FACTORs INFLUENCING IMPLEMENTATION OF PUBLIC HEALTH STANDARDS IN SELECTED CITY COUNCIL MARKETS IN NAIROBI, KENYA.

By

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NOVEMBER 2007

Kirimi, Florence
Factors influencing implementation of
DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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To my late father John Kirimi, my beloved mother Carolyne Kirimi, sisters Fridah and Fides Kirimi, for their encouragement and support throughout my studies.
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<td>Central Business District</td>
</tr>
<tr>
<td>CCN</td>
<td>City Council of Nairobi</td>
</tr>
<tr>
<td>EMCA</td>
<td>Environmental Management and Coordination Act</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<tr>
<td>HCP</td>
<td>Healthy Cities Program</td>
</tr>
<tr>
<td>IPAR</td>
<td>Institute of Policy Analysis and Research</td>
</tr>
<tr>
<td>Ksh</td>
<td>Kenya Shillings</td>
</tr>
<tr>
<td>MOH</td>
<td>Ministry of Health</td>
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<td>NEMA</td>
<td>National Environment Management Authority</td>
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ABSTRACT

Public Health involves the organized efforts by societies to protect, restore and promote the health of the population. Public health programs and activities focus on the prevention of disease and enhancement of health. They are directed towards the population as a whole rather than individuals. Creation of healthy market places is part of the Healthy Cities Programs (HCP) strategy developed by World Health Organization. This approach aims to create environments that are supportive to good health. However, many market places set a poor example. Most of the Nairobi City Council markets have questionable public health standards but little is known about the factors leading to such state of affairs. No remedial measures can be taken if such conditions are not identified, hence the need to carry out this study. The purpose of the study was to find out the factors influencing implementation of public health standards in Nairobi City Council markets. The markets were conveniently selected due to their location. The study employed a descriptive survey research design because it allowed for extensive data collection on a large population within a short period of time. The study population consisted of three hundred customers, one hundred food vendors, six market administrators, four public health officers and two senior staff from the department of social services and housing. Pre-tested questionnaires and interview schedules were used for data collection, while observations were used as illustrations to major findings. Data was analyzed using Statistical Package for Social Sciences (SPSS) software. Majority of the food vendors (66%) were aware of the requirements of the public health act. A significant number of vendors (63%) underwent a medical check up in line with section 135 of the public health act. There was no significant association between medical examination and duration of operation in the market ($\chi^2=2.384; \text{df}=4; p>0.05$). Nuisance is prohibited in section 115 of the Act. Never the less, both customers and vendors acknowledged presence of nuisance in the market which included poor waste disposal, presence of pests, poor sanitary conditions and foul smell. Public health officers’ visits to the markets are paramount to ensure public health requirements are maintained, in line with section 123 of the Act. However, the study revealed that the officers lacked official transport arrangements and security details, unless there was a disease outbreak or when conducting arrests. Five out of the six market administrators noted that inadequate finances posed a major challenge in implementation of public health standards, since all the money collected from the markets was submitted to the City Treasury. Decentralization of funds generated from the markets is thus recommended. These funds can then be re-invested in maintenance, expansion and offering better services within the markets. The results of this work could be useful to the city council of Nairobi in ensuring that public health standards are observed in the markets.
CHAPTER ONE: INTRODUCTION

1.1 General Introduction

Public health as a field of study has its chief concern on the health needs of populations. Public health concerns have developed in different ways, reflecting the social pressures and influences of the day. A few centuries ago, public health mainly dealt with health problems related to influences of the day (Wilner et al., 1980). The American heritage dictionary defines public health as the science of protecting and improving the health of a community as by preventive medicine, health education, application of sanitary measures and monitoring of environmental hazards (American heritage dictionary, 2004). Public health entails organized efforts by societies to protect, promote and restore people’s health. It is the combination of sciences, skills and beliefs that are directed to the maintenance and improvement of health through collective or social actions. Public health programs and services emphasize the prevention of disease and the health needs of the population as a whole (The McGraw-Hill Professional, 2005). The mission of public health is to fulfill society’s interest in assuring conditions in which people can be healthy (MedicineNet, 2007).

A majority of the world’s population live in urban areas (WHO, 2006). This is the result of rapid growth of cities and peri-urban areas over the past few decades, particularly in developing countries. Problems in many urban cities are aggravated because urban growth is often unplanned, uncontrolled and under financed (Ibid). This has overwhelmed the capacity of many municipal authorities to provide basic health and environmental services and infrastructure, which are minimum prerequisites for a healthy population. In view of
the increasing urbanization and deteriorating physical and social environments, World Health Organization developed the concept of Healthy Cities in 1986 as a vital tool for assuring that health is explicitly considered in urban management and development planning, through improved environmental conditions and better public health services (WHO, 1997).

In addition to schools and work places, one of the most important settings in cities is the food market. Access to nutritious food is essential for life and is indeed the foundation for health (WHO, 2006). The Healthy Cities program developed by WHO aims to ensure improved environmental conditions and better public health services, part of which entails creation of healthy market places (WHO, 1997). Market places offer consumers low cost fresh produce and other foods direct from the producers and ready-to-eat foods prepared by vendors. Market places serve as an important social role for exchanging ideas and information. These locations offer an opportunity for health education (Reilly et al., 1996). The market place may also be seen as a setting wherein regulations and laws are enforced (WHO, 2004b).

Public health standards ought to be observed in the markets as stipulated in the Public Health Act, Cap 242 Laws of Kenya. Various arms of the government are mandated to ensure that this is done. They include public health officers, inspectorate department of City Council of Nairobi and other civil administrators. In cases where public health standards were not maintained, the public health officers in charge of such markets were empowered to order market closures (Personal Communication, Chief Public Health Officer). City Council of Nairobi markets have not been excluded from occasional closures
in the past. This study will attempt to examine factors considered as a hindrance to implementation and maintenance of public health standards in CCN markets.

1.2 Statement of the Problem

The state of environment in the urban areas and the provision of basic services have not kept pace with the rapid population growth (Ondingi et al., 2004). With over half of the world’s population now living in urban areas, food markets have become important sources of affordable food for many millions of people particularly in developing countries. The food markets often serve as the commercial and social center of communities. At the same time, markets in some cases have also become associated with major outbreaks of diseases, including cholera (Moy, 2001). World Health Organization asserts that having healthy markets creates environments that are supportive to good health. However, many markets set a poor example with unsanitary conditions and unhygienic practices (Reilly et al., 1996). Urban populations in most countries in the world have more than doubled in the recent past, yet infrastructure development has proceeded far more slowly (Ondingi et al., 2004). Nairobi city has experienced a huge and relatively steady population increase since Kenya became independent in 1963 (NEMA, 2005). According to 1962 census, the population of Nairobi was 266,794. At the moment, it has a population of about 2,940,911 million people (City council of Nairobi, 2007). However, little has been done to expand these markets despite the growing population. The structures have remained basically the same with little improvements. Problems related to decline in hygiene standards have led to the frequent closures of some City Council markets in an attempt to clean them up. These include Burma and Wakulima markets. In Wakulima market, a total of six thousand rats were killed during the cleaning
that followed the closure (Cyrus, 2005). This is an indication of a dirty environment where refuse disposal was not carried out properly. Little is known about the factors that hinder implementation and maintenance of public health standards in the markets, hence the need to carry out this research.

1.3 Research questions

1. How are public health standards being implemented in the selected City Council of Nairobi markets?
2. What are the problems encountered in maintaining and implementing public health standards?
3. What measures can be taken to improve and maintain public health standards in the markets?

1.4 Hypothesis

There are no factors influencing implementation of public health standards in the CCN markets.

1.5 Objectives of the study

1.5.1 General Objective

To identify the factors affecting implementation of public health standards in the selected CCN markets.

1.5.2 Specific Objectives

a) To ascertain the extent to which public health standards have been implemented.
b) To identify the challenges faced in maintaining and implementing public health standards in the markets.

c) To find out measures that can be taken to improve and maintain implementation of public health standards in the markets.

1.6 Justification and significance of the study

According to the World Health Organization, food markets serve as the commercial and social center of communities. These markets vary depending on the food varieties and dietary preferences. However, all the food markets should have one thing in common – they should provide the community with safe and nutritious food. Food is an important vehicle of disease transmission. The way it is handled and preserved before it is finally sold is important. Disease and death may result from contaminated food, thus proper food handling and food preservation is called for. Public health standards as outlined in the public health act must be adhered to by food handlers. The findings of the study can be used by the management of Nairobi city council to plan and deal with public health standards in these markets. The results of the study will add to the existing knowledge on public health standards in the markets and the extent to which these standards have been adhered to. The study will also serve as a baseline for similar studies in future.

1.7 Basic assumptions of the study

It has been assumed by the researcher that:

➢ The information given by the respondents is correct.

➢ The respondents did not influence each other in answering the items on the questionnaire.
The items on the questionnaire were understood by all.

### 1.8 Conceptual Framework

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<th>Independent Variables</th>
<th>Dependent Variable (Outcome)</th>
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<tr>
<td>- Gender</td>
<td>• Medical examination</td>
<td>- Public Health Standards Observed.</td>
</tr>
<tr>
<td>- Education level</td>
<td>• Inspection of premises</td>
<td>or</td>
</tr>
<tr>
<td>- Market</td>
<td>• Environmental sanitation</td>
<td>- Public Health Standards Not Observed.</td>
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<tr>
<td>- Duration of operation in the market</td>
<td>waste disposal</td>
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<td></td>
<td>water supply</td>
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<td>sanitation facilities</td>
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<td>drainage facilities</td>
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Implementation of public health standards will vary depending on the education level, the market and other factors. Hence, a conceptual framework was developed to guide the study. The independent variables formed the public health requirements that were to be observed in the markets. The outcome was either compliance or non-compliance to the public health standards as set out in the public health act.

### 1.9 Operational Definition of Terms

Clean – Free from dirt, conditions conducive to health.

Food – Any article used for food or drink, or that is intended for use or for sale in whole or in part for human consumption.

Garbage – waste generated, for instance in markets.

Implementation - Complying with regulations set in the public health act, Cap 242.
Organic waste – More directly derived from plant sources that can generally be degraded/decomposed by microorganisms.

Sanitation facility – An Excreta disposal facility, typically a toilet or a latrine.

PUBLIC HEALTH STANDARDS

The rules and regulations in the Public Health Act, Cap 242 Laws of Kenya. These are:

1. Nuisance is prohibited (section 115).

2. Local authority to prevent occurrence of nuisances (section 116). These include: discharging noxious matter/waste water into a course not approved for reception of such discharge, deposit and accumulation of refuse which is offensive and likely to harbour rats or other vermin, occupied dwelling that lacks sufficient water supply, and trade premises that have offensive smells, are not ventilated or are overcrowded.

3. Notice issued to abate nuisance. Failure to do so results in court proceedings (section 119).

4. Officers empowered to enter any premise to examine existence of any nuisance therein at all reasonable times (section 123).

5. Sale of unwholesome food prohibited (section 132 [2]).

6. Medical examination of food vendors (section 135 [a]).

7. Section 154 allows for closure of markets.

8. Officers can prosecute for any contravention of, or against, or default in complying with any provision of this Act (section 167).
CHAPTER TWO: LITERATURE REVIEW

2.1 Health requirements for food vendors at public markets

Various countries have various standards of hygiene that should be maintained by food vendors and by those working in hotels or stalls where food is sold (Davinson and Seaton, 2004). In Wellington Dufferin Guelph, all food vendors must receive prior written approval from the Wellington-Dufferin-Guelph health unit before becoming eligible for a stall or table at the market. If one has a permanent retail outlet or processing plant, a copy of a current satisfactory inspection form from a local health department or Canadian Food Inspection Agency is required along with the application (Gordon, 1998).

According to Alberta Regulation 328/2003 Section 31, part (1) Food handlers ought to wear clean clothing and footwear, exhibit cleanliness and good personal hygiene, wash hands as often as necessary to prevent the contamination of food or food areas, refrain from smoking in food areas and refrain from any conduct that could result in the contamination of food or food areas. No person should work as a food handler if prohibited under the Communicable Diseases Regulation (AR 238/85).

According to the Alberta Regulation Public Health Act section 17 Any operator of a food establishment shall ensure that the establishment is of sound construction, is in good state of repair and is so designed to ensure the safe and sanitary handling of food in it. It should also have hand-washing stations, adequate in number and location, to ensure convenient access. The food establishment has to be supplied with hot and cold running water that is safe for human consumption and available in quantities sufficient to meet the needs of the food establishment, connected to a properly operating sewage disposal system. It needs to
be equipped with properly operating means of providing ventilation to food areas that are subject to the generation or accumulation of odours, fumes, steam vapours smoke or excessive heat.

The Tonga Public Health Act stipulates that no person who is engaged or employed in the sale of food, or in the preparation, storage, packing, conveying or delivery of food for sale, shall do or omit to do anything whereby food becomes or is likely to become contaminated, infected, polluted, tamed, spoilt or any way a risk to public health. Any person who contravenes the provisions of this section is guilty of an offence. The Tonga Public Health Act also stipulates that every person who is engaged or employed in the preparation, storing, packaging, conveying or delivering of food for sale, and in the course of his employment comes in direct contact with such food or with the interior of any package used for such food, shall at all times maintain his clothing and himself in a state of cleanliness and avoid smoking or spitting. Any person who contravenes the provision is guilty of an offence. The Public Health Act also requires that any food handler may be required to undergo a medical test or examination when an authorized officer considers it necessary and may be excluded from food handling until the result of the examination is known.

In Kenya, all those employed to serve ready to eat food must have a certificate of good health from a recognized medical doctor, which should have been taken recently (within 6 months). The Food legislation rules and regulations also entail closure of unhygienic food premises and use of safe food packaging materials (Kenya, 1990).
2.2 Public Health Act – Cap 242 Laws of Kenya

The preventive aspects of health are covered by a number of sections in the Public Health Act. These are: Sanitation and housing, Protection of foodstuffs, General and Public water supplies, meat, milk and other articles of food. The Public Health Act mainly deals with the sanitary measures to be considered in the food establishments.

2.2.1 Sanitation and housing

In part IX, the Public Health Act empowers local authorities to maintain cleanliness and prevent nuisances (sub section 116). This section clearly imposes duties on local authorities to take measures to maintain their areas in a clean and sanitary condition, and to take legal measures against anyone who contradicts such efforts. Health authorities are empowered to prevent or remedy danger to health from unsuitable dwellings.

Sub section 118 of the Act empowers the local authorities to prevent the occurrence or to remedy nuisances. They include; Ensuring the premises are clean and should not harbor rats or other vermin, the premises need not be overcrowded, no offensive smell need arise from drainage system or water closet, waste water or noxious matter should flow into a proper drainage system, accumulation or deposit of refuse, offal or other manure is prohibited.

2.2.2 Protection of foodstuffs

This is found in Part X, Section 127 – 128. This section requires that any building, that is, warehouses or go downs to be used for the storage of foodstuffs, shall be constructed of such materials and in such a manner as shall in the opinion of the medical officer of health, render such warehouse, go down or building rat proof. If such building has fallen into a state of disrepair, or does not in the opinion of the medical officer of health afford
sufficient protection against rat invasion by reason of the materials used in the construction, the medical officer of health shall give a written notice to the owner to effect repairs and alteration. Food stuffs within a warehouse or building need sufficient protection. Foods on display must be adequately protected from public handling and other contamination. Food should be individually wrapped, offered in closed cartons and be properly labeled (Champaign County Public health Department, 2001).

2.2.3 Public water supplies, meat, milk and other articles of food

The Public Health Act empowers local authorities to protect water supplies. Sale of unwholesome food is prohibited and rules for protection of food are given.

2.2.4 General

Section 154 of the Public Health Act allows public health officers to make rules for the establishment, control and closing of all markets and market buildings.

2.3 Environmental Management and Coordination Act, 1999.

The Act gives details of the environmental quality standards which include:

Section 72 (1) Water pollution is prohibited through effluent discharge management.

section 74 (1) Every owner or operator of a trade or other industrial undertaking shall discharge any effluents into existing sewerage systems.

section 87 (1) No person shall discharge or dispose of any wastes, in such a manner as to cause pollution to the environment or ill health to any person.

2.4 Healthy Food Markets

A Healthy food market is a setting in which all stakeholders collaborate to provide food for the community. The stakeholders including local authorities, market managers, suppliers,
vendors, other food market workers and consumers themselves must share a common vision of a healthy-promoting food market that continuously seeks to better serve the health and well-being of the community (WHO, 2004b). Combining their resources all stakeholders will work together to implement incremental changes to improve the market. Thus a healthy food market is not an end in itself, but a mutually beneficial process serving the interests of all stakeholders especially food vendors and consumers (Ibid). Food markets have evolved to become one of the defining characteristics of a community. A common feature of most food market is the wide array of foodstuffs from fruits and vegetables to grains and tubers, and from meats, poultry and fish to eggs and dairy products as well as processed and semi-processed foods (Moy, 2001).

Food markets also offer an array of ready-to-eat foods that are accessible and affordable for even the lowest income members of the community. Therefore, the food markets are essential settings for maintaining the health and nutritional status of urban populations, especially in developing countries (WHO, 2006). Rangsit market has been considered as one good model of a healthy market place. The market has successfully reached all significant standards of public health aspects. On social aspects, this market could serve the needs and requirements of consumers with pleasant environments as well as convenience to enjoy choosing satisfactory choices of goods at reasonable prices (Rangsit Healthy market place, 2005). In United States of America, sanitarians tasked with monitoring the health and sanitation at the public market places in Aceh Besar and Aceh Jaya districts, usually attend a series of trainings to increase their capacity to perform their roles in ensuring that healthy marketplaces remain healthy (CHF International, 2006).
2.4.1 Ensuring Healthy Food Markets

Proper handling of food along the entire food supply can help to ensure the safety of food (American Public Health Association, 1996). Three key messages have been developed by World Health Organization, for use to guarantee healthy food markets and the specific measures that need to be taken (Moy, 2001)

A. Keep clean. There is need to provide basic infrastructure such as toilet and hand washing facilities, safe water supplies, cleanable walls and drainage. Ensure that all waste materials, including solid and liquid waste, are collected and disposed of regularly from the market ideally, at least once a day. Protect market areas and food from environmental hazards including rain, sun, dust, insects, rodents and other animals.

B. Avoid contamination. Separate ready-to-eat food that is likely to be contaminated, such as raw fish, meat and poultry. Separate clean and contaminated food areas as much as possible. Assure that displayed and stored raw and cooked foods are separated to avoid cross contamination.

C. Minimize growth of microorganisms in food. Promote cooling of all raw meats, fish and poultry through refrigeration or storage on ice.

2.4.2 Benefits of a Healthy Food Market

Benefits of a healthy food market, extend beyond the market. For primary food producers, it would result in greater market access and reduced costs due reduced wastage of food. The food vendors gain from improved business and sales, and safer working environments. For the food market manager, it means improved food market business, improved relations with vendors and customers, more effective systems in place and less risk of fines and litigation. For customers/consumers patronizing the food market, it would result in a safe
and healthy shopping environment, access to adequate hygiene facilities while shopping, greater access to safer and better quality commodities at reasonable prices, and exposure to other health promotion messages (Moy, 2001).

2.5 Management of Public markets

Market authorities have insufficient skilled personnel and are unable to enforce regulations. Consequently, trading in public markets becomes more difficult and costly. Public retail markets are usually congested, unhealthy and insecure (Marcello and Claudia, 2003). Inner Hanoi had about 72 retail markets in the year 2000, out of which only 50% were planned and had market management boards. Most markets however, had no parking facilities for both traders and customers. Customers thus prefer to buy vegetables, fruit, meat, egg and fish from street food sellers. Indeed most public markets sell meat, dairy and fish products that are often sold ready to eat without further cooking. Such products are considered high-risk products because they can support the growth of harmful bacteria (Davinson and Seaton, 2004). Approval of the production premises for such foods must be obtained from the local environment health department under the food premises registration regulations.

In Bangkok, only 104 of the 2000 fresh food markets in the country met the hygiene standards set by the Public Health ministry as far as cleanliness, sanitation and freshness of products was concerned. Many of these markets needed to improve their water, drainage, food selection and storage systems in order to meet the ministry’s health standards requirements (Bangkok Post). Markets in Lalmonirhat municipality are in a deplorable condition. Lack of proper maintenance is the main reason behind their poor condition.
Nurul, 2006). The meat shops are in an unhygienic state as these shops have been established in town without any permission of the authorities concerned (Ibid).

Kongowea market is probably one of the oldest city markets in Kenya, having been in existence for over a century. The market was blamed for low food supplies to vessels as a result of falling hygiene standards ("Dirty markets", 2005). This market was responsible for the fruits and vegetables exported to South Africa, Dar-es-salaam, Singapore and Dubai. The ship handlers called for privatization of Mombasa as they accused the Mombasa municipal council of poor professional management and as a result, public health standards had gone down. This led to low international demands for fruits and vegetables. Market places reflect local community values and practices, and are often commercial and social hubs of cities. As colourful as markets may be, attitudes, practices and market conditions may not facilitate healthy lifestyles or choices for market by the market community, for instance poor hygiene in terms of lack of clean water, sanitation and solid waste disposal (WHO, 2004b).

In setting up a market there is need to ensure there is sufficient water supply, toilet facilities, waste disposal facilities and ventilation (Kenya, 1990). Market operations should be conducted in a manner that protect and promote health. The food market should have a functioning administrative system, and be zoned to in order to more effectively protect selected commodities from cross-contamination (Moy, 2001). For example live and raw foods of animal origins should be separated from ready-to-eat foods. Solid and liquid waste should be handled and stored in a manner so as not to contaminate food (Ibid).
2.6 Maintenance and fire hazard practices

The inadequacy of wholesale facilities most of which were built over 50 years ago and are now positioned in the Central Business District, act as impediments of achieving or implementing the public health standards. Market storage facilities, especially cold storage are insufficiently and badly managed (Marcello and Claudia, 2003). Difficulties faced by traders operating in such markets are responsible for additional costs and losses as well as increased food contamination. Examples of these problems can be found in cities like Accra, Abidjan, Lahore and Santa Domingo (Ibid).

Lahore city lacks a wholesale market for cereals and pulses. Out of the three fruit and vegetable markets that were developed 20 years back, only Badami Bagh market is functioning. However, the market is facing a serious congestion problem due to the high number of lorries as well as poor parking, berthing, storage, drainage, water and sanitation facilities. Access roads to wholesale markets are in bad conditions causing traffic congestion and delays in transportation of marketed perishable items. This situation, compounded by inadequate packaging practices, results in poor hygiene and high food losses (Argenti, 2001). Motor vehicle access should be planned to enable ease of vendor, supplier and service personnel movement while minimizing the possibility of contaminating products or harming the market participants and customers. Ideally, the entry of people and food into the market should be well separated from waste storage (Moy, 2001).

Most African cities lack specific wholesale market facilities. Markets are not properly managed and maintained. Funds generated from market fees are not re-invested into
maintenance, expansion and better services. Lack of maintenance has been responsible for the burning down of large number of markets especially in Africa. In a study conducted in Hanoi’s wholesale markets by FAO, out of the four markets only one was planned – Long bien market. The three unplanned markets are now operating in the inner city making it difficult for the food trucks to reach markets, due to traffic jams and insufficient parking space. Though traders pay fees, markets and storage facilities are inadequate and poorly maintained (Maurizio and Olivio, 2001). This leads to food losses and reduced quality of food especially the fresh foods. According to Moy, 2001, unclean and poorly managed facilities can result in loss of business from local consumers.

2.7 Environmental Factors

Even before realization of environmental pollution and contamination problems that presently cause concern, man recognized certain relationships between his environment and outbreak of disease (Waite and Jewell, 2001). The discovery that microorganisms existing in the environment could lead to contagious diseases led to the development of environmental activities to curb diseases like cholera, typhoid and malaria. Such activities became the sanitation aspects of environmental control and are reflected today in programs to ensure, for example, that drinking water is safe, milk is pasteurized, food is hygienically prepared and handled, and waste is disposed off in ways to prevent breeding of insects and rodents (Ibid). Environmental factors affect health in both positive and negative ways (Wright, 1997). Positive environmental factors sustain health and promoting them, is preventive medicine. These include disposal of human excreta, water drainage, water supply, waste collection and sewage disposal. For instance, the healthy and pleasant environment of Rangsit market received the highest standard certification of the ministry.
of public health. Cleanliness and hygiene of the market was evident since both waste water and solid waste are technically and systematically managed (Rangsit Healthy market place, 2005). Negative environmental factors include monitoring and management of municipal and industrial outflows to the environment (Wright, 1997).

The safe disposal of waste is probably one of the most critical environmental problems that both developing and developed countries have to contend with in our modern times. Uncollected solid waste is a major environmental challenge in Nairobi. The city currently produces about two thousand, four hundred tonnes of garbage daily (NEMA, 2005). The volume and variety of wastes produced by households, industries, markets among others, are increasing at an alarming rate in our towns and cities. Such wastes pose a big threat to human health. Proper management of waste must take into consideration means and ways beyond current approach of careful storage and disposal practices (Sonia et al., 1989). In whatever form waste exists, it can breed or attract pests such as rats and flies that are dangerous to human health, more so where food for human consumption is stored, sold or processed.

2.8 Infrastructure as a basis of maintaining public health standards

The slow rate of economic development in Africa has been blamed partly on its inferior state of infrastructure. Research conducted so far indicates there have been serious cases of non-performance in recent years owing to poor budgetary outlays towards expansion and rehabilitation (Lee and Anas, 1992). This has resulted in power shortages, inadequate and poorly managed telephone services, chronic water shortages. Poorly maintained roads tend to obstruct communication more than they facilitate it. Roads are used to transport
foodstuff from rural areas to towns. When it takes long to transport such products, they get spoilt (Ibid). According to Kimuyu and Kayizizi, 1998, roads (3.7%), water (15.2%) and waste disposal (10.9%) led as the greatest infrastructure problem for over 25% of the firms’ sampled.

Dilapidated roads, poor sanitation systems and inadequate supplies of drinking water are some of the problems crippling residents of Lalmonirhat municipality (Nurul, 2006). The roads have been left uncared for a long time and the sweepers do not clean most of the roads. As a result, heaps of garbage is a common sight along the roads. In absence of sufficient drains, many areas in the town go under water after even light rainfall (Ibid). Narrow passages of most markets in Narail hampered easy movement of both buyers and sellers. The unplanned construction of shops and stalls reduced the space in these markets creating problems for keeping the commodities properly (United News of Bangladesh, 2006).

Improvements in the physical infrastructure of food markets contribute to the promotion of safe foods (Moy, 2001). For example, sufficient and appropriately placed toilets for both men and women with hand-washing facilities are important for well being of market participants. An adequate water supply should be available for cleaning and food preparation needs. Portable water should also be available for drinking. Drainage should be appropriately designed to meet the various needs across the food markets(Ibid).
CHAPTER THREE: MATERIALS AND METHODS

3.1 Introduction

This Chapter addresses two main issues; it describes how the study was undertaken and specifies how data were analyzed. It contains the following sections: study area, study population, study design, sampling procedures, data collection and data analysis.

3.2 The Study area

The study was carried out in Nairobi Province. Nairobi is the capital city of Kenya as well as the headquarter of major commercial, industrial and educational concerns. It was selected for the study because of its metropolitan metamorphosis and development. Being the largest metropolis in Kenya, it provides a central market for many agricultural products thus providing a variety of foods to be selected from.

Nairobi city has an area of 693km² stretching from latitude 1° 25’ S to 1° 10’ S and longitude 36° 40’ E and 37° 15’ E. It shares common borders with Kiambu to the North West, Thika district to the North, Machakos district to the East and Kajiado district to the South. Administratively, Nairobi is divided into 8 divisions namely: Kasarani, Embakasi, Starehe, Pumwani, Makadara, Lang’ata, Dagoretti and Westlands (figure 3.1).
Figure 3.1  Selected City Council Markets in Nairobi
The City Council of Nairobi offers markets and trading services through the Department of Social services and Housing. For organization and management of all council’s public markets, the department has five categories of markets under its jurisdiction. These are: Rental, Self constructed, Tenant purchased, Wholesale and Open Air markets. Self constructed markets are owned by individuals on payment of a nominal fee. Tenant purchased markets were constructed by the city council of Nairobi and loaned to individuals. Open Air markets operate on selected days. The markets in the study area were selected from the Wholesale and Rental categories of markets. The specific markets (figure 3.1) were conveniently selected from the two categories of City Council of Nairobi markets.

Wakulima market is the largest wholesale market in Nairobi. It supplies commodities in bulk to majority of Nairobi’s residents, and it is on a 5-acre piece of land. Rental markets are wholly owned by the CCN and rented to individuals. They include: Burma, City, City Park, Kariokor and Jogoo road markets. Burma market stands on 2 acres and houses traders dealing in various items, among them raw meat, dry cereals, cooked food, clothing and carpentry. City market is situated in the Central Business District. Traders in the market deal with various things among them flowers, curio shops, fruits and vegetables, food kiosks, raw and ready-to-eat meat. City park market is the largest rental type of market followed by Jogoo road/Uhuru market. Kariokor market deals with various types of trade, like tailoring, food, electrical accessories, hardware and even bookshops.
3.3 The Study population

The study population consisted of customers, food vendors operating in the selected CCN markets for over an year, market administrators, public health officers and department of social services staff.

3.3.1 Inclusion criteria

a) Food vendors who had been in the selected markets for over a year.

b) Customers and food vendors in the respective markets, who consented.

c) Market administrators, Public Health Officers and Department of Social Services and Housing staff who are in charge of these markets.

3.3.2 Exclusion Criteria

a) Traders who were not dealing with raw and ready to eat foods.

b) Food vendors who had operated in the selected markets for less than 1 year.

c) Customers and Food vendors who did not consent.

d) Market administrators, Public Health Officers and Department of Social Services and Housing staff who are not in charge of these markets.

3.4 Ethical considerations

Clearance was sought from the Graduate School of Kenyatta University, City Council of Nairobi, Ministry of Education, Science and technology. Informed consent was sought from all selected for the study. There was no loss of benefit or harm experienced by those who withdrew from the study at any stage. Confidentiality was maintained on all data and information collected.
3.5 Study design

Descriptive survey research design was used to answer questions concerning the public health standards in the markets (Gay, 1982). The descriptive study aimed to collect data to test hypothesis. It reported the way things were and attempted to describe attitudes, values and characteristics (Mugenda and mugenda, 1999). A survey is a method of gathering information about a large number of people. It typically employs questionnaires and interviews in order to determine the opinions, attitudes, preferences and perceptions of persons of interest to the researcher (Borg and gall, 1989). A survey was used because it is effective in measuring the relationship between and among variables (Cohen, 1994; Sproul, 1988). The survey method was also chosen because it allowed for extensive data collection on a large population within a short period of time (Miller, 1991).

3.6 Sampling and sample size determination

The simple random sampling method in which each unit in the defined population has an equal chance of being included (Sproul, 1988) was used to select two market categories. Convenience sampling was then used to select the study markets and food vendors. The markets were selected from the Wholesale and Rental types of markets, having about 20% of the total stalls dealing with food. The estimated number of food vendors in the study markets was 1000. Ten percent of the food vendors in the study markets were included in the study, 10% of 1000 = 100 food vendors. Ten percent (10%) to twenty percent (20%) of the population was considered acceptable in descriptive research (Ary et al, 1996). The vendors were proportionately distributed in the markets as shown in appendix one. Convenience sampling was also used to select customers to be included in the study as shown in the appendix one. For each vendor sampled, 3 customers were selected.
Purposive sampling technique was then used to pick four Public Health Officers, six Market Administrators, and two senior officials in the Department of Social Services and Housing staff. This technique was used because the officers were expected to come from the allocated areas of operation. Purposive sampling allowed the researcher to use cases that had the required information with respect to the study. Cases of subjects were therefore handpicked because they were informative and possessed required characteristics (Mugenda and Mugenda, 1999).

3.7 Research instruments and Data collection

The study relied on primary data collected through pre-tested questionnaires and interview schedules. The interview schedules targeted food vendors and customers. English language was used to interview and where there were difficulties, Kiswahili language was used. The questionnaires were self-administered to the Market administrators, Department of Social Services and Housing (City Council Department) and Public Health Officers. The interview schedules were semi-structured, containing both structured and unstructured questions (Mugenda and Mugenda, 1999). The questionnaires and interview schedules provided information on gender, duration of operation in the market, perception of public health standards in the markets and factors affecting implementation of these standards in the markets. Photographs were used as illustrations to major findings. Both qualitative and quantitative data were collected using interview schedules and questionnaires.

3.8 Data Quality Control

A pilot study was done in Kwale road and Landhies markets. These markets were not included in the study, but they are in the Rental category of city council markets. Data...
validity and reliability was achieved through pre-testing of data collection instruments during the pilot study. This enabled the researcher to identify vague questions and check for flaws and bias (Mugenda and Mugenda, 1999). The research assistants were trained before the actual data collection to ensure conformity. Data quality control was also achieved through total involvement of the researcher in data collection and close supervision of the research assistants. To ensure confidentiality and anonymity of respondents, the respondents were not to write their names.

3.9 Data analysis technique

Both qualitative and quantitative data were collected for the study. Qualitative data was first coded and then labels were assigned to various categories. Common themes were obtained from which inferences were made. Conclusions were then drawn from the findings (Miles and Huberman, 1994). Responses from open ended questions were analyzed qualitatively and used to supplement, explain and interpret quantitative data (Ulin et al., 2002). Quantitative data analysis was subjected to both descriptive and inferential statistics. The Statistical package for social sciences (SPSS) was used to obtain statistical measures such as frequencies and percentages. SPSS computer package not only gives accurate information but also allows coding and recording of variables to suit the study. Tables and bar graphs were used for data presentation. Chi square tests were used to test for relationships between variables, at a significant level of 0.05 as is usually recommended for social sciences (Ibid).
CHAPTER FOUR: RESULTS

4.1 Introduction

This Chapter analyses data collected from food vendors and their customers, market administrators of the selected City Council markets, District public health officers and Officers from the department of Social services responsible for the markets under study.

4.2 Social demographic information

4.2.1 Gender of the respondents

Women and men accounted for 56% and 44%, respectively among the food vendors. Customers consisted of 40.7% males and 59.3% females. Issues related to food are usually left to women and this could explain why the number of women was higher than that of males. Moy, 2001, asserts that women tend to place emphasis on health and environmental issues. They are usually the food managers at home. Market administrators are in charge of city council of Nairobi markets. City, Kariokor and city park markets were headed by males, while wakulima, Jogoo road and burma market were headed by females. Both males and females had an equal chance of ensuring public health standards were observed and maintained in the markets. All the market administrators had at least secondary education. This implied a better understanding of what was needed to ensure that public health standards were maintained and implemented in the markets.

4.2.2 Duration of operation in the markets

Most of the vendors (51%) operated in the market for less than 5 years, while only one vendor had been in the market for over a year. The social services staff in charge of Jogoo road and burma markets had been in the department for over 21 years, while the one in charge of wakulima, Kariokor city and city park markets had operated in the department
for 5 years. Market administrators' of Burma, Kariokor and City Markets had worked in the market for 6–10 years, whereas those in charge of city park, wakulima and Jogoo road markets had operated for 11–15 years, 16–20 years and over 21 years respectively.

4.2.3 Factors determining choice of a market

The choice of market was determined by its convenience, good prices offered, lack of alternative and variety of foodstuffs available as shown in figure 4.1. Wakulima market had the highest number of customers (70%) visiting it due to the good prices and the variety of food stuffs offered. This can be attributed to the fact that Wakulima is the largest wholesale market in Nairobi which supplies commodities in bulk. The results concur with a report by Moy in 2001, which showed that food markets offered a variety of ready to eat foods that were accessible and affordable (Moy, 2001). The foods sold were usually fresh and at fair prices. According to WHO 2004b, the main function of a market place is to provide an economic centre for trade in goods and services.

Figure 4.1 Factors determining choice of a market

![Bar chart showing factors determining choice of a market](chart.png)
Customers mainly visited the markets to buy food and/or to eat. Wakulima (82%), Burma (56%) and city (51%) markets had the highest number of customers who bought foodstuffs, while Kariokor (60%) and city park (47%) markets had the highest percentage of customers visiting the market for the purpose of eating. This shows that markets are not only a commercial center but also serve as a social center of communities.

4.3 Implementation of public health standards

Public Health standards are published in the Public Health Act Cap 242. Complying with these standards will result in markets that continuously seek to better serve the health and well being of the community.

4.3.1 Sale of unwholesome food

Sale of unwholesome food is prohibited in the Act (section 132 [2]). Any person exposing foodstuffs for sale should take adequate measures to guard or prevent any contamination. Foodstuffs can be protected from contamination by use of packaging, display cases or other effective means. However, this was not the case as shown in plates 4.1. City market had display cases for their meat (plate 4.2), as opposed to Burma market (plate 4.1)
Plate 4.1  Meat openly displayed in Burma market with no refrigeration facilities.

Plate 4.2  Meat stored in a refrigeration facility
4.3.2 Medical examination

Majority of the vendors (66%) were aware of the requirements of the Public Health Act. The association between awareness of the Act and the vendors’ duration of operation at the market was not significant ($\chi^2 = 5.780; \text{df}=4; p \geq 0.05$), an implication that the longer a vendor operated in the market did not have an influence on the vendors’ awareness of the Act. Section 135 of the Act gives orders for protection of food. In complying with the orders, medical examination is a requirement for any person dealing with food intended or exposed for sale. Majority of the vendors (63%) underwent a medical check up as shown in table 4.1. The remaining 37% of the vendors whose medical status was not known, not only violated the public health act, but also put at risk the health of the general public in the markets. In Kenya, all those employed to serve ready to eat food must have a certificate of good health from a recognized medical doctor, which should have been taken recently (within 6 months) (Kenya, 1990).

Table 4.1 Medical examination by markets

<table>
<thead>
<tr>
<th>Market</th>
<th>Medical check up</th>
<th>No medical check up</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wakulima</td>
<td>29 (58%)</td>
<td>21 (42%)</td>
<td>50 (50%)</td>
</tr>
<tr>
<td>City park</td>
<td>12 (46%)</td>
<td>14 (54%)</td>
<td>26 (26%)</td>
</tr>
<tr>
<td>Burma</td>
<td>12 (86%)</td>
<td>2 (14%)</td>
<td>14 (14%)</td>
</tr>
<tr>
<td>Jogoo road</td>
<td>3 (100%)</td>
<td>-</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Kariokor</td>
<td>2 (100%)</td>
<td>-</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>City market</td>
<td>5 (100%)</td>
<td>-</td>
<td>5 (5%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>63 (63%)</strong></td>
<td><strong>37 (37%)</strong></td>
<td><strong>100 (100%)</strong></td>
</tr>
</tbody>
</table>

$\chi^2 = 2.384; \text{df}=4; p \geq 0.05$
There was no significant association noted between medical examination and duration of operation in the market ($\chi^2=2.384; \text{df}=4; p \geq 0.05$), as shown in table 4.2. The number of years vendors had operated in the market did not influence them to go for a medical check up. They went because they knew it was a requirement in the Public Health Act.

**Table 4.2 Duration of operation in the markets and medical check up**

<table>
<thead>
<tr>
<th>Duration of operation in the market</th>
<th>Medical check up</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Less than 5 years</td>
<td>33</td>
<td>18</td>
</tr>
<tr>
<td>6 – 10 years</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>11 – 15 years</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>16 – 20 years</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Over 21 years</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>37</td>
</tr>
</tbody>
</table>

$\chi^2=2.384; \text{df}=4; p \geq 0.05$

The results also indicated that there was a significant relationship between awareness of the Act and medical examination among the vendors ($\chi^2=4.927; \text{df}=1; p \leq 0.026$), An implication that the vendors underwent a medical examination because they knew it was a requirement of the Public Health Act.

### 4.3.3 Inspection of premises

The Public Health Act authorizes public health officers to enter any premises any time for the purpose of examining existence of any nuisance (section 123). This is illustrated in table 4.3.
Table 4.3 Inspection of premises by market

<table>
<thead>
<tr>
<th>Market</th>
<th>Premises inspected</th>
<th>Premises not inspected</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wakulima</td>
<td>43 (86%)</td>
<td>7 (14%)</td>
<td>50 (50%)</td>
</tr>
<tr>
<td>City park</td>
<td>20 (77%)</td>
<td>6 (23%)</td>
<td>26 (26%)</td>
</tr>
<tr>
<td>Burma</td>
<td>12 (86%)</td>
<td>2 (14%)</td>
<td>14 (14%)</td>
</tr>
<tr>
<td>Jogoo road</td>
<td>3 (100%)</td>
<td>-</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Kariokor</td>
<td>1 (50%)</td>
<td>1 (50%)</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>City market</td>
<td>4 (80%)</td>
<td>1 (20%)</td>
<td>5 (5%)</td>
</tr>
<tr>
<td>Total</td>
<td>65 (65%)</td>
<td>35 (35%)</td>
<td>100 (100%)</td>
</tr>
</tbody>
</table>

Majority of the vendors (65%) acknowledged that their premises were inspected before the license was renewed (table 4.3). This implied that the public health officers were inspecting premises in accordance with the Act. The frequency of visits varied per market as illustrated by vendors’ responses in table 4.4.

Table 4.4 Frequency of visits by public health officers’

<table>
<thead>
<tr>
<th>Frequency of inspection</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Once a month</td>
<td>30</td>
<td>46</td>
</tr>
<tr>
<td>Twice a month</td>
<td>26</td>
<td>40</td>
</tr>
<tr>
<td>Every 3 months</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Half yearly</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>100</td>
</tr>
</tbody>
</table>
Public health officers are under the Public health inspectorate section in the city council, and it is headed by the chief public health officer. Their duties include inspection of food plants like restaurants and food kiosks; law enforcement – issuing of intimidation notices, statutory notices, seizure of unwholesome food and prosecution; general sanitation report to relevant departments of any dump noted, blocked sewer, waste water discharge, choked gully traps and stagnant water (Chief Public Health Officer, CCN). With this in mind, their visits to the markets are paramount. The frequency of their visits and the type of advice they give can go a long way in enhancing proper implementation of public health standards in the markets under their jurisdiction.

Table 4.5 Inspection of markets and nuisance presence

<table>
<thead>
<tr>
<th>Nuisance</th>
<th>Markets inspected</th>
<th>Chi square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Poor waste disposal</td>
<td>Yes</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>11</td>
</tr>
<tr>
<td>Presence of pests</td>
<td>Yes</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>26</td>
</tr>
<tr>
<td>Poor sanitary conditions</td>
<td>Yes</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>23</td>
</tr>
<tr>
<td>Inadequate water</td>
<td>Yes</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>16</td>
</tr>
<tr>
<td>Foul smell</td>
<td>Yes</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>12</td>
</tr>
</tbody>
</table>
The nuisance noted in the markets was poor waste disposal, presence of pests, poor sanitary conditions, inadequate water and foul smell. There was no association between inspection of markets and presence of nuisance as shown in table 4.5 (The significance level was ≤0.05). Whether or not presence of nuisance was noted in the markets, did not depend on whether or not the market was inspected. This showed that the Public Health officers inspected the markets as part of their duty, and not because they anticipated a nuisance. Inspection of markets is important to ensure nuisances are prevented. Public health officers visited the markets and offered advice to vendors on how to conduct their businesses without breaching the Public health act. The advice given was on preventing food from contamination, maintaining cleanliness in their premises and obtaining medical certificates.

A significant number of vendors (65) acknowledged that markets were inspected ($\chi^2=7.840; df=1; p<0.005$). Wakulima (86%) and City park markets (77%) had the highest number of those who acknowledged visits by public health officers (table 4.3). Eighty four percent of the vendors in Wakulima market noted that the public health officers’ advised them during such visits while 16% said the officers did not give any advice on such visits. In Burma market, 86% of the vendors interviewed admitted that public health officers visited the market. All the vendors interviewed in Jogoo road market acknowledged visits by public health officers. Vendors in Kariokor market noted irregular visits by officers, while in city market 25% said the visits occurred monthly and 50% said the officers visited markets every 3 months.
A significant association was noted between inspection of business premises and inadequate stalls as a nuisance ($\chi^2=8.663$, df=1, p≤0.003). This resulted in overcrowding within the stalls, an implication that some vendors were operating in the markets illegally (without a license). This placed a strain on the existing water supply and sanitation facilities. Despite inspection of premises, the strained facilities would hamper efforts to prevent nuisances in the markets.

4.3.4 Presence of nuisance

The Public Health Act empowers local authority to prevent occurrence of nuisance (section 116). The nuisance includes; discharging noxious matter/waste water into a course not approved for reception of such discharge, deposit and accumulation of refuse which is offensive and likely to harbour rats or other vermin, occupied dwelling that lacks sufficient water supply, and trade premises that have offensive smells, are not ventilated or are overcrowded. Failing to follow these requirements can lead to declining hygiene standards in the markets. Presence of nuisance (Table 4.6) indicates a failure on the part the local authority and contravenes section 116 of the public health act.
### Table 4.6 Presence of nuisance

<table>
<thead>
<tr>
<th>Nuisance</th>
<th>Customers</th>
<th>Vendors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor waste disposal</td>
<td>Yes – 180 No – 120</td>
<td>Yes – 64 No – 36</td>
</tr>
<tr>
<td></td>
<td>$\chi^2=12.000; df=1; p \leq 0.001$</td>
<td>$\chi^2=12.000; df=1; p \leq 0.001$</td>
</tr>
<tr>
<td>Foul smell</td>
<td>Yes – 175 No - 125</td>
<td>Yes – 61 No – 39</td>
</tr>
<tr>
<td></td>
<td>$\chi^2=8.333; df=1; p \leq 0.004$</td>
<td>$\chi^2=4.840; df=1; p \leq 0.028$</td>
</tr>
<tr>
<td>Poor sanitary conditions</td>
<td>Yes – 177 No - 123</td>
<td>Yes – 66 No – 34</td>
</tr>
<tr>
<td></td>
<td>$\chi^2=9.720; df=1; p \leq 0.002$</td>
<td>$\chi^2=10.240; df=1; p \leq 0.001$</td>
</tr>
<tr>
<td>Presence of pests</td>
<td>Yes – 178 No - 122</td>
<td>Yes – 62 No – 38</td>
</tr>
<tr>
<td></td>
<td>$\chi^2=10.453; df=1; p \leq 0.001$</td>
<td>$\chi^2=5.760; df=1; p \leq 0.016$</td>
</tr>
<tr>
<td>Lack of adequate water</td>
<td>Yes – 176 No - 124</td>
<td>Yes – 65 No – 35</td>
</tr>
<tr>
<td></td>
<td>$\chi^2=9.013; df=1; p \leq 0.001$</td>
<td>$\chi^2=9.000; df=1; p \leq 0.003$</td>
</tr>
</tbody>
</table>

NB: multiple responses were allowed

Chi square test of proportionality was revealed that a significant number of both customers and vendors acknowledged presence of nuisance in the market as shown in table 4.6 (the significance level is $\leq 0.05$). This was an indication that nuisance existed in the markets. Presence of nuisance in the markets contravenes section 115 of the public health act.

#### 4.3.4.1 Discharge of waste water

Proper drainage system allows for free flow of liquid waste. Based on observation, waste water was discharged in drainages but, it was mixed with other substances which could lead to blocked drainage systems as shown in plates 4.3 and 4.4. The drainage was in a
deplorable condition. This constituted a nuisance as indicated in section 118 of the Public Health Act.

Plate 4.3 Dirty drainage system in Burma market
4.3.4.2 Waste disposal and presence of pests

Customers and vendors complained of poor waste disposal as shown in table 4.6. Waste disposal mechanisms were poor as noted in plates 4.5 and 4.6.
Plate 4.5  Dumping site within Wakulima market. Vendors are selling their produce next to it.

Plate 4.6  Disposal of left over food in Jogoo road market (open dustbins with no cover)
The amount of waste disposed off varied per market as shown in figure 4.2

**Figure 4.2 Amount of waste disposed off daily per market**

Wakulima market (14 tonnes) had the highest amount of waste generated per day while Jogoo road market (1 tonne) had the least. This could be attributed to the fact that Wakulima was the largest wholesale market in Nairobi. Garbage was collected three times a week in Jogoo road, Kariokor and city markets, whereas in wakulima, burma and city park markets, garbage collection was done on a daily basis. Moy, 2001 proposes daily collection of waste.

### 4.3.4.3 Water supply

Water supply was unreliable as noted by 50% of the market administrators'. Both customers and vendors complained of inadequate water supply (table 4.6). The main
source of water supply for the vendors was the City council and sometimes the supply was irregular. Fifty one percent of the vendors said they received consistent supply of water. City Park recorded the highest responses (25) for access to consistent water supply. On the other hand, Wakulima recorded the highest responses (33) of vendors who had no access to consistent water supply.

4.3.4.4 Trade premises

Trade premises should be ventilated, not overcrowded and free from offensive smells. There was no significant relationship between markets and poor ventilation as a nuisance in the markets ($\chi^2=4.038$, $df=5$, $p<0.05$). This could be attributed to the fact that food stalls in the markets had windows, doors and vent holes which allowed for free air circulation. However, 57% of vendors and customers complained of overcrowding in the markets. Foul smell was noted in all markets except kariokor and city park. Twenty five percent of the customers at Wakulima market noted that the market had a foul smell, while in Burma market, 55% had the same opinion. The smell at Burma market was made worse by the way food was displayed especially the stalls dealing with raw meat. They lacked refrigeration facilities and the meat was displayed in the open as shown in plate 4.1

4.3.4.5 Market Closure

The public health officers are empowered by the Public Health Act to order closure of markets if nuisances are not abated (section 154). The same response was echoed by the public health officers in charge of the markets under study. The duties of the public health officers include: Law enforcement – issuing of intimidation notices, statutory notices, seizure of unwholesome food and prosecution. If there was a nuisance arising from a particular market, the public health department verbally informed the concerned section. If
nothing was done, a memo was then issued followed by a notice (section 119) giving the concerned section time to abate the nuisances. If not complied with, legal proceedings then followed (section 167). These nuisances include poor sanitation facilities, uncollected garbage, lack of water, blocked drainage systems and congestion in the markets due to illegal traders.

Table 4.7 Market closure

<table>
<thead>
<tr>
<th>Market</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>City market</td>
<td>-</td>
<td>5 (100%)</td>
<td>5 (5%)</td>
</tr>
<tr>
<td>Burma</td>
<td>13 (93%)</td>
<td>1 (7%)</td>
<td>14 (14%)</td>
</tr>
<tr>
<td>Jogoo road</td>
<td>2 (67%)</td>
<td>1 (33%)</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Kariokor</td>
<td>-</td>
<td>2 (100%)</td>
<td>2 (2%)</td>
</tr>
<tr>
<td>City park</td>
<td>18 (69%)</td>
<td>8 (31%)</td>
<td>26 (26%)</td>
</tr>
<tr>
<td>Wakulima</td>
<td>30 (60%)</td>
<td>20 (40%)</td>
<td>50 (50%)</td>
</tr>
<tr>
<td>Total</td>
<td>63 (63%)</td>
<td>37 (37%)</td>
<td>100 (100%)</td>
</tr>
</tbody>
</table>

From table 4.7, it is evident that all the markets under study have been closed at one time with the exception of City market and Kariokor market. Failure to abate nuisances in a market can lead to its closure (section 119). Wakulima, Burma, Uhuru and City park markets have been closed, while closures did not occur in City and Kariokor markets. A significant number of vendors (34) noted they had ever been charged in a court of law for failing to abide by the act ($\chi^2=10.240$, df=5, $p<0.05$). This is line with section 167 of the act. The vendors were charged with; failing to go for medical check up and having dirty premises.
Presence of nuisance can warrant closure of markets. A significant number of vendors (63) acknowledged that the markets had ever been closed ($\chi^2=11.560; \text{df}=1; \ p \leq 0.001$). For this study however, no significant association was noted between closure of markets and presence of nuisance as shown in table 4.8. Since the significance level was greater than 0.05, closure of markets and presence of nuisance were related. This implied that when a nuisance arose from a particular market, the concerned department was informed verbally. A notice then followed, giving the concerned section enough time to abate the nuisance. Addressing the areas deemed to be a public nuisance did not therefore warrant closure of the markets.

<table>
<thead>
<tr>
<th>Nuisance</th>
<th>Market closed</th>
<th>Chi square</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Poor waste disposal</td>
<td>Yes</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>24</td>
</tr>
<tr>
<td>Presence of pests</td>
<td>Yes</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>22</td>
</tr>
<tr>
<td>Poor sanitary conditions</td>
<td>Yes</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>21</td>
</tr>
<tr>
<td>Inadequate water</td>
<td>Yes</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>23</td>
</tr>
<tr>
<td>Foul smell</td>
<td>Yes</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>27</td>
</tr>
</tbody>
</table>
4.4 Challenges in implementation of public health standards

The fact that four out of the six markets (67%) have been closed, is an indication that implementation and maintenance of public health standards in the city council markets needs some attention. It is clear from the study that there are certain factors that affect implementation of public health standards within the markets as shown in table 4.9. Factors affecting implementation of public health standards also act as constraints in implementation. Market administrator’s perception of factors affecting implementation were rated as 1=“badly affects implementation”, 2=“somehow affects implementation”, 3=“somehow does not affect implementation” and 4=“does not at all affect implementation”. However, to facilitate the analysis, “badly affects implementation” and “somehow affects implementation” were collapsed into one category, as were “does not at all affect implementation” and “somehow does not affect implementation”.

Table 4.9 Market administrators’ perception of factors affecting implementation

<table>
<thead>
<tr>
<th>Factors</th>
<th>Affects implementation</th>
<th>Does not affect implementation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of adequate finances</td>
<td>5 (83%)</td>
<td>1 (17%)</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Inadequate staff</td>
<td>4 (67%)</td>
<td>2 (33%)</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Unreliable water supply</td>
<td>3 (50%)</td>
<td>3 (50%)</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Poor sanitary conditions</td>
<td>4 (67%)</td>
<td>2 (33%)</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Poor waste disposal</td>
<td>4 (67%)</td>
<td>2 (33%)</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Structural design</td>
<td>2 (33%)</td>
<td>4 (67%)</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Congestion in the markets</td>
<td>2 (33%)</td>
<td>4 (67%)</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Electricity supply</td>
<td>3 (50%)</td>
<td>3 (50%)</td>
<td>6 (100%)</td>
</tr>
<tr>
<td>Road network</td>
<td>1 (17%)</td>
<td>5 (83%)</td>
<td>6 (100%)</td>
</tr>
</tbody>
</table>
The road network did not affect implementation as acknowledged by 83% of the market administrators. This implied that markets were easily accessible and the food products arrived in the markets on time thus no delays in transportation of perishable items. However, 83% noted that lack of finances to run the markets was a major hindrance to proper implementation of public health standards. Congestion in the markets and structural design did not affect implementation as noted by four market administrators. Other hindrances mentioned include delayed and poor payment of salaries, and demoralized staff as indicated by officials from the department of social services. This created laxity in performance of their duties which would have led to corruption.

The Public Health Act Cap 242 empowers local authorities to maintain cleanliness and prevent nuisances. It gives local authorities power to take charge of cleanliness in areas under their jurisdiction and take legal measures against anyone who contravenes such efforts (subsection 116). However, the study has revealed some flaws in the council’s ability to perform this task effectively. Careless disposal of waste, foul smell, poor sanitary facilities are just but a few examples to justify the above findings. The Environment department within City Council of Nairobi is responsible for refuse collection within the markets. With the current capacity of less than 20 vehicles that are always in as dysfunctional state and refuse generation rate of over 1600 tonnes a day, only 40% of the garbage is collected leaving a 60% collection deficit (Mwaura, 1991).
The markets sampled for the study fall into four administrative divisions namely: Kamukunji which covers Burma and Wakulima markets, Starehe which covers Kariokor and City markets, City park market which is in Westlands and Jogoo road market in Makadara division. Each division is allocated only 1 District public Health officer despite the number of markets in the district. But each district public health officer is assigned a few public health officers on the ground to work with. The District public health officers were responsible for the markets in their division (Personal Communication, CCN Chief Public Health Officer).

All the officers visited the respective markets under their area of jurisdiction at least once a month. According to the officers, during the visits, Jogoo road and City park markets were found to be satisfactory while Burma, Wakulima and City markets were found to be unsatisfactory. Given the businesses conducted in such markets and the large population of Nairobi that depend on the markets for their daily food supply, public health officers need to visit the markets at least on a weekly basis to ensure that public health requirements are maintained. Unfortunately, this was not the case. The public health officers lacked official transport which made it difficult for them to visit the markets regularly to inspect the public health standards (Personal Communication, District Public Health Officers).

One of the roles of public health officers is law enforcement. If there was a nuisance arising from a particular market, the department concerned was verbally informed, followed by a Memo. If there is no change, a notice was issued to that department giving it time to abate the nuisance (section 119). If this is was not done, legal proceedings followed (section 167). Public health officials have occasionally sued the department of social
services for failing to maintain general cleanliness in the markets. In 2002, social services department was sued 5 times following public complaints about the status of the markets (Personal Communication, Prosecutor CCN). A significant number of vendors noted they had ever been charged in a court of law for failing to abide by the act ($\chi^2=10.240$, df=5, $p \leq 0.001$). In February and March 2005, 30 food vendors from City market were taken to court for failing to abate nuisances, which constituted a breach of the Public Health Act (Personal Communication, Prosecutor City Council of Nairobi). This included: Failure to clean their premises thoroughly, Lack of a valid medical certificate and lack of protective clothing. Unfortunately, court cases took long before a verdict was given. This greatly affected the implementation of public health standards in the markets concerned. For instance, a case concerning failure of City market to improve hygiene standards had been pending in court for the last one and a half years and judgment was yet to be delivered.

4.5 Suggestions to maintaining public health standards

In order to minimize or alleviate the constraints in maintaining and implementing public health standards in the markets, the respondents felt certain measures should be put in place. Majority of vendors (94%) suggested an improvement in waste disposal mechanisms. They felt that daily collection of garbage would prevent breeding of pests and other vermin which may cause diseases. A similar response was echoed by 4 market administrators. All the market administrators agreed that hiring of adequate manpower was necessary, especially those involved in cleaning the markets. Both vendors (87%) and market administrators’ recommended regular visits by the public health officers to inspect premises, ensure prevention of nuisance and give advice to the vendors. This would enhance implementation of public health standards in the markets. Meat business was
overwhelmed in Burma market. The public health officers felt that there was need to increase storage facilities as the existing ones were already strained. Zoning (separating different activities) in the market places was considered essential. This would entail allocating traders dealing with similar products to certain sections within the markets, especially those dealing with meat and meat products. The public health officers suggested that provisions should be made for transport and security details in the course of performing their duties, not only when conducting arrests.

According to the staff of social services department, the sanitation facilities were poorly maintained. Thus, they felt there was need to privatize these facilities. Market administrators and staff of social services in the markets suggested that funds should be decentralized within the markets. Bureaucratic procedures involved in obtaining money would be reduced and this would then ensure that any money collected from the markets would be re-invested to improve the market facilities, like in buying cleaning and painting materials. Appraisal of staff members was recommended as it would motivate them to work effectively and efficiently. The appraisals included staff retraining, promoting staff when opportunities arose, prompt and adequate payment of salaries. This would boost the morale of the work force and hopefully improve their efficiency.
CHAPTER FIVE: DISCUSSIONS

5.1 Implementation of Public Health Standards

Food stuffs can be protected from contamination by use of display cases or other effective means. In City market vendors had effective display cases for their meat (plate 4.2), in line with section 132[2] of the Public Health Act. However, this was not the case in Burma market (plate 4.1). The District Public Health Officer in charge of Burma Market noted that meat business in the market was overwhelmed. This may explain why the market lacked sufficient refrigeration facilities for storage. According to Argenti, 2001, services and facilities being provided by market committees are insufficient for proper packing and storage of food items. Purchasing of ready-to-use foods from market vendors poses a considerable health risk (WHO, 2004a). The reasons for this are apparent from the observational data in the markets. Foods were often displayed openly on the ground and in poor sanitary environments. The presence of flies at the markets and the apparent lack of facilities for food protection suggested a high potential for contamination. This scenario is replicated in a study done by Marcello and Claudia, 2003, which showed that insufficient market storage facilities especially cold storage facilities, led to increased contamination of food. This is because micro organisms multiplied very quickly if food was stored at room temperature (Marcello and Claudia, 2003).

The vendors played a major role in ensuring that public health standards were maintained. The duration a vendor operated in the market did not have an influence on awareness of the Act ($\chi^2=5.780; \text{df}=4; p>0.05$). This implied that the public health officers gave advice to the vendors on how to conduct their businesses without breaching the Public Health Act. The World Health Organization notes that market places have an important social function
in providing an avenue for exchange of ideas and knowledge. Thus provide an avenue which can be used to sensitize market community members on the importance on healthy market places (WHO, 2006). Majority of the vendors (63%) underwent a medical check up, in complying with section 135 of the Public Health Act. The findings concur with a study done in Nigeria, where medical examination practice among the food vendors was high (76%) (Musa and Akande, 2003). The number of years vendors had operated in the market did not influence them to go for a medical check up (Table 4.1). They went because they knew it was a requirement in the Public Health Act.

Section 123 of the Public Health Act allows the public health officers to inspect premises at all reasonable times. Majority of the vendors (65%) acknowledged that their premises were inspected before the license was renewed (table 4.3). The vendors noted that inspection of the markets was done either monthly, twice a month, every three months or half yearly. Among 35% of vendors who said that Public Health Officers did not inspect their premises, 5% noted they had ever offered a bribe to the Public Health Officers, to avoid legal proceedings. However, the Public Health Officers acknowledged they inspected the markets at least once a month. The variation in the frequency of visits can be attributed to the fact that some vendors were operating in the markets illegally (without a license). The Public Health Officers, however did not acknowledge having received bribes form the vendors. The Public Health Act had a serious flaw as it did not specify the frequency of inspection, and may explain why the public health officers made irregular visits to the markets. The district public health officer in Makadara District noted that subletting of food stalls was not allowed, hence such stalls were not inspected. Consequently no license from the Public Health was given. There was no significant
dependency relationship between inspection of markets and presence of nuisance (Table 4.5), an indication that public health officers conducted routine inspections of the markets, not because they anticipated nuisance.

Nuisance was present in the markets as noted by a significant number of customers and vendors (Table 4.6). This contravenes Section 116 of the Public Health Act. From the observational data, waste disposal mechanisms were poor as shown in Wakulima and Jogoo road markets (Plate 4.5 and 4.6 respectively). According to NEMA 2005, uncollected solid waste is a major environmental challenge in Nairobi. The city currently produces about 2400 tonnes of garbage daily and the city council collects about 1.4 tonnes per day. The findings concur with a study done in Lahore which found out that inadequate management of market waste acts as a source of unhealthy environment (Argenti, 2001). The findings also agree with the results of a study done in Nairobi, which found that due to lack of proper solid waste disposal mechanisms, unlawful dumping compounded the problem of a safe environment (Ondingi et al., 2004). According to the World Health Organization 1996, waste should not be allowed to build up as it will attract flies and other vermin. The waste may contain a multitude of disease causing organisms, hence the need to ensure waste removal in a regular and timely manner. Unattended waste lying around attracts flies, rats and other creatures that may in turn spread disease. Normally it is the wet waste that decomposes and releases a bad odour, which leads to unhygienic conditions. A study done in Buguruni market, Dar es salaam in Tanzania, found that improved mechanisms of waste disposal activities within and outside the market produced a synergism which contributed significantly to the hygienic conditions in the market (MOH, 1997).
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Presence of rats in most of the markets was acknowledged by both customers and vendors as shown in the table 4.6. Garbage and waste dirty water beside the food stalls was quite conspicuous because most of the vendors did not have garbage receptacles hence these became a breeding ground for houseflies. The conditions under which foods were handled by the vendors were questionable. The findings agree with a study done by Kilungu, which found out that foods were prepared in unsanitary conditions (Kilungu, 2003). This was because some vendors deposited their food and water wastes just next to their stalls. This resulted in a dirty environment that attracted houseflies, the presence of which compromised sanitation. Presence of pests is an indication of poor hygiene and sanitary practices. The results also concur with a study done in Nairobi which found that proper garbage collection and disposal were lacking and vendors had to put garbage in their own place. According to FAO, adequate drainage and waste disposal systems and facilities should be provided and properly designed so that the risk of contamination of food and portable water is low (FAO, 1995).

Water supply to the vendors was inadequate. Water for washing and rinsing utensils was reused for a long time before it was replaced. This resulted in some vendors buying the essential commodity. Consequently, hygiene was compromised. The results were consistent with a study done in Nairobi where vendors washed their utensils in buckets and rinsed only once. The water was replaced after using for a long time (Muinde and Kuria, 2005). World Bank asserts that safe water is an essential pillar for health (World bank, 1995). Latham emphasizes that personal hygiene can only be achieved if adequate water is available (Latham, 1997). Therefore, food vendors should have sufficient portable water
for drinking, preparation of all kinds of foods and sufficient running water for all washing operations.

Presence of nuisance can warrant closure of markets. A significant number of vendors (63) acknowledged that markets had ever been closed. In November 2006, Mogonga open air market in Gucha district was closed due to poor sanitary conditions, lack of proper drainage systems, and uncollected garbage. The closure occurred since the council did not address these areas cited to be a public nuisance (Mokuru, 2006). There was a significant association between closure of markets and presence of nuisance as shown in table 4.8. The significance level was $\geq 0.05$. These results contradict the findings of a study done by Winnipeg, which indicated that several food establishments had been closed for operating in filthy and unsanitary conditions (Winnipeg, 2007). This implied that when a nuisance arose from a particular market, the concerned department was informed verbally. A notice then followed, giving the concerned section enough time to abate the nuisance. Addressing the areas deemed to be a public nuisance did not therefore warrant closure of the markets.

5.2 Challenges in implementation of public health standards

Five out of six market administrators noted that lack of finances to run the markets was a major hindrance to proper implementation of public health standards. Social services officers also agreed that financial constraints affected implementation of public health standards in the markets. Each of the markets collected revenue which was later submitted to the City Treasury department. The officials charged with the day to day running of these markets were not left with petty funds for emergency as all the money collected was
remitted. For instance, in case of pest infestation in the market or need for brooms and other cleaning materials. The Public health act requires stalls to be painted regularly, but this was not done due to the bureaucratic procedures involved in obtaining the materials. All requests for finances and other materials needed to ensure and maintain proper public health standards in these markets had to be made through City treasury. The repair, cleaning and other requests made to the city treasury took long to be honoured. The bureaucratic procedures involved made it hard to plough back this money to improve the market facilities. This concurs with a study done by Maurizio and Olivio in 2001, where they found out that funds generated from market fees are not re-invested into maintenance, expansion and better services.

Five out of six market administrators acknowledged the sanitation facilities were poorly maintained. Majority of the sanitation facilities had no running water and were flowing with waste. However, all the markets had toilets as their sanitation facilities. The facilities had separate compartment for males and females as recommended by WHO. According to WHO, all public places need to have adequate sanitation facilities. The toilet facilities should be arranged in separate blocks for males and females (WHO, 1996).

The Social services and housing department was charged with the delivery of social services and provision of markets. Through the markets and trading services section, the department was responsible for the organization and management of all council’s public markets. Senior officials from social services also felt that waste disposal mechanisms posed a great challenge in implementation of public health standards. This was evident in the western zone which comprised of Wakulima, City, City park and Kariokor markets, as
opposed to eastern zone (Jogoo road and Burma markets). The social services staff also noted that the markets were cleaned once daily, and in every three months a general cleaning was done. In both zones, the social services staff noted that traders felt that the responsibility of maintaining cleanliness lay solely with the city council because they had paid cess fee. However, this attitude could have had an adverse effect on public health standards in the markets since the responsibility for keeping the markets clean lay with all those that used it, not only the appointed cleaning crews. Moy 2001, asserts that daily cleaning of the market is strongly recommended in order to ensure healthy market places.

Cooperation lacked between market vendors and city council officials resulting in poor maintenance of public health requirements in the public markets. There was lack of self discipline in the usage of CCN facilities. For instance, market administrators felt there was a tendency by the traders in the markets to misuse sanitation facilities. This led to blockage and thus poor maintenance as the council could not cope with the high demand. Yet, when asked to pay for using the facilities, the traders complained insisting that the facility should be used free of charge. The vendors also disposed off their waste carelessly reasoning that the cleanliness of the markets was solely the responsibility of the city council. Unfortunately, if the market was closed due to falling of hygienic standards, the vendors would also suffer. Poor working relations between administrators and the vendors hindered proper implementation of public health in the markets.

There was lack of harmonization among various sections in the City Council of Nairobi. The Public Health Department through the Public Health officers, was responsible for law enforcement, issuance of intimidation notices and seizure of unwholesome food. The City
Treasury Department was supposed to collect city council’s revenue, while enforcement of the city council’s by laws was done by the City Inspectorate Department. However, the public health officers found it hard to inspect the mushrooming illegal food kiosks in the markets, since they were not recognized by the public health department. Yet, officers from the city inspectorate collected cess fees from vendors in these kiosks. This interfered with implementation of the public health requirements in the markets. In the City Council of Nairobi, there were key players involved in maintenance of general cleanliness in the markets. The department of Environment was charged with the responsibility of collecting and disposing off waste in such markets whereas, the water and sewerage company was responsible for water supply. Failure, for instance to supply water or collect garbage by the concerned departments, resulted in nuisance presence in the market. This contravened section 116 of the act, which required local authorities to prevent nuisances.

Nearly all markets have a problem with waste disposal, leading to foul smell and acting as a breeding site for pests and other vermin. Uncollected solid waste is one of Nairobi’s most visible environmental problems (Mwaura, 1991). One half of the solid waste generated in Nairobi consists of organic matter. Estimates of daily generation of solid waste for the city as a whole, range from 800 tonnes (Syagga, 1992) to 1000 tonnes (Personal communication, CCN Social services department). Daily disposal capacity of the City Council of Nairobi is about 400 tonnes, less than fifty percent. The City Council of Nairobi cannot effectively collect the garbage generated in the city. However, it is the duty of the traders to keep the markets garbage free. There is a backlog of garbage collection since the department lacks appropriate infrastructure to dispose off on time (Personal Communication, CCN Environment department). A vendor in burma market felt they had
done their best to keep the market clean, and that the remaining bit was a responsibility of
the City Council of Nairobi.

The City Council of Nairobi estimates that private companies are disposing about 50
tonnes a month. Privatization as an alternative to publicly provided waste management has
been explored for developing countries. Privatization of refuse collection enables existing
capacities to manage the remaining waste load. The support offered by private refuse
collection enterprises has alleviated the problem and is therefore, appreciated (Bartone,
1991). However, mushrooming of such firms has created problems of control and
haphazard dumping. Due to this development, the department formulated a policy on
private sector involvement in solid waste management. It is hoped that with the
operationalization of the comprehensive Environment and Management Coordination Act
1999, the City Council of Nairobi will form a new section to address the environment
matters. Bartone, 1991, notes that the private sector can operate more efficiently than the
public sector in providing municipal waste services while, Cointreau, 1994, concludes that
it is a possible opportunity, not a panacea, for improving waste management in developing
countries. The implementation of Public health standards greatly depends on the
effectiveness of the city council to perform its roles especially within the markets.

Public health officers were not assigned official cars or security details unless a situation
was out of control, for example in case there was a disease outbreak, when conducting
arrests or if a notice had been issued regarding a threat to public health which required the
market(s) to be closed. This interfered with implementation and maintenance of public
health standards (Chief Public Health Officer, CCN). The Public Health officers were not
enough to cover their areas of jurisdiction regularly. The situation was made worse by low salaries, poor working conditions and lack of motivation. Inspection of markets was one of the duties of the public health officers. However, traders dealing with meat in burma market were aggressive towards the public health officers. This created a feeling of insecurity among the public health officers (Personal Communication, District Public Health Officer). All these problems could have made them ineffective in implementing public health standards in the markets.

Sixty seven percent of the market administrators felt that inadequate staff affected implementation of public health standards. The findings are similar to a study done by Smoke, which found out that problems of City council of Nairobi can be traced both to local and central government. Staff at both levels suffer from lack of decision making authority, lack of accountability, and heavy volumes of work due to understaffing (Smoke, 1994). Smoke also identified several financial problems that plague local authorities: neglect collection of taxes, dishonesty of revenue collectors and political pressure on officers to be less aggressive in revenue collection. This concurs with a study done by Bubba, which identified that these problems were exacerbated by political difficulties at the city level (Bubba and Lamba, 1991). There was poor relations between the politicians and officers. The City Council of Nairobi had been at the center of those controversies. These organizational, fiscal and political problems faced by central and local governments in Kenya resulted in inability to cope with the staggering population growth. There was excessive strain placed on existing facilities and under investment in new ones. Urban services, including waste management were, especially affected (Ibid).
CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

i. There was inadequate compliance with the requirements of the public health act amongst the food vendors. Thirty seven percent of the food vendors did not undergo a medical examination as required. The results revealed no significant association between medical examination and duration of operation in the market ($\chi^2=2.384; \text{df}=4; p\geq0.05$). The duration a vendor operated in the market did not have an influence on awareness of the Act ($\chi^2=5.780; \text{df}=4; p\geq0.05$).

ii. Presence of nuisance in the markets was a contravention of the public health act section 116. These included poor sanitary conditions, presence of pests, foul smell, and inadequate water. Waste disposal mechanisms were poor. This resulted in a dirty environment that attracted houseflies, presence of which compromised sanitation.

iii. The city treasury department is responsible for collection of the council's revenue. Repair, cleaning materials and other requests took long to be honoured. The bureaucratic procedures involved made it hard to plough back the money into maintenance, expansion and offering better services in the markets.

iv. Public health officers lacked official transport arrangements and security details in the course of performing their duties, unless when conducting arrests or in case of a disease outbreak. The Public Health Act was not clear on the frequency of inspection. Thus, the public health officers did not inspect the markets regularly.

v. There was a feeling that the structural design and congestion had no impact on implementation of public health standards in the markets, an indication that the structural design of buildings was never seriously assessed and may lead to collapse of buildings.
6.2 Recommendations and areas for further research

6.2.1 Recommendations

i. Decentralization of funds generated from the markets is recommended. Bureaucratic procedures involved in obtaining money from the city treasury would be reduced. These funds can then be re-invested in maintenance, expansion and offering better services within the markets.

ii. Adequate arrangements should be made to provide the public health officers with official transport and security details in the course of performing their duties, not only when a situation is out of control. There was a flaw in section 123 of the public health act as it was not clear on the frequency of inspection, hence the need to review this section.

iii. Inadequate provision for the collection and disposal of solid wastes is associated with a great range of disease vectors like cockroaches, houseflies and rodents, living and breeding within and around the solid waste areas. Attention may be given to the possibility of implementing practices such as composting into manure and recycling of materials into animal feeds.

6.2.2 Recommendation for further research

i. Similar research work should be conducted in other public markets, both in rural and urban areas. The study only focused on Wholesale and Rental categories of the City Council of Nairobi. Other studies can also be done on other categories of City Council of Nairobi markets, that is Self constructed, Tenant purchased and Open air markets.
REFERENCES


APPENDICES

APPENDIX 1: DISTRIBUTION OF FOOD VENDORS AND CUSTOMERS PER MARKET

<table>
<thead>
<tr>
<th>Market</th>
<th>Number of Food Vendors</th>
<th>Sample of food vendors</th>
<th>Customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burma</td>
<td>140</td>
<td>10 x 140 = 14</td>
<td>14 x 3 = 42</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>City</td>
<td>50</td>
<td>10 x 50 = 5</td>
<td>5 x 3 = 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>City Park</td>
<td>260</td>
<td>10 x 260 = 26</td>
<td>26 x 3 = 78</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Jogoo road/Uhuru</td>
<td>30</td>
<td>10 x 30 = 3</td>
<td>3 x 3 = 9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Kariokor</td>
<td>20</td>
<td>10 x 20 = 2</td>
<td>2 x 3 = 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Wakulima</td>
<td>500</td>
<td>10 x 500 = 50</td>
<td>50 x 3 = 150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,000</td>
<td>100</td>
<td>300</td>
</tr>
</tbody>
</table>
APPENDIX 2: RESEARCH INSTRUMENTS

FIELD RESEARCH QUESTIONNAIRE (A) – Market Administrators

Hello, My name is Kirimi Florence, a Masters of Public Health student at Kenyatta University. I am carrying out a research on “Constraints in implementation of public health standards in selected city council markets, Nairobi. You are one of the officers chosen to provide the necessary data. The information you give will be used exclusively for academic purposes and treated with utmost confidentiality.

Name of Market ....................................................................................................................

SECTION ONE (Personal Data)

Question one

   Gender □ Male □ Female

   a) How long have you worked with the city council of Nairobi?

       □ < 5 years □ < 15 years □ Over 21 years

       □ < 10 years □ < 20 years

   b) What is your present rank?

       □ Administrative assistant □ Senior administrator

       □ Superintendent

       □ Any other. Please specify.................................................................

   c) What is your highest level of education?

       □ Primary level □ Secondary level

       □ Tertiary level □ University level

       □ No formal education

   d) Please state, if any, the professional qualifications you hold, in the space provided.

                                                                                           .................................................................
                                                                                           .................................................................
                                                                                           .................................................................

   e) Do you have any other allowances apart from your salary and house allowance?

       □ Yes □ No
f) What is the major source of water supply for the traders?

- Piped water (city council)
- Rain water
- Purchasing water
- Borehole/well/spring
- Other


g) How often is the water available?

- Daily
- Twice a week
- Thrice a week
- Other


h) On estimate, how much waste is disposed off from the market daily (in tonnes)?


i) How often is the garbage collected?

- Daily
- Twice a week
- Weekly
- Other


SECTION TWO

Question Two

I would like to know how the factors below affect the proper implementation of Public health standards in the market, especially stalls selling raw and ready to eat foods.

**Key**

(4) Does not at all affect the implementation

(3) Somehow does not affect the implementation

(2) Somehow affects the implementation

(1) Badly affects the implementation

Please tick one.

<table>
<thead>
<tr>
<th>Factor</th>
<th>(4)</th>
<th>(3)</th>
<th>(2)</th>
<th>(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. Electricity supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. Availability of reliable road network</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iii. Congestion in the market</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv. Lack of adequate finances to run the market</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>v. Inadequate staff</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vi. Unreliable clean water supply</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>vii. Poor sanitary conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>viii. Poor disposal of waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ix. Poor structural design of the market</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Question Three
The City Council of Nairobi is supposed to ensure that proper public health standards are maintained in such markets. Frequent closures of some of the markets indicate a failure on their part. What would you attribute this to?

Question four
Under the present circumstances, what remedial measures ought to be taken to ensure that such closures do not occur in future?

THANK YOU.
FIELD RESEARCH INTERVIEW SCHEDULES (B) – Food Vendors

Hello, My name is Kirimi Florence, a Masters of Public Health student at Kenyatta University. I am carrying out a research on “Constraints in implementation of Public Health standards in selected City Council markets, Nairobi”. You have been chosen as one of the respondents in the study. The study will be useful to the management in improving its services. The information you give will be kept confidential.

Name of Market ..................................................................................................................................................

Gender □ Male □ Female

1. How long have you been operating in this market?
   □ < 5 years □ < 10 years
   □ < 15 years □ < 20 years
   □ Over 21 years.

2. Type of food being sold by the vendor ..........................................................................................................

3. a) Are you aware of the public health standards in the Public Health Act?
   □ Yes □ No
   b) If Yes, briefly state the contents in the space provided...................................................................................

4. During your operation time in the market, have public health officers or other government officials ever closed it down?
   □ Yes □ No

5. If your answer to question four above is yes, what reasons were given for the closure?
   ........................................................................................................................................................................

6. Do you normally get consistent supply of water for use in the business?
   □ Yes □ No

7. If your answer to question six above is no, how do you get your water supply?
   ........................................................................................................................................................................
8. How do you dispose off wastes originating from your business?

9. Are you aware of the existence of any pests within the market or its surrounding?
   - Yes
   - No
   - Not sure

10. Do you and your staff go for medical check ups to ascertain your state of their health?
    - Yes
    - No

11. Do public health officers inspect the market?
    - Yes
    - No

12. If your answer to question eleven above is yes, how often do they come?
    - Once a month
    - Every 3 months
    - Half yearly (after 6 months)
    - Once a year
    - any other, Specify

13. If your answer to question eleven above is yes, do they give you advice on how you should conduct your business without breaching the public health act?
    - Yes
    - No

14. If your answer to question thirteen above is yes, what sort of advice do they give? (specify)

15. Have you ever been charged in a court of law for breaching the public health act?
    - Yes
    - No
16. If your answer to question 15 above is yes, what was the charge? (specify)

17. What do you feel constitutes a nuisance in the markets?

18. What do you think the CCN should do to improve and maintain good public health standards in the market?

THANK YOU.
FIELD RESEARCH QUESTIONNAIRE (C) – Department of Social Services and Housing

Staff

Hello, My name is Kirimi Florence, a Masters of Public Health student at Kenyatta University. I am carrying out a research on “Constraints in implementation of Public Health standards in selected City Council markets, Nairobi”. You have been selected as one of the officers to participate in the study. Please assist me by answering the questions as accurately as possible. The information you give herein will only be used for academic purposes and will be treated confidentially.

SECTION A

Name of Market .................................................................

Question One

Gender  □ Male  □ Female

a) How long have you worked in this department?
   □ < 5 years  □ < 10 years
   □ < 15 years  □ < 20 years
   □ Over 21 years.

b) What is your present rank?

............................................................................................................

............................................................................................................

c) How often are the markets cleaned?
   □ Daily  □ weekly  □ monthly
   □ Not at all  □ any other, specify ........................................................

............................................................................................................

d) How often do you paint the stalls and the market in general?
   □ Very often  □ often
   □ not so often  □ rarely
   □ Any other (specify) ..............................................................................

............................................................................................................
e) Which type of sanitation facilities are used in the market?
- [ ] Toilets
- [ ] Latrines
- [ ] Other

f) How often are the sanitation facilities cleaned?
- [ ] Daily
- [ ] Twice a week
- [ ] Weekly
- [ ] Other

g) What would you say about the sanitary conditions in the market?
- [ ] Sufficient and well maintained toilets
- [ ] Insufficient but well maintained
- [ ] Sufficient but poorly maintained
- [ ] Insufficient and poorly maintained

h) Do you have a policy on how general cleanliness should be maintained in the markets under your jurisdiction?
- [ ] Yes
- [ ] No

i) If yes, do you adhere to the policy?
- [ ] Yes
- [ ] No

j) If the answer to (i) above is yes, briefly comment on its effectiveness.

Question Two

How would you rate these factors as agents of implementing proper public health standards in the market?

<table>
<thead>
<tr>
<th>Key</th>
<th>(1) Excellent</th>
<th>(2) Good</th>
<th>(3) Fair</th>
<th>(4) Worse</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
</tbody>
</table>

Please tick one

i. Waste disposal mechanisms

ii. Cooperative workforce

iii. Political goodwill from top political will of CCN

iv. Sufficient funds to manage cleanliness

v. Sufficient and reliable water supply
vi. Caring and well informed traders
vii. Constant supply of electricity

Question Three
What are the major factors that can be attributed to declining hygiene standards in most CCN markets?

Question Four
What do you think could be done to improve the implementation of public health standards in CCN markets?

THANK YOU.
FIELD QUESTIONNAIRE (D) – Public Health Officers

Hello, My name is Kirimi Florence, a Masters of Public Health student at Kenyatta University. I am carrying out a research on “Constraints in implementation of Public Health standards in selected City Council markets, Nairobi”. You are one of the officers chosen to provide the necessary data. The information you give will be used exclusively for academic purposes and treated with utmost confidentiality.

SECTION ONE

Name of Market ...........................................................................................................................................

Gender    □ Male □ Female

1. How often do you inspect city markets to ensure that proper public health standards are maintained?
   □ Once a month □ Every 3 months □ Half yearly (after 6 months)
   □ Once a year □ Any other, specify ..............................................................

2. On such visits, how do you normally find the public health standards in such markets?
   □ Quite satisfactory
   □ Satisfactory
   □ Unsatisfactory

3. What action(s) has your office taken in cases where the public health state is not satisfactory?
   □ Give warnings to relevant authorities
   □ Order closures of the markets
   □ Sue the offending party
   □ Take no action
   □ Others (specify) .............................................................................................................................
4. What do you consider a nuisance in the markets?
   - Sanitary problems
   - Poor food handling
   - Poor waste disposal
   - Others (specify)

5. What would you consider to be the stumbling blocks in carrying out your official duties?

6. What is the official position regarding public health in the day-to-day running of public markets?

THANK YOU.
FIELD RESEARCH INTERVIEW SCHEDULES (E) - Customers

Hello, My name is Kirimi Florence, a Masters of Public Health student at Kenyatta University. I am carrying out a research on “Constraints in implementation of Public Health standards in selected City Council markets, Nairobi”. You have been chosen as one of the respondents in the study. I will be very glad to have your responses. The information you give will be kept confidential.

Name of Market..............................................................................................................

Gender □ Male □ Female

1. How often do you visit this market?
   □ Daily □ Twice a week
   □ Three times a week □ Occasionally
   □ Any other, specify .................................................................

2. Where do you stay?
   □ Eastlands
   □ Westlands
   □ Nairobi west
   □ Others (specify).................................................................

3. What do you normally come for in the market?
   □ To eat
   □ To buy food
   □ Others
     (specify)...........................................................................

4. Type of food the customer is purchasing............................................
5. What normally attracts you to the market?
   - It is convenient
   - It offers good prices
   - Lack of an alternative
   - Others
     (specify)

6. What do you feel constitutes a nuisance in the market? (Tick as many)
   - Poor disposal of waste
   - Foul smell
   - Overcrowding in eating places
   - Poor ventilation
   - Poor sanitary conditions
   - Presence of pests in the market
   - Lack of clean drinking water
   - Others (specify)

THANK YOU
APPENDIX 3: ETHICAL CLEARANCE DOCUMENTS

A) Letter from the City Council of Nairobi

TO : MEDICAL OFFICER OF EHAULTH
     (CITY HALL)

: DIRECTOR OF SOCIAL SERVICES & HOUSING
   (CITY HALL ANNEXE)

REF : CCN/HRM/22/VOL.11/2406/(632)/05

DATE : 27TH DECEMBER, 2005

RE : FLORENCE KAWIRA KIRIMI - 157/5019/2003 - RESEARCH STUDY

The above named who is a postgraduate student undertaking master of
Public Health Degree Programe at Kenyatta University, has been authorised
to carry out a research on "Factors that determine Implementation of Public
Health Standards in selected City Council Markets, Nairobi.

Please accord her the necessary assistance.

J. I. NYAGAH (MRS)
FOR : DIRECTOR - HUMAN RESOURCES MANAGEMENT
HAR/vgm
B) Letter from Ministry of Education, Science and Technology

MINISTRY OF EDUCATION, SCIENCE & TECHNOLOGY

Telegrams: EDUCATION", Nairobi

Fax No. 318581

Telephone: 318840

When replying please quote

MOEST 13/001/35C 586/2

15th December, 2005

Florence Kawira Kirimi
Kenyatta University
P.O. BOX 43844
NAIROBI

Dear Madam

RE: RESEARCH APPLICATION

Following your application for authority to conduct research on “Factors that determine implementation of Public Health Standards in selected City Council Markets, Nairobi”, I am pleased to inform you that you have been authorized to carry out research in Nairobi City Council Markets for a period ending 30th July, 2006.

You are advised to report to the Provincial Commissioner, Nairobi, the Provincial Director of Education Nairobi and the Town Clerk, Nairobi City Council before embarking on your research project.

Upon completion of your research project, you are expected to submit two copies of your research report to this Office.

Yours faithfully

M/O, ONDIEKI
FOR: PERMANENT SECRETARY
Cc

The Provincial Commissioner
Nairobi

The Provincial Director of Education
Nairobi

The Town Clerk
Nairobi City Council
Nairobi
C) Letter from Nairobi Provincial Commissioner

OFFICE OF THE PRESIDENT

PROVINCIAL COMMISSIONER
NAIROBI AREA
P.O. BOX 30234-0010
NAIROBI

13th January 2006

M/S Florence Kavira Kirimi
P.O. BOX 54080-00200
NAIROBI

RE: RESEARCH AUTHORIZATION

Authority is hereby granted to you to conduct a research "Factors that determine implementation of public Health standards. The areas include covered the Nairobi City Council Markets for a period ending 31st July, 2006.

(KULA R. MACHE)

FROM: PROVINCIAL COMMISSIONER,
NAIROBI PROVINCE,

P.O. BOX 10224, NAIROBI