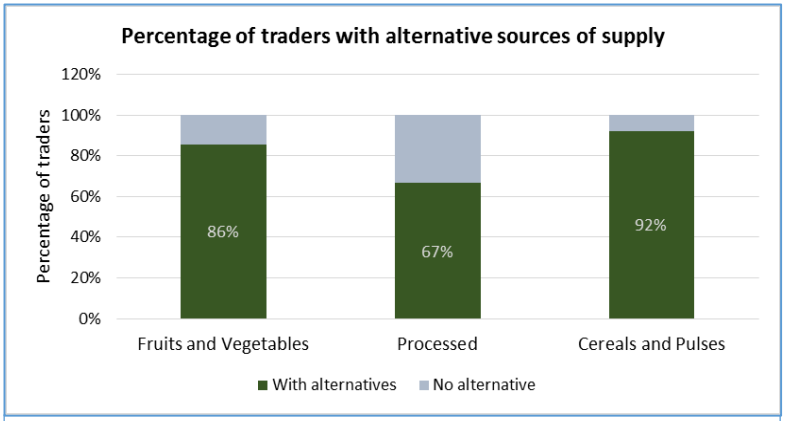

Figure 20: Traders with alternate source. Source: Trader's Questionnaire

Traders reported that the most important factors they take into consideration when deciding which suppliers to use were: Quality, price and timeliness of supply. Other included: distance to the supply markets and availability of transport.

Quality Checks

The large majority of the traders reported they check for quality when procuring food commodities. However these were mostly physical quality checks so the quality measure used were not standard.

7.2 Traders' Own Perceptions

A way of assessing traders' capacity to respond to increased demand is through direct questions on traders' perception on their ability to increase supplies under the existing cost structure and value chain. However, traders' answers may be biased by a number of factors such as the perception of potential business opportunities, or the fear that the information could be used by fiscal authorities or competitors. Researchers have also expressed concerns that traders' confidence in accessing additional commodities may lead to an overestimation of supply expandability[14]. In view of this, the findings on the traders' perceptions of their own response capacity are complemented by the analysis of a number of proxy indicators that influence traders' capacity.

Traders were asked whether they are able to serve an increase in demand under the existing cost structure and value chain. 100 percent of the interviewed traders mentioned they would be able to increase their supplies.

The traders were also asked about how much increase in demand they can absorb using their current supply chain mechanisms. Figure 21 shows the reported proportions of additional demand traders can meet by supply chain. Majority of the traders in the fruits and vegetables and processed commodity chains reported that they can absorb about 70-100 percent demand increase, while majority of traders in the staples chain can absorb 50-70 percent increase in demand.

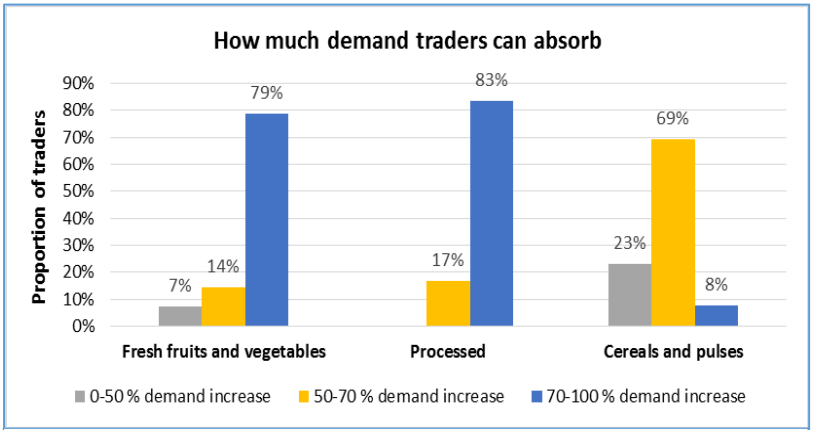

Figure 21: Capacity to absorb demand. Source: Trader's questionnaire

Traders and key informants reported that certain external factors need to be put in place - by the national and county government and other stakeholders - so as to help the traders increase supply if demand increases, the key factors include:

- Improved transport infrastructure from the producing areas of Kenya and within the informal settlements.
- Greater access to credit for traders.
- Improved security on the roads and within the markets.
- Additional market infrastructure is required, complete with storage facilities as well as increased trading space with the formal markets. Standards of hygiene need urgent improvement – especially for fresh produce sections.

[14] *Using food aid to stimulate markets in pastoral areas, market assessment, into the EC Food Facility Programme in Northern Kenya, Alessandro De Matteis, Save the Children, March 2012*

Increasing Supply Capacity

To gauge the time it would take to increase supply, traders were asked about how many days it would take them to increase their supply if demand were to increase by 25% and 50%. Majority

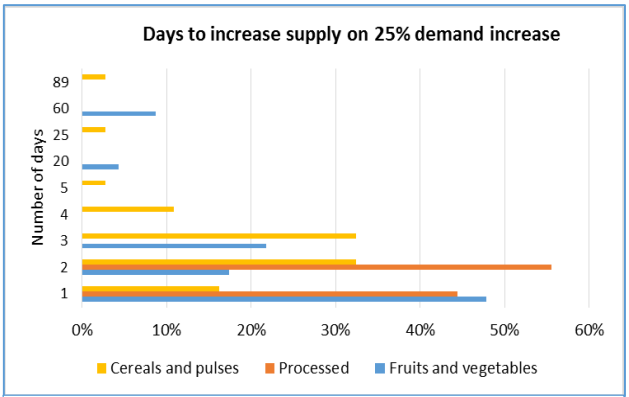

Figure 22: Days to increase supply. Source: Trader's Questionnaire

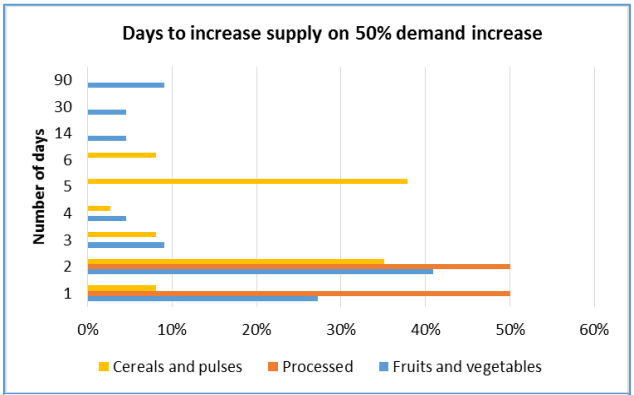

Figure 23: Days to increase supply. Source: Trader's Questionnaire

of the traders in the processed commodities chain said that one to two days would be adequate. Majority of fruits and vegetables and staples traders would take one day to about a week, while few would take up to three months. See figure 22 and 23 above.

7.3 Business Administration Capacity

The following section provides an analysis of the traders' operational capacity in terms of business/trading experience and profit margins.

Length of Time in Business

The number of years the shops have been operating can be an indicator of the strength of the traders' business relationships. On average traders have been in business for about 14 years – operating from the same shop. Fruits and vegetables traders reported the longest average period in business (16 years), while the staple and processed commodity chain trader have had about 14 and 8 years respectively.

Prevailing Monthly Turnover per Trader

Profit margins are an indicator of dominant traders' behavior and hence of the degree of competition in the market. In a low purchasing power area, excessively high margins also reduce the capacity of customers to meet their basic needs.

Traders are usually reluctant to answer questions related to their business costs or profit margins. In order to reduce the sensitivity of the question, traders were asked about their estimated gross turnover for the previous month. **Turnover was used as a proxy indicator of**

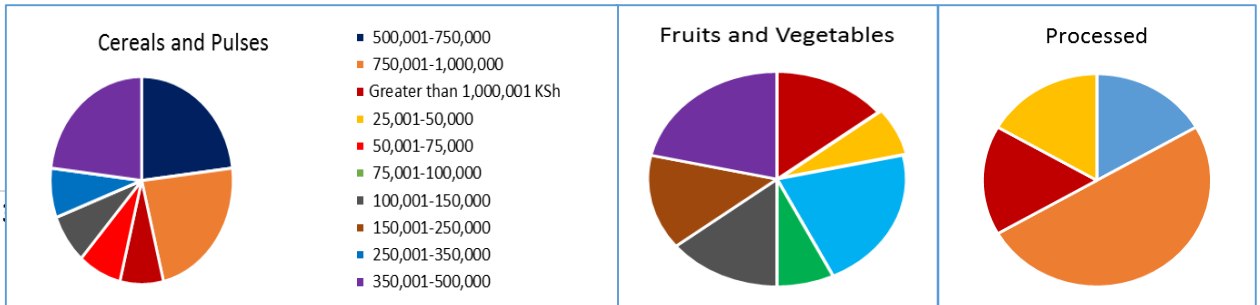

Figure 24: Prevailing monthly turnover per trader. Source: Trader's Questionnaire

the profit margins. Figure 24 illustrates the responses by supply chain. Overall, the highest turnover was recorded by traders dealing with processed food (about 83% of traders reported a turnover of more than half a million Kenya shillings). Even though, some fruits and vegetables chain traders' recorded turnover greater than one million Kenya shillings, this chain also had the lowest turnover, largely attributed to the low volumes handled by its traders.

8.0 Cost-efficiency of Transfer Modalities

This section aims to compare the cost-efficiency of different transfer modalities to the schools, i.e. in-kind vs. cash. Cost efficiency is defined as the relationship between the programme's full costs and its outputs. It refers to an analysis of the costs of alternative transfer modalities in monetary terms, in order to use available resources as efficiently and effectively as possible.

For the in-kind modality the procurement value and logistic costs[15] to transport the commodity to the respective market are considered, while for cash the local average wholesale market price at the time of the survey in the Nairobi is used. The WFP delivery costs were provided by the various WFP Kenya CO units, while the market prices are an average of the data obtained from the informal settlements and hub markets, during the field work. The calculations are shown in **annex IX**.

As per the in-kind procurement modality - during the assessment period (April, 2014) - the following scenario emerges.

- Cereals: 70% internationally procured bulgur wheat; 20% regionally procured maize and 10% locally procured maize
- Pulses: 100% internationally procured yellow split peas
- Vegetable oil: 100% internationally procured
- Salt: 100% locally procured

In this scenario the comparisons are made based on the total food basket and by commodity, see table below.

Food basket per child per day	
Cereals	150 grams
Pulses	40 grams
Vegetable oil	5 grams
Salt	3 grams

Source: WFP Kenya CO

In order to enhance the comparability of results, cost-efficiency calculations were made excluding the operational costs from both the in-kind and the cash components. It is therefore recommended to integrate additional cost estimates when available and then conduct a more comprehensive analysis.

[15] *The logistics costs are composed of transport, storage and handling, quality control and salaries for logistics staff.*

Figure 25 illustrates the cost-efficiency calculations results by commodity and for the total food basket[16].

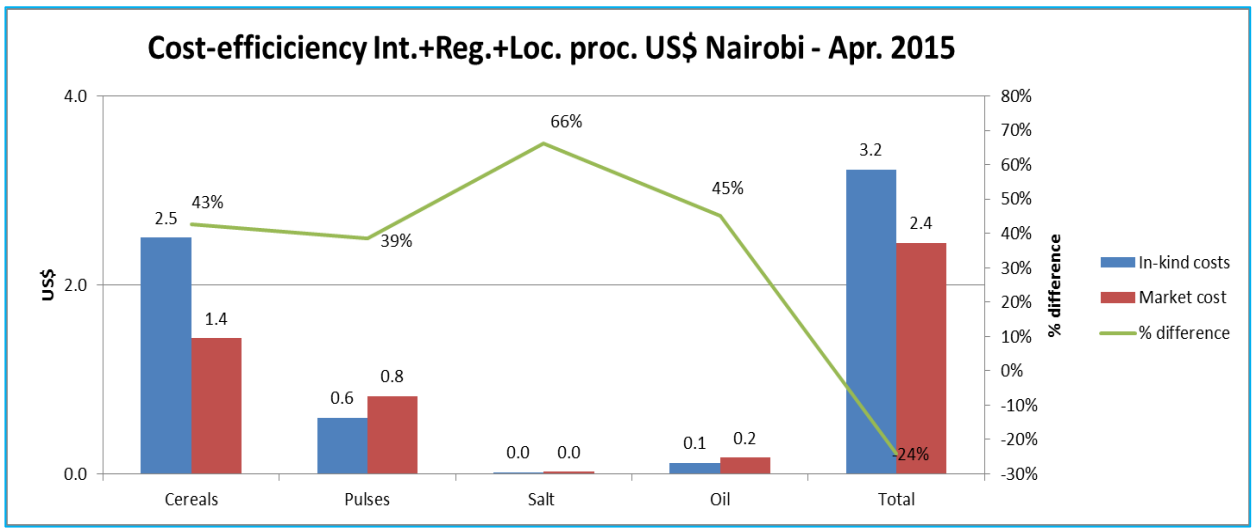

Figure 25: Cost efficiency in-kind vs. C&V. Source: Own calculations from Trader survey and MoALF and WFP data

As per the above procurement arrangement, the WFP in-kind costs for the full basket were **higher** than the market costs by **24** percent. The result is an indication that it would be cost effective for schools to purchase from the local markets as compared to WFP purchasing, handling and delivering to the schools. However, the in-kind and market costs are expected to periodically change, because of seasonal price variations, as well as different procurement arrangements[17].

[16] *Delivery cost: procurement and logistics costs for WFP to deliver food to the informal settlements schools. Market costs: cost in the local markets of the equivalent commodities.*

[17] *Procurement arrangements may change from season to season or from school term to another; depending on food availability and resource flow.*

9.0 Food Basket Options

The current food basket made of in-kind food meets one third of the child's kilocalorie needs and provides approximately 700kcal/day. Using market data from April 2015, an analysis of the current basket (Basket 1) was conducted and found that the following ration would cost **8.92 KES/child/day** if locally procured. The basket, while meeting macronutrients, is lacking in micronutrients.

Basket 1: Based on current (in-kind) food basket				Energy
Type	**COMMODITY**	**Serving (g)**	**Price (KSH)**	kcal
Starch	Dry Maize	150	5.25	548
Pulses	Beans Rosecoco	40	3.02	133
Salt	Salt	3	0.08	-
Fat	Vegetable oil	5	0.57	44
		TOTAL	**8.92**	**725**
			Percent of kcal needs met	**30%**

Baskets 2 and 3 provide the option of adding fresh foods of either a fruit or vegetable in portion sizes recommended by the Kenya National Guideline for Healthy Diets and Physical Activity. These baskets provide the opportunity to diversify the meal with at least 4 food groups. However further consideration is needed for serving sizes, food safety, and frequency of delivery and storage capacity. Seasonal fluctuations and market prices would as well be a consideration. This option meets 100% of 2-3 micronutrients.

Basket 2: Current basket + Vegetable				Energy
Type	**COMMODITY**	**Serving (g)**	**Price (KSH)**	kcal
Starch	Dry Maize	150	5.25	548
Pulses	Beans Rosecoco	40	3.02	133
Vegetable	Cabbages	70	1.61	25
Salt	Salt	3	0.08	-
Fat	Vegetable oil	5	0.57	44
		TOTAL	**10.53**	**750**
			Percent of kcal needs met	**31%**

Basket 3: Current basket + Fruit				Energy
Type	**COMMODITY**	**Serving (g)**	**Price (KSH)**	kcal
Starch	Dry Maize	150	5.25	548
Pulses	Beans Rosecoco	40.00	3.02	133
Fruit	Avocado	75	2.02	120
Salt	Salt	3	0.08	-
Fat	Vegetable oil	5	0.57	44
		TOTAL	**10.94**	**845**
			Percent of kcal needs met	**35%**

Basket 4 provides the costing analysis should a school choose at point fortification with micronutrient powders to meet the gap of fortified commodities, which are poorly consumed by populations in informal settlements. This option meets 100% of 10 micronutrients at a cost of only 10ksh/child/day price point.

Basket 4: Maize + MNP				Energy
Type	**COMMODITY**	**Serving (g)**	**Price (KSH)**	kcal
Starch	Dry Maize	150	5.25	548
Pulses	Beans Rosecoco	40	3.02	133
MNP	MNP	0.4	1.14	0
Salt	Salt	3	0.08	-
Fat	Vegetable oil	5	0.57	44
		TOTAL	**10.05**	**725**
			Percent of kcal needs met	**30%**

The above baskets provide an opportunity to enhance school meals through the cash based modality. However, schools require necessary national guidelines and policy on the minimum ration composition and nutritional requirements to empower schools to make the most economical and nutritionally dense choices for students.

10. Conclusions

The markets in Nairobi County informal settlements markets are well structured. There are enough actors across the value chain to ensure a consistent supply of food commodities year round. No major barriers to entry were noted in the staples and processed commodity supply chains. The fresh produce market structure has a number of intermediaries; there are no barriers to entry at the farm gate level or assembly point. However, there are barriers to entry at the urban market centers, where cartels of brokers provide the link between wholesalers and retailers. Poor road infrastructure introduces additional transaction costs. These factors unnecessarily cause price spikes for a majority of the fresh produce and may occasionally make these produce inaccessible (unaffordable) to the Nairobi informal settlements schools - owing to the limited budgetary allocation.

The markets are well integrated with other markets in the producing areas and across the borders; mainly due to a good transport infrastructure. There is thus flow of food commodities – through trade - from the surplus-producing areas and other supply sources such as other countries – especially Tanzania and Uganda - through cross-border trade. Prices correlation and co-integration analysis showed that the Nairobi market is strongly correlated and co-integrated with other markets such as Nakuru, Eldoret, Mombasa, Kitale and Kisumu. Granger causality tests also revealed that price shocks (changes) are transmitted from some markets to others. Supply shock in one region can enhance integration of spatially located markets, as shock can be easily transmitted from one market to the other thus **reducing price spread between the two markets**. If smallholders can have information concerning such shocks (price changes in

different markets), it can be enable them to access better markets and better prices for their produce. It can also empower them to access better-paying markets thus taking advantage of opportunities that exist in distant markets. This will mean more suppliers to those distant markets (in this case Nairobi markets) and thus ensuring consistent flow (supply) of food commodities year round, so the Nairobi schools would not encounter food availability problems.

The conduct of the markets generally displayed competitive behavior, prices are set by negotiations except in the fresh fruits and vegetable market chain where in many cases, brokers and transporters determine the market price for each fresh produce consignment delivered, accounting for the purchase price, cost of assembly and transportation costs, and thus to some extent hold the market power. This cartel-like behavior most of the times leads to unfair competition and may unnecessarily increase prices of fresh produce, thus making them inaccessible (budget wise) to Nairobi informal schools – this increases the basket cost and consequently the transfer value.

As at the time of the study, food commodity prices were within the normal seasonal trend, however, these commodities seasonally fluctuate depending on production cycles. An annual price seasonality analysis – for Nairobi markets - indicated that prices for maize are normally at the highest starting May to July, while the lowest prices are recorded in February to March and September to October, following the harvests from the Western, rift valley, central and eastern Kenya regions. Beans prices are normally high starting March to May and lowest price is in February following the harvests in the rift valley region and in July after harvest in the central Kenya region. As for vegetables and fruits, cabbage prices in Nairobi show a seasonal low in December and a seasonal high in April. Potato prices show seasonal lows in July/August and highs in April. Oranges show a low in July and high in September. Onions show a low in September and a high in May. These seasonal lows are mostly influenced by high availability.

For the Nairobi schools, the choice to purchase a particular food commodity will most likely be influenced by the period of price seasonal lows. However, atypical (non-seasonal) price spikes (high increase) will lead to a rise in the schools' food basket cost, necessitating an upward adjustment of the transfer value.

Majority of the interviewed traders have adequate capacity to supply the Nairobi informal settlements schools. 100 percent of the interviewed traders mentioned they would be able to increase their supplies under their existing cost and structure. They also reported that they have capacity to expand their business – especially with greater access to credit, good transport and market infrastructure and proper security.

Cost efficiencies for cash –vs. in-kind transfer modalities: Cost-efficiency is defined in this study the relationship between the programme's full costs and its outputs. The procurement arrangements during the period of assessment (April, 2014) was as outlined below.

- Cereals: 70% internationally procured bulgur wheat; 20% regionally procured maize and 10% locally procured maize

- Pulses: 100% internationally procured yellow split peas
- Vegetable oil: 100% internationally procured
- Salt: 100% locally procured

As per the above procurement arrangement, the WFP in-kind costs for the full basket were **higher** than the market costs by **24** percent. The result is an indication that it would be cost effective for schools to purchase from the local markets as compared to WFP purchasing, handling and delivering to the schools. However, the in-kind and market costs are expected to periodically change, because of seasonal price variations, as well as different procurement arrangements[18].

11. Recommendations

The current food basket made of in-kind food meets one third of the child's kilocalorie needs and provides approximately 700kcal/day. Using market data from April 2015, an analysis of the current basket was conducted and found that the ration would cost **8.92 KES/child/day** if locally procured. The basket, while meeting macronutrients, is lacking in micronutrients. Other food basket options – with fresh foods included - were also analyzed and presented for consideration - during implementation - as outlined in section 9.0 of the report.

A pilot utilizing fresh foods would provide valuable insight on the opportunity to diversify school children's diets. Documented lessons around serving sizes, food safety, frequency of delivery and storage capacity could help inform GOK policies for inclusion of fresh foods for schools.

The choice of a particular fruit or vegetable will need to change depending on availability and times of seasonal price lows. School level storage and handling arrangements – especially hygiene standards – will also be key in determining the type of fresh produce to purchase.

Atypical (non-seasonal) price spikes (high increase) may lead to a rise in the schools' food basket cost, necessitating an upward adjustment of the transfer value. The frequency of revision should take into consideration these seasonal and non-seasonal price increases.

It is recommended that both in-kind and cash ODOC cost estimates - when available – be integrated and then conduct a more comprehensive cost-efficiency analysis. That would provide a more accurate picture of the comparative costs of running the programme.

Government price data collection was discontinued in the informal settlements markets, due to budgetary constraints. It is hence recommended to continue advocating for the resumption of this service of price monitoring in the key informal settlements markets. More specifically, the

[18] *Procurement arrangements may change from season to season or from school term to another; depending on food availability and resource flow.*

market information system (MIS), currently under development by the Ministry of Agriculture with financial support from WFP, should meet the price information requirements of the HGSMP, i.e. uninterrupted collection of wholesale prices for the main commodities in the key resupply markets and the informal settlements markets within Nairobi County.

Traders and key informants reported that certain external factors need to be put in place - by the national and county government and other stakeholders - so as to help the traders increase supply if demand increases, the key factors include:

- Improved transport infrastructure from the producing areas of Kenya and within the informal settlements,
- Greater access to credit for traders,
- Improved security on the roads and within the markets and,
- Additional market infrastructure complete with storage facilities as well as increased trading space with the formal markets. Standards of hygiene need urgent improvement; especially for fresh produce sections.

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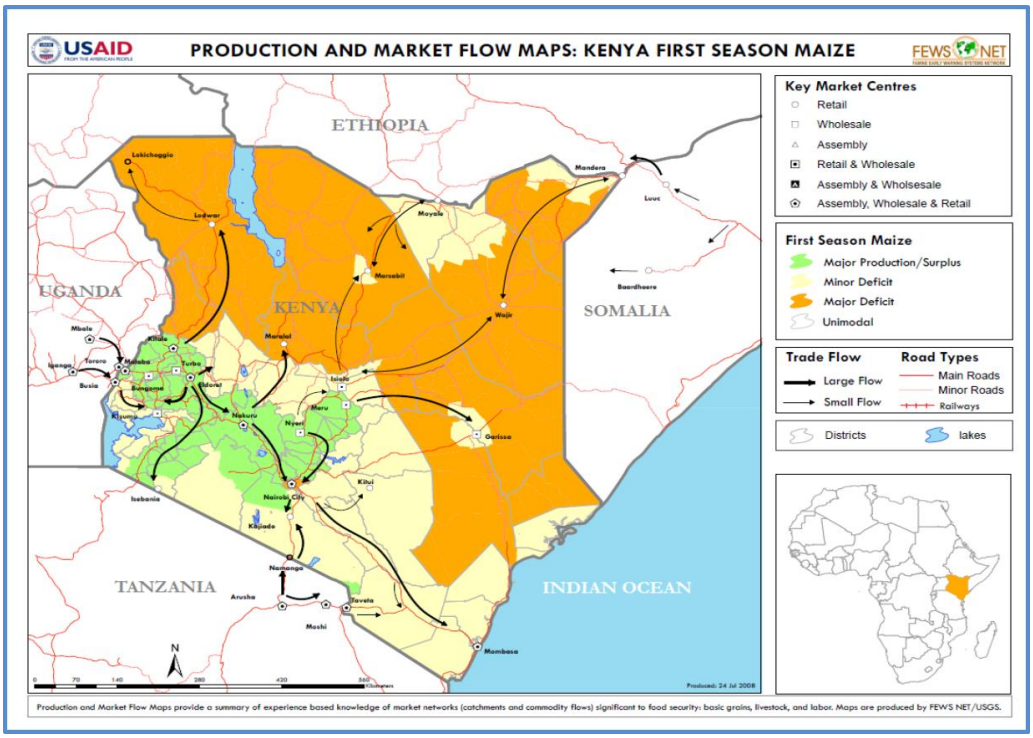
Annexes

Annex I: Main harvesting seasons in the Greater Horn of Africa (GHA) region

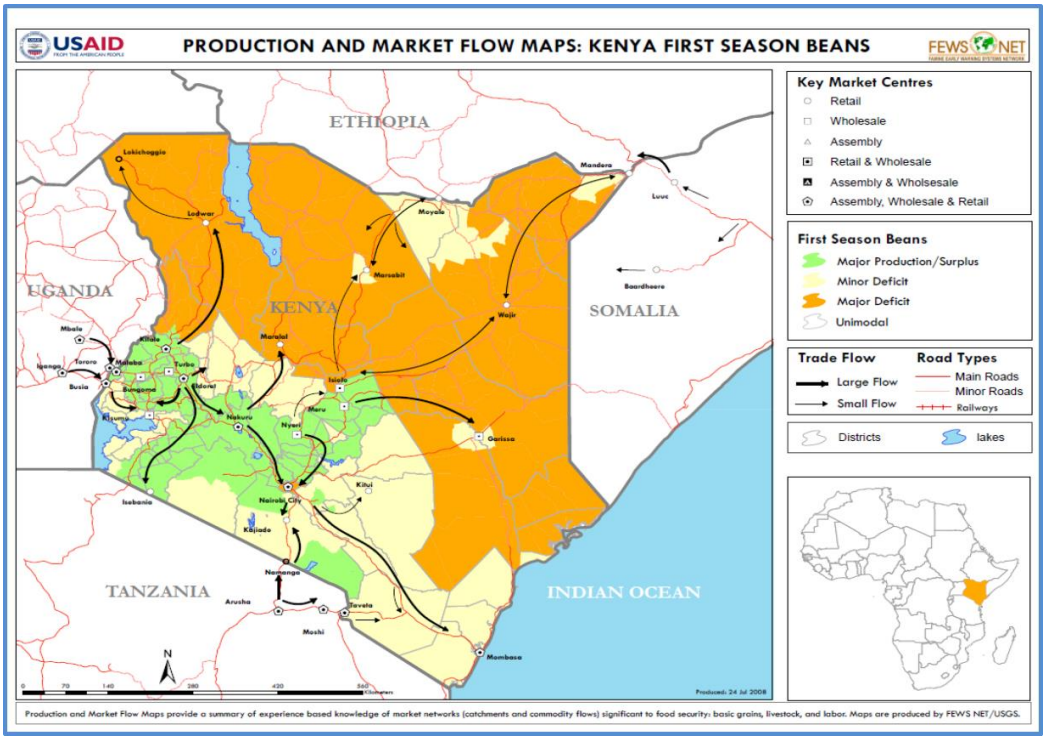
Country/Seasons	Harvesting Period											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kenya												
Long rains (main season)									■	■	■	■
Short rains (minor season)			■									
Uganda												
Long rains (main season)								■	■	■		
Short rains (minor season)			■									■
Tanzania												
Main season (msimu and masika)						■	■	■	■	■		
Minor season (vuli)			■	■								
Ethiopia												
Main season (meher)										■	■	■
Minor season (belg)						■	■					
Somalia												
Main season (gu)								■	■			
Minor season (deyr)			■									
Eritrea												
Main season (kremti)												■
Minor season (bahri)			■	■								
Djibouti												
Long rains (karan)								■	■			
Short rains (heys)												
Rwanda												
Long rains (Season B)						■	■	■				
Short rains (Season A)												■
South Sudan												
Long rains (main season)									■	■	■	
Short rains (minor season)	■	■										■

Main harvesting seasons in the GHA. Source: FEWSNET – Awuor T. (2007)

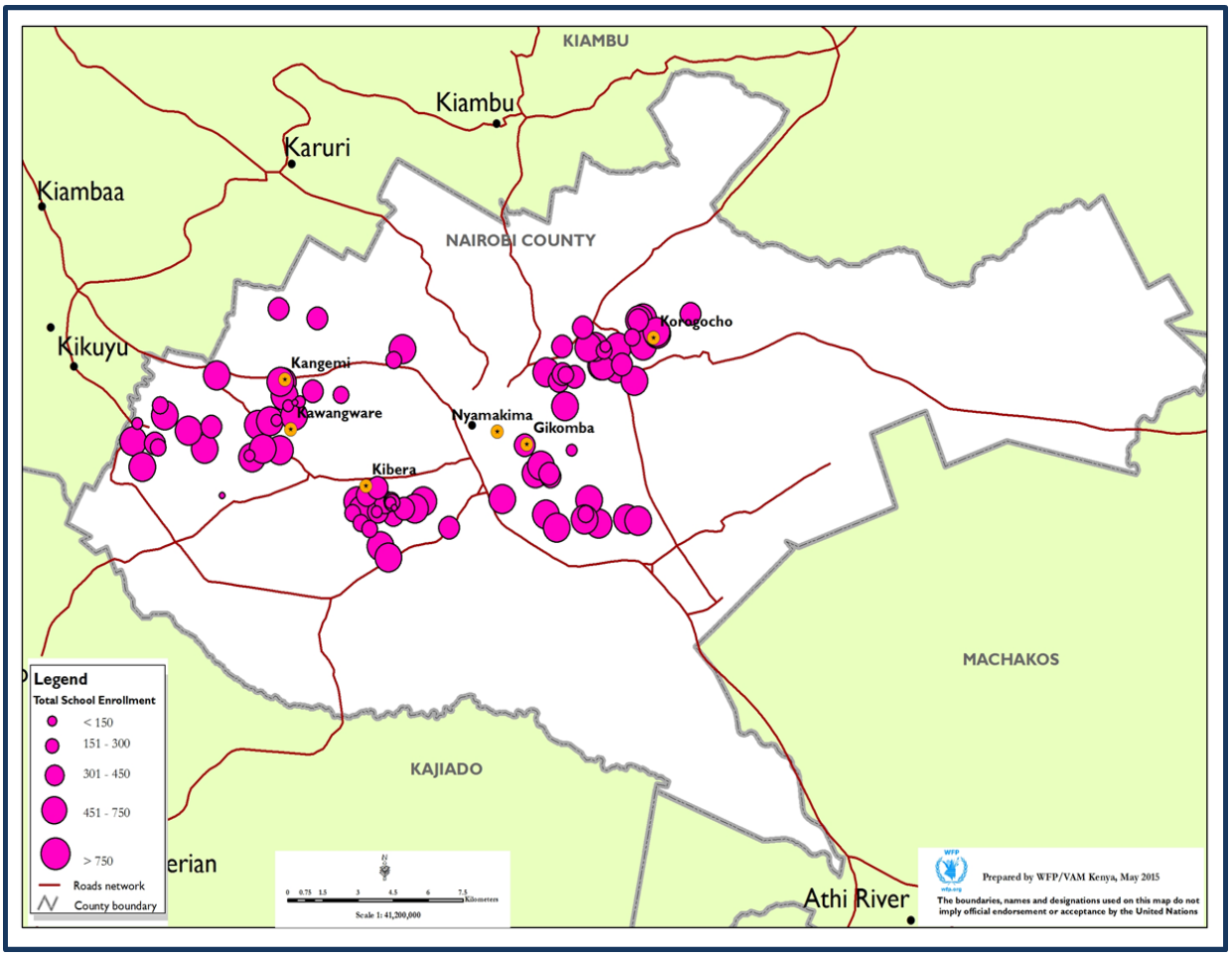
Annex II: Maize production and market flow map



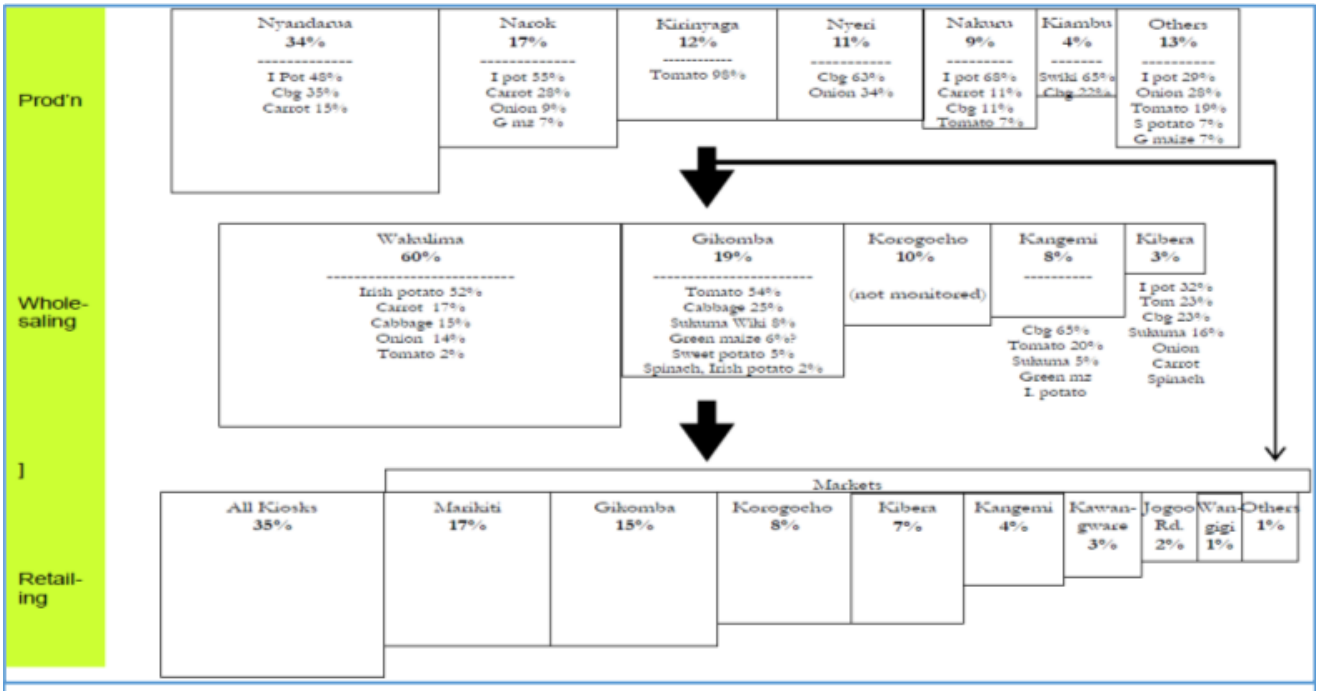
Annex III: Beans production and market flow map



Annex IV: Nairobi County map – administrative boundaries, schools and markets

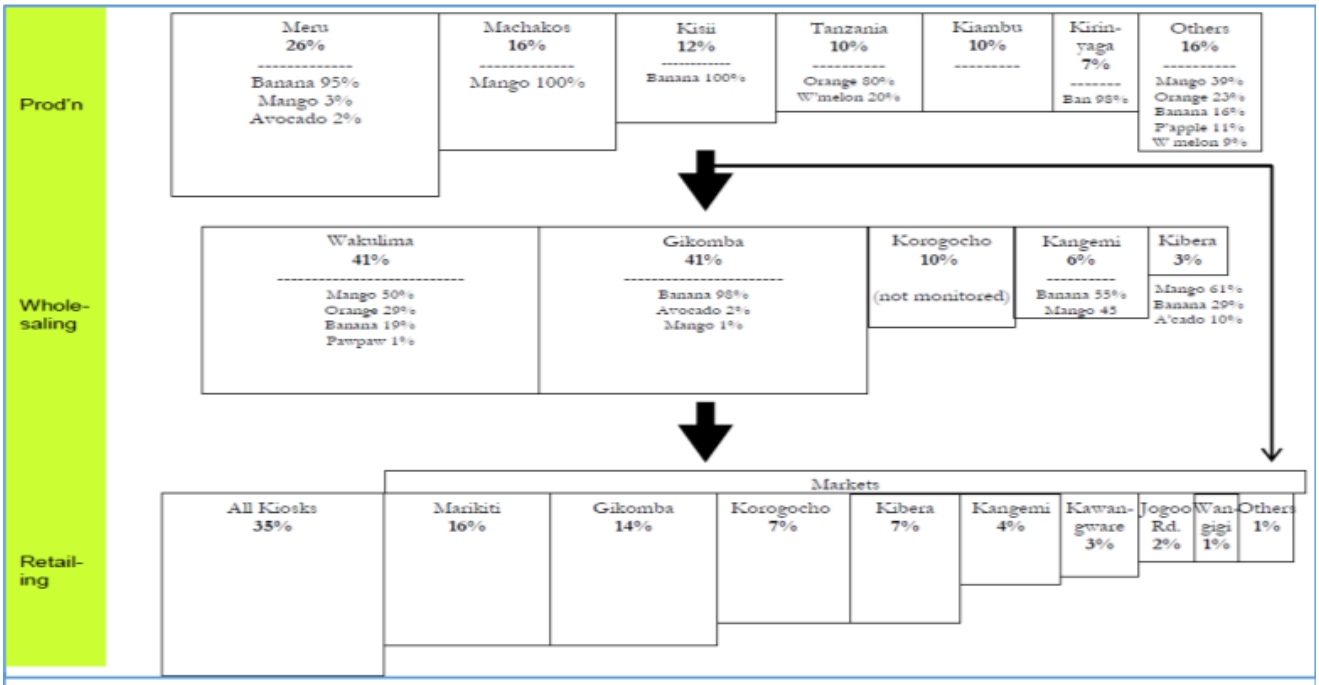


Annex V: Structure of fresh vegetable production and marketing in Nairobi County



Structure of fresh vegetables production and marketing into Nairobi County. Source: Tegemeo Insitute working paper (2009)

Annex VI: Structure of fresh fruits production and marketing in Nairobi County



Structure of fresh fruits production and marketing into Nairobi County. Source: Tegemeo Insitute working paper (2009)

Annex VII: Calculation of the Seasonal Indices

Seasonal Indices (SI)

First, a seasonal index for each month in a time series (2006-2015) was calculated using the 12-month centered moving average approach:

(1) $$SItm = Ptm/CMAtm,$$

Where SItm is the Seasonal Index for month m during year t, Ptm is the price during month m of year t, and CMAtm is the 12 month cantered moving average of Ptm. Because the CMA term "uses up" the first and last six months of a time series, this procedure generates an index for all but the first and last six months. In this case of 113 months of price data, we generated 101 seasonal index numbers.

As can be seen in equation (1), SItm (i.e., the seasonal index for a specific month during a specific year) shows by what percentage the price for that month lied above or below the prices of the surrounding 12 months. For example, an SI of 1.2 during February 1998 indicates that the price that month was 20% above the average price over the surrounding 12 months[19]. In similar fashion, an SI of, say, 0.87 during June of the same year indicates that, during that year, the price in June was 13% (1.00-0.87) below the average price over the surrounding 12 months.

Grand Seasonal Index (GSI)

To obtain a measure of the amount by which a given month "typically" lied above or below its surrounding prices during a specific time period, we calculate the average over our whole time period (2006-2015) of the SI for each month:

(2) $$SI_m = \sum_{i=1}^{n} SI_{tm} / n$$

Where n is the number of years in the time series. This operation gives us a single value for each month of the year, reflecting the average amount by which prices during any given month lied above or below their surrounding prices. This is our measure of seasonality; when portrayed in a graph, these twelve values provide a useful visual summary of typical seasonal patterns, and are often referred to as the Grand Seasonal Index (GSI).

A final step is to calculate the standard deviation of each monthly value in the GSI (SDm). Examining SDm in addition to each GSI value is important to indicate how reliable a given GSI value is. A typical pattern found in agricultural price data is that standard deviations and GSI values during the harvest seasons are both low, while the each tends to be high during the pre-

[19] *Because a 12 month CMA is based on an even number which includes the current month, the actual calculation of CMAt uses the preceding and following five months, plus the current month (for a total of 11), then weights the sixth preceding month and the sixth succeeding month by one-half. Most common statistical packages such as SPSS will calculate such a CMA automatically.*

harvest season. These patterns indicate that prices reliably reach seasonal lows during one or two months of the harvest, then rise over the course of the year prior to the next harvest, but that the exact timing and level of the seasonal high is less predictable than the timing and level of the seasonal low.

Without imposing formal statistical tests, a common rule of thumb in interpreting GSI values is to conclude that a fairly robust seasonal high is reached whenever (SIm-SDm) ≥1.0 (in other words, whenever the GSI value is at least one standard deviation above a value of 1.0), and that a robust seasonal low is reached whenever (SIm+SDm) ≤1 (the GSI values is at least one standard deviation below a value of 1.0).

Annex VIII: Summary statistics for wholesale price seasonality of seven FFV crops in Nairobi

	Nairobi	
	Seasonal Low	Seasonal High
Bananas		
Month	June/Sep	Feb/Mar/Nov
Level	0.95	1.04
% change		9%
Kales		
Month	Dec	March
Level	0.81	1.47
% change		81%
Onions		
Month	Sep	May
Level	0.77	1.44
% change		87%
Tomatoes		
Month	Sep/Oct	May
Level	0.74	1.32
% change		78%
Cabbages		
Month	Dec	Apr
Level	0.77	1.20
% change		56%
Oranges		
Month	July	Sept
Level	0.83	1.12
% change		35%
Potatoes		
Month	Aug	May
Level	0.77	1.28
% change		66%

Source: Mathenge and Tschirley, Tegemeo Institute, 2006

Annex IX: Cost Efficiency Calculations

		USD/mt
Internationally procured cereals (bulgur wheat)	**Costs and Services**	**Nairobi**
	Bulgur wheat (US in kind)	550.00
	Shipping	175.00
	Mombasa Port costs	30.00
	Primary Transport	30.95
	Secondary Transport from EDP to FDPs	8.13
	EDP Management	11.67
	Distribution costs-LTSH	2.14
	Distribution costs-ODOC	
	ODOC costs - Other	
	TOTAL DOC rate/mt (USD)	**807.89**
	Cost of 90kg bag (USD)	72.71
	DSC - 20%	14.54
	Total Food Basket cost per 90 kg bag (USD)	**87.25**
C&V cost	Current market price per 90 Kg bag (Ksh)	3151.43
	Current market price per Kg (USD)	34.14
	C&V related costs	0.00
	DSC - 20%	6.83
	Total food basket cost per 90 Kg bag (local purchase in USD)	**40.97**
% difference (minus indicates higher cost of in-kind)		**-53.04%**

		USD/mt
Regional procured maize - ex Tanzania	**Costs and Services**	**Nairobi**
	Cost (food + Overland transport + Q & Q Reg/Loc procured)	250.70
	Nairobi Transhipment costs	13.31
	Primary Transport	8.45
	Secondary Transport from EDP to FDPs	8.13
	EDP Management	11.67
	Distribution costs-LTSH	2.14
	Distribution costs-ODOC	
	ODOC costs - Other	
	TOTAL DOC rate/mt (USD)	**294.40**
	Cost of 90kg bag (USD)	26.50
	DSC - 20%	5.30
	Total Food Basket cost per 90 kg bag (USD)	**31.79**
C&V cost	Current market price per 90 Kg bag (Ksh)	3151.43
	Current market price per Kg (USD)	34.14
	C&V related costs	0.00
	DSC - 20%	6.83
	Total food basket cost per 90 Kg bag (local purchase in USD)	**40.97**
% difference (minus indicates higher cost of in-kind)		**28.86%**

		USD/mt
Locally procured maize - Eldoret	**Costs and Services**	**Nairobi**
	Cost (food + Q & Q locally procured)	307.80
	Eldoret Transhipment costs	12.21
	Primary Transport	28.17
	Secondary Transport from EDP to FDPs	8.13
	EDP Management	11.67
	Distribution costs-LTSH	2.14
	Distribution costs-ODOC	
	ODOC costs - Other	
	TOTAL DOC rate/mt (USD)	**370.12**
	Cost of 90kg bag (USD)	33.31
	DSC - 20%	6.66
	Total Food Basket cost per 90 kg bag (USD)	**39.97**
C&V cost	Current market price per 90 Kg bag (Ksh)	3151.43
	Current market price per Kg (USD)	34.14
	C&V related costs	0.00
	DSC - 20%	6.83
	Total food basket cost per 90 Kg bag (local purchase in USD)	**40.97**
% difference (minus indicates higher cost of in-kind)		**2.50%**

		USD/mt
Internationally procured pulses (yellow split peas)	**Costs and Services**	**Nairobi**
	Yellow Split Peas (US in kind)	437.00
	Shipping	70.00
	Mombasa Port costs	30.00
	Primary Transport	30.95
	Secondary Transport from EDP to FDPs	8.13
	EDP Management	11.67
	Distribution costs-LTSH	2.14
	Distribution costs-ODOC	
	ODOC costs - Other	
	TOTAL DOC rate/mt (USD)	**589.89**
	Cost of 90kg bag (USD)	53.09
	DSC - 20%	10.62
	Total Food Basket cost per 90 kg bag (USD)	**63.71**
C&V cost	Current market price per 90 Kg bag (Ksh)	6797.14
	Current market price per 90 Kg bag (USD)	73.64
	C&V related costs	0.00
	DSC - 20%	14.73
	Total food basket cost per 90 Kg bag (local purchase in USD)	**88.37**
% difference (minus indicates higher cost of in-kind)		**38.71%**

		USD/mt
	Costs and Services	**Nairobi**
Internationally procured oil	Oil (internationally procured)	775.00
	Shipping	64.00
	Mombasa Port costs	30.00
	Primary Transport	34.55
	Secondary Transport from EDP to FDPs	8.13
	EDP Management	11.67
	Distribution costs-LTSH	2.14
	Distribution costs-ODOC	
	ODOC costs - Other	
	TOTAL DOC rate/mt (USD)	**925.49**
	Cost of 20kg Jerrican (USD)	18.51
	DSC - 20%	3.70
	Total Food Basket cost per 20 kg Jerrican (	**22.21**
C&V cost	Current market price per 20 LT (Ksh)	2,280.00
	Current market price per 20 Lt (USD)	24.70
	C&V related costs	-
	DSC - 20%	4.94
	Total food basket cost per 20 Lt (local purch	29.64
	Total food basket cost per 20 Lt (local purc	**32.22**
% difference (minus indicates higher cost of in-kind)		**45.06%**

		USD/mt
	Costs and Services	**Nairobi**
Locally procured salt	Cost (food + Q & Q locally procured)	110.00
	Port costs	-
	Primary Transport	30.95
	Secondary Transport from EDP to FDPs	8.13
	EDP Management	11.67
	Distribution costs-LTSH	2.14
	Distribution costs-ODOC	
	ODOC costs - Other	
	TOTAL DOC rate/mt (USD)	**162.89**
	Cost of 20 kg bale (USD)	3.26
	DSC - 20%	0.65
	Total Food Basket cost per 20 kg bale (USD)	**3.91**
C&V cost	Current market price per 20 Kg bale (Ksh)	500.00
	Current market price per 20 Kg bale (USD)	5.42
	C&V related costs	0.00
	DSC - 20%	1.08
	Total food basket cost per 20 Kg bale (local purchase in US	**6.50**
% difference (minus indicates higher cost of in-kind)		**66.28%**