THE RELATIONSHIP BETWEEN INCOME AND FOOD CONSUMPTION PATTERNS IN URBAN NAKURU

BY

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A Thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Applied Human in the Department of Food Technology and Nutrition University of Nairobi.
DECLARATION

I, Diannah Mueni Wathome, hereby declare that this thesis is my own work and has not been presented in any university for a degree.

Signed

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(i)
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This piece of work is dedicated to my Lord, God and Saviour who provided me with His ever sufficient Grace to successfully complete the work.
This thesis reports on a study carried out in Nakuru Municipality to determine the relationship between income status and food consumption patterns of its indigenous Africans. Residents from three different income groups, i.e., high, mid, and low were interviewed using a structured questionnaire, to determine their food consumption patterns as well as their income status. Food consumption patterns were defined in terms of consumption frequency, expenditure, and the quantity consumed of selected food items. The consumption of two nutrients was also looked into.

The results showed that there was a significant variation among the groups in the food consumption patterns. The findings also indicated a general trend in which consumption of most of the food items increased with rise in income. Their consumption was highest in the high income group and lowest in the low income group. There were a few foods however that differed from this general trend. The consumption frequency of maize and beans, and the amounts consumed of maize-meal, maize, beans, and sugar differed from the general trend. The expenditure on maize-meal,
maize, and beans also differed. These observations led to the conclusion that there is a relationship between income and food consumption patterns, i.e., the level of household income influenced the frequency of consumption, the amounts consumed, as well as the expenditure on food items. These findings suggest that income is an important factor influencing food consumption patterns. It is therefore recommended that income be taken into account in the planning and formulation of nutrition policies.
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CHAPTER 1

INTRODUCTION

1.1 Introduction

In order for a nation to develop, the basic needs of its people must be adequately met. One of the most important of such needs is the need for adequate nutrition. The interrelation between household monetary availability and food consumption patterns, provides relevant data to those involved in development issues. The data provided gives insight into existing situations on which policy makers, programme planners, and more specifically health and economic planners can base their decisions.

In the present day, household food consumption patterns may be largely attributed to the household economic situation. In the past, man's food consumption patterns were determined mainly by the territory where he lived. The soil and climate in the region determined the foods that could be grown, while the geographical location determined the availability of other food products, e.g., fish in places close to a water source. Man therefore made of food what was available to him (Rao, 1976). Thus, through the centuries, cultures have
revolved around the principal indigenous foods that are locally available. These food cultures included special and sometimes unique food preparation methods and processing techniques that have had a role in determining the food consumption patterns of the people who practiced them. Therefore, indigenous foods and their respective cultures kept populations on the same food patterns for generations.

However, with the advent of change in socio-economic structure and urbanization, other factors have set in as determinants of food consumption patterns. These include, among others, level of education and economic status (Rao, 1976). Economic status is principally a function of income especially in urban areas where people purchase most of the food they eat. It would therefore be expected that in such areas income will influence the type of foods people buy. But is this really the case? And if it be so, how does the income influence what foods people buy? This study has set out to answer these questions by attempting to establish whether there is a relationship between Income Group and food consumption patterns of the residents of urban Nakuru, Kenya.

The study focuses only on the indigenous African population in the study area for two reasons. Firstly,
they are the majority among the residents just as is the case in most of the other urban centres in Kenya. Therefore the results can be well extrapolated. Secondly, this is intended to prevent the introduction of errors brought about by the vast differences in the socio-economic status and in food consumption patterns between the indigenous and non-indigenous African communities.

The choice of the study area was influenced by the fact that urban Nakuru represents an area in which the results of the study will be little influenced by foods received as gifts because it is situated in the midst of a large scale farming area which mainly produce commercial products and far from small scale farming rural areas. Normally, people in urban areas obtain foods mainly by buying, although they can also obtain some as gifts. It is common practice for indigenous Kenyan urban dwellers to get (or receive) foods from relatives and friends in the rural areas. The closer the home place of the urban dweller, the more frequent the trips between the urban and rural areas, and vise versa, and therefore the more the foods received from the rural areas (Anonymous, 1981). It is therefore expected that there will be negligible influence on the study by foods obtained from rural areas as gifts in this study area.
1.2 Statement of the problem

In comparison to the number of studies that have been done on other subjects, very few have been done on income and food consumption patterns. Those concerned with the interrelation between the two variables are even fewer. Most of the studies that have related income to food consumption have shown that income influences food consumption. There are few studies however that have indicated that income does not affect food consumption.

In view of the few studies that have been done on the subject, it is not surprising that there is no documented study done in Kenya that relates income to food consumption. This study therefore seeks to fill in the gap of knowledge indicated by establishing if and how income influences the food consumption patterns of the residents of an urban area of Kenya.

1.3 Expected benefits of the study

It is hoped that this study will contribute to the little information that exists on the relation between income and food consumption patterns. The need for such information has been pointed out by some researchers. Solomons (1989) for example indicated a
need when he pointed out that the degree to which the process of urbanization and its nutritional consequences are generalizable remains a question to be answered. Furthermore, it has been recognized that any meaningful policies can only be based on information generated through research and a monitoring system (Oniang'o, 1988). The results of this investigation will provide useful information on which the formulation and amending nutrition policies can be. This is important because governments can ensure adequate nutritional status for their citizens (which is essential for productive living) by formulating and amending existing nutrition policies.

1.4 Objectives of the study

The main objective of the study was to determine the relationship between income level and food consumption patterns by:

(i) Determining household income group.

(ii) Determining weekly frequency of consumption selected food items.

(iii) Determining the approximate amount of selected food items consumed in a week.

(iv) Determining household expenditure on food items.

(v) Determining the approximate household nutrient (calories and protein) consumption.
1.5 Hypotheses of the study

The study is based on the following hypotheses:

1) The level of household income influences the consumption frequency as well as the amounts consumed of certain food items.

2) The level of household income influences the expenditure on food items.

1.6 Definition of terms used in the study

a) Household: A residential unit whose occupants living together have their needs met from common resources.

b) Household member: Anyone who was living in the residence at the time of the survey, and who had been living there for at least one month.

c) Income: The cash earnings of all the household members from all sources.

d) Food consumption patterns: This refers to the following:

i) The number of times in a week that selected food items are consumed.

ii) The amount of selected food items consumed in a week.

iii) The amount of money spent on food items.

e) Income group: defined as the economic status of a household as determined by the total household income, the value of observable household items, the
occupation of the head of household, and the residential area.
CHAPTER 2

LITERATURE REVIEW

2.1 Studies on Income and Food Consumption Patterns

Most of the studies that have been done on Food Consumption and Income can be classified into two major groups. One group focused on establishing how households respond to changes in income and food prices. These are mostly economic-oriented studies in which the findings are reported in forms such as consumption functions which are of meaning mainly to the economist (Vander-Moortele et. al., 1982; Benton et. al., 1985; Gaeg et. al., 1985; Quisumbing, 1986; Adrian, 1976; Alderman, 1984; Pinstrup-Andersen et. al., 1984). In the other group are those studies which have focused on the relationship between income and nutritional status or food consumption patterns of cash crop and food crop farmers with the aim of comparing which of the two groups are better off nutritionally.

Relatively few studies have investigated the relationship between income and food consumption patterns especially, in reference to the relationship
between income and specific foods or nutrients. The relationship between income and food consumption patterns has been indicated in reports and revealed in a number of studies. In a study to determine the influence of income and the length of urban residence on the dietary patterns, food intakes, and nutrient adequacies in a peri-urban slum in Brazil, (Amorozo et al. 1984) found that the dietary expenditure was significantly related to income, and that income was the major determinant of nutritional adequacy. Chaudhury (1986) observed that income was a very important factor in determining nutritional status in developing countries. In another study on income distribution and consumption patterns in rural and urban Kenya, it was shown that food expenditure patterns between income groups were different (Van der Moortele, 1982).

Among the reports in which a relationship between income and food consumption has been indicated, is one on the patterns of urban food purchasing behaviour in Kenya (Kwofie et al., 1988). In this report, income is said to influence food consumption behaviour of the urban dwellers in Kenya. The report also shows that the proportion of household expenditure devoted to food follows Engel's law which states that as the total income increases, a decreasing proportion of the total
income is spent on purchasing food commodities.

Meilink (1987) also reported on food consumption and prices in Kenya, noting that income was a crucial factor in determining a household's ability to meet its food requirements. Swanberg (1976) reported that the results of several consumption studies revealed that food consumption is income related. A report on economic growth, income, and nutrition pointed out that income is a major determinant of diet quantity and quality (Berg, 1983). Similar studies in India (India National Monitoring Bureau, 1984) and Indonesia (Chernichovsky, 1982) have revealed that household incomes significantly affect food consumption patterns. Similarly, results presented in a Food and Agricultural Organization (FAO) report on surveys that were carried out in various countries of the world showed a general tendency among the urban populations in developing countries to increase the consumption of cereals and cereal products, vegetables, fruits, meats, eggs and diary products as income increases (FAO, 1986).

Economic status (of which income is a major element) has been reported by various authors and researchers to be a major determinant of food consumption patterns (Rao, 1976; Chaudhury, 1986; Armstrong et. al., 1987).
These studies have underscored the role of economic factors in influencing the quality of diet. Household income has been shown to affect consumption of certain specific nutrients. For example, in a study to determine the impact of socio-economic factors on the consumption of selected nutrients in the United States, Adrian et. al. (1976) found disposable household income to be a significant factor affecting household consumption of protein, fat, thiamine, and vitamins A and C. Swanberg (1976) also reported that protein and calorie consumption is highly correlated to income levels. Gray (1982) in a report on food parameters in Brazil noted that as incomes rise the consumption of root tubers declines whereas that of cereals, meat and dairy products rises rapidly. In another study, Aylward et.al. (1975) found that in developing countries protein intake and quality vary greatly with socio-economic class, and also that whereas the upper and middle income groups usually have a satisfactory protein intake, low income groups have an intake which is very low. Reutlinger et. al. (1976) also showed that as incomes rise, people turn to foods containing more and higher quality nutrients per calorie. In a study to determine the effects of income and other factors on food consumption (West et. al., 1976) it was established that income exerts an effect on the value of food consumed and therefore on the nutrients.
consumed as well. A similar relationship was expressed by Meilink (1987) in another report which showed that household income is a crucial factor affecting a household’s ability to meet its food requirements. On the other hand, a number of other reports have reported that income does not affect food consumption. In one such report, Ritchie (1967) gave examples of various studies which showed income had no effect on food consumption. One such study showed that in spite of the great differences in cash income, the quality of diet of the groups studied were identical. In another report (Schnetz et. al. 1984) indicated that economic status does not affect foods eaten.

2.2 Urban Nutrition

Until recently the nutrition community focused its research on rural populations of developing countries. Although nutritional problems of urban communities have not been totally abandoned, much evidence points to some degree of neglect of urban nutrition in the tropics. Interest and activity in nutrition in these countries spans barely 50 years. The end of the second world war is said to have been the land mark for awakening interest in nutrition of the third world (Gross et. al., 1985). It was after the war when the United Nations was formed that the Food and
Agricultural Organization undertook a project to establish the distribution of kwashiorkor, that Protein-energy malnutrition (PEM) was found to be widespread in rural areas, the populations amongst whom it had been sought. Since then the nutrition community has focused interest mainly in rural nutrition issues.

Various reasons have been suggested as to why urban populations have been neglected. One of them is the belief that most hardships exist in the rural areas where the majority of the population reside. Another is that urban populations are not easy to study. There is the fear of hostility and aggression from urban dwellers. The demographic instability of the populations may also be frustrating (Oniang'o, 1988). Rural populations on the other hand are easy to study, more friendly and have a lesser tendency to be lost to follow-up (Gross et. al., 1985).

Although when the UN was formed the majority of the world's population lived in the rural areas, the picture today is different. In 1950 47% of the people in developed countries and 83% of those in developing countries lived in rural areas. In recent times, the urban population has been increasing rapidly and the number is still growing. Today there are more urban dwellers and it is projected that by the year 2000 more
than half of the world's population will be living in urban and peri-urban areas (Solomons et. al., 1987). In Africa the rate of urbanization is estimated at 6% per annum, which is higher than the population growth rate. In Kenya the urban growth rate is estimated at 7.9% per annum (Government of Kenya, 1989) and is expected to double in less than 10 years (Oniang'o, 1988). Hunger and malnutrition in the cities of the developing countries have been said to arise as a consequence of rapid urbanization (FAO, 1986). Considering therefore, the rapid urbanization evident from the figures shown above, it is expected that the magnitude of urban malnutrition will increase at the same rate. This realization calls for increased concern for urban nutrition issues. A sense of urgency is added to such a need by the realization that many urban dwellers in Africa have poorer nutritional status than rural residents (Hance, 1970).

It is not until recently that the nutrition community worldwide has shown increased interest in urban nutrition issues (Solomons et. al., 1987). In the Western Hemisphere Nutrition Congress V held in 1983, the organizers recognized the need to focus on metropolitan issues of developing nations (Gross, 1985). Despite the current interest in urban nutrition, there remains plenty to be done on the
subject. It has been pointed out that according to available data, the nutritional situation in urban areas is very poor and needs immediate attention (Oniang'o, 1988). Other authors have pointed out the need for international meetings to have as the centre of focus, the subject of progress in urban nutrition in the developing world (Gross et. al., 1985). The need to address certain specific areas of urban nutrition such as consumer behaviour of socio-economic groups when conducting studies in household food consumption patterns has been pointed out by Kwofie et. al. (1988).

2.3 Planning Food and Nutrition Programs and Policies

Malnutrition and its serious consequences for development and well being of the people has been an issue of major concern throughout the world. This has been demonstrated by the substantial efforts that the international community, governments, and institutions of developing countries have put to combat the causes and consequences of nutritional disorders. These efforts include large programs involving considerable resources (West et. al. 1976). In order for these programs to achieve their objectives and to ensure that the sources so spent are effectively used, the projects
and programs set to combat malnutrition must be based on factual information on the nature of the existing nutrition situation and the factors affecting nutrition. West et. al. (1976) efforts include large expressed this point by reporting that although much has been learned about the multiple causes of malnutrition and about the methods for assessing nutritional problems and of planning nutritional strategies and programs, there has been considerable uncertainty as to which of the interventions are likely to be most effective in particular environments. They also pointed out that this lack of information can lead to wasted resources or delays in implementation, and has been a primary contributor to the inability of many programs to produce the expected results. In addition to playing a vital role in designing nutrition programs, information on the current nutrition situation is also of vital importance in the formulation of food and nutrition policies. These have been recognized to play a key role in solving nutritional problems (Hartog et. al., 1985). Quinsembing (1986) also expressed the importance of nutrition policies in combating malnutrition when he reported that food analysts have recognized the importance of including nutrition-specific policies in development plans. The view mentioned above on the importance of factual information in combating
Malnutrition has been shared by other authors. Omawale (1984) pointed to the importance of examining socio-economic data in relation to nutrition in order to be able to formulate policies that might improve nutrition. Similarly, Hartog et al. (1985) reported that in order to formulate and implement effective food and nutrition policies, it is crucial to know the nature and the extent of nutrition problems (i.e., who are the malnourished, under what circumstances, and why). It is therefore clear that while some authors have reported that income influences food consumption, others have reported that income has no effect on food consumption. As such there is no common agreement and the subject needs further investigation. The literature also revealed that there is need for increased interest in urban nutrition issues, venturing in undertakings that will generate the very much needed information on the nutrition situation and factors affecting it. It is also evident that such information serves a vital role in the formulation of effective food and nutrition policies and programs, whose role in improving nutrition has also been demonstrated. This study has undertaken to provide such information as mentioned above by determining how income affects the food consumption patterns in a Kenyan urban setting.
CHAPTER 3

THE STUDY SITE RESEARCH IMPLEMENTATION
AND METHODOLOGY

3.1 THE STUDY SITE

As has already been stated, Nakuru municipality was selected as the site for this study. It is the fourth largest town in Kenya and the capital of the Rift Valley province. It is situated on the bed of the famous geographical feature, the great Rift Valley, and on the slopes of the extinct Menengai volcano. It is situated at 6,070 ft. (approximately 2000m) above sea level, and at 36 degrees east of the central longitude, and at 0.4 degrees south of the equator. The population of Nakuru projected from the 1979 census to currently stands at 200,000.

Nakuru is the centre of large scale farming in the Rift Valley province. About 90% of the land in Nakuru district and the surrounding districts is fertile and favours the growth of wheat, maize, barley, pyrethrum, and coffee. Rearing of beef and dairy cattle as well as sheep is also carried out.
Nakuru has an array of industries, many of them situated on the western side of the municipality where the industrial area is located. Most of these industries are agro-based, dealing with human and animal food processing, or in forest and timber products. There are, in addition, a few chemical industries, as well as an industrial estate with some 19 companies producing a variety of other items.

The industrial area constitutes but a small part of the municipality, while the bigger part constitutes of residential areas. Although the living quarters in these areas fall under three different ownership types (i.e., the Municipal council, the Government, or private companies and individuals) they are not located by ownership. In some places there is a mixture of living quarters owned by the parties mentioned above. Other residential areas are exclusively Municipal Council areas, but the majority of the quarters in many of the residential areas are owned by private companies and individuals.

Most of the residential areas can be categorized by income group. Knowing who owns the quarters helps in categorizing an area by income group. This is
especially so in the cases where the quarters are owned by the municipal council, government or private companies. In such cases residents are housed in such a way that each area houses residents of a particular income bracket.

For purposes of mapping, the areas of the municipality are divided into three divisions, i.e., the north, south, and central divisions. This grouping will be used for the sake of discussing the various residential areas and the income groups under which they fall.

In the north there are five residential areas: Milimani, Menengai, Dawsonville, London, and Hilton. In Milimani there are three categories of houses; Government senior staff houses, municipal council senior staff houses, and private houses. This area is categorized as being high income, the minimum income of the residents is estimated at over Ksh. 6,000 a month. Menengai which comprises mainly of plots owned by individuals is categorized as a middle income area. Hilton and London are shanties and therefore low income areas. Dawsonville is a mid income area.
In the central division are most of the commercial and residential areas of the municipality, the major shopping areas, schools, and other social amenities. The residential areas include municipal council mid income sections such as Ngala, Moi, Kabachia, Gilani and Shabab. This area also has individually owned plots whose residents comprise different income categories with the majority falling under the mid income group. Mohamed Kahero and Kenlands are other mid income areas in this section as well as also quarters owned by the Kenya Grain Growers Co-operative Union and the Pyrethrum Board. Koinange estate and Section 58 which are situated in this area are categorized as mid to high income areas. Low income areas include Mithonge (also known as Kanyi), Kisulisuli, Free Area, Ziwani, and Bondeni (included in this area are quarter for police officers). In this area also are Seremoi and Mama Ngina estates. 'Old Prison' (which houses senior staff of the Kenya Railways Cooperation) and a neighbouring un-named area all which are categorized as being mid-high income areas.

In the south division there are more residential areas which are categorized as mixed income areas than
there are in the other two divisions. Ngera is a mid-high income area while Pangani, Freehold, Longdays, Langalanga I, II and III, Flamingo II, Kaloleni C, Ojuka, 'USAID', as well as an area that belongs to the Kenya Posts and Telecommunications Cooperation are said to be low-mid income areas. Lake View is a low income area with a few mid income residents scattered in the area. Other low income residential areas in this division include Race Track, Kimathi, Flamingo I, Kivumbini I, II, III and IV, Shauri Yako, Kaloleni A and B, Paul Machanga, Nakuru Press, Lumumba, Ronda, Mwariki, Abongoloya and quarters owned by various private firms (Gitau, 1989).
3.2. IMPLEMENTATION

3.2.1 Initial stages

In the initial stages of background research was conducted and the questionnaire developed. Permission to carry out the research was sought and obtained, and the necessary funds secured. A preliminary trip was made to the study area to contact the relevant authorities and inform them of the intended research project. During this time information on the different residential areas in the study site and their respective income classification was also established.

3.2.2 The pilot study

In conducting this pilot study, a draft questionnaire was administered to 20 respondents for pretesting to establish the following:

a) Clarity: Comprehension by both the field assistants and the respondents.

b) Length of the questionnaire: The average time taken to administer each questionnaire. The respondents response to the time taken was also checked.
c) Acceptability: The questions were checked to see if they caused any misunderstanding, embarrassment, or any negative response from the respondents.

d) The reliability of using the method of rating household durables as a criteria of establishing income group of household was also assessed. Necessary modifications were then made. The major amendment was shortening of the questionnaire. It was found to be so lengthy that the respondents tended to become uncooperative as a result of the many questions that they were being asked.

3.2.3 Selection and training of field assistants

Five persons who could speak Kiswahili well and had previous experience in data collection were trained to administer the questionnaire. They were introduced to the survey, they were told what the principal investigator intended to find out, as well as the purpose of the study. The trainees were also briefed on what they were expected to do and on other relevant information such as the expected duration of the survey and the times they were expected to work. After this introduction they underwent the actual training as described below.

The trainees were further exposed to the questionnaire and encouraged to ask questions on
anything that was not clear. The following important points on data collection were emphasized:

1. The need to ask questions precisely (i.e., as they were written on the questionnaire).
2. The need to avoid leading questions.
3. The need to fill in the questionnaire precisely.
4. The importance of not making any assumptions but always asking the relevant questions so as to establish the truth.
5. The need to take seriously each and every question in the questionnaire (no matter how trivial it seemed as it was important to the study).
6. The need to be courteous, polite and respectful to the respondents and also of avoiding asking questions in such a manner that would nag, embarrass, or make the respondent uncomfortable in any way.
7. How to appropriately introduce themselves and their purposes for visiting the households.

The trainees were taught how to accurately translate the questions into Kiswahili since it was written in English but was to be administered in Kiswahili. They were then given turns to practise administering the questionnaire. Once the principal investigator was satisfied that the trainees were ready to try out the questionnaire in real life situation, they were given
a written test (see appendix B) and based on the results of the test and one's competence in administering the questionnaire, two of the trainees were selected to assist in the actual data collection exercise. These two were given further training (i.e., they allowed to visit a few more households where they administered the questionnaire) until the principal investigator was satisfied that they could go into the field alone.

3.2.4 The actual study

In the actual study the questionnaire was administered to the female head of the household or to the wife in households where a male was the head of the household. The pilot study had shown that these were the people who could best answer the questions in the questionnaire. In a few cases, where neither of the two persons mentioned above was involved in cooking, the person in the household involved in the cooking was called upon to answer the questions on food consumption.
3.3 RESEARCH METHODOLOGY

In this section the sampling procedure used, as well as the methods used to achieve the objectives discussed in chapter one will be described.

3.3.1 Sampling

a) Sampling Procedure

The sampling procedure was carried out in three main steps as summarized in Figure 1. The first step involved establishing the number of residential areas in Nakuru municipality and their classification by income group by consulting with officials of the Nakuru Municipal Council.

In the next step simple random sampling procedure was used to select the residential areas to be surveyed. All the residential areas in each group except the high income group were given a number on a separate piece of paper which was then folded into a tiny ball. These balls were shuffled in a box and a number of them randomly drawn. The number drawn was equivalent to the number of residential areas to be surveyed from the particular income group (i.e., 9 from the low income group and 6 from the mid income group). For the high income group, all the residential areas were
FIGURE 1 - Flow Chart of Sampling Procedure

All Residential areas in urban Nakuru (58)

Residential areas in high income category (3)

Residential areas in mid income category (18)

Residential areas in low income category (37)

Simple random sampling

Sampling Method

Residential areas from high income category (3)

Residential areas from mid income category (6)

Residential areas from low income category (9)

Convenience sampling

Sampling Method

Households from high income category (60)

Households from mid income category (120)

Households from low income category (180)
included as they were only three. The numbers were so selected so as to acquire the same proportion as that for the number of households, i.e., 1:2:3 from 60, 120 and 180 households in the high-, mid-, and low income groups respectively. Accordingly, the residential areas that were picked out are shown in Table 1.

Table 1 - Residential areas selected by income group

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<th>Low</th>
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<td>Shauri Yako</td>
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<td>Kaloleni B</td>
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<tr>
<td></td>
<td>Kabachia</td>
<td>Lumumba</td>
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<td></td>
<td></td>
<td>Kivumbini</td>
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<td>London</td>
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</tbody>
</table>

In the third step, systematic sampling procedure was used to establish the households to be surveyed from each of the residential areas named above. Each residential area to be surveyed was visited and the number of households in each noted.
b) Determination of the number of residential areas and households to be surveyed

Firstly, the overall sample size was determined by using results from a study done in Brazil (Amorozo et al., 1984). This study showed the consumption of fresh beef varied most with income. It estimated 25.3% overall beef consumption with 17.45% in the lower income group and 33.35% in the higher income group. These estimations (i.e., 17.45% and 33.35%) were used to determine the minimum sample size required to test the hypothesis at 5% level of significance, with a 90% power of confidence of detecting the true difference between groups using the following formula (WHO, 1985):

\[ n > \frac{(Z_a \sqrt{p(1-p)} + Z_b \sqrt{q(1-q)})^2}{d^2} \]

Where:
- \( n \) = The desired sample size from each income group.
- \( p \) = The estimated consumption in the lower income group.
- \( q \) = The estimated consumption in the higher income group.
- \( Z_a \) = The normal standard deviate which corresponds to the desired level of significance.
- \( Z_b \) = The normal standard deviate that corresponds to the desired power of confidence.
- \( d \) = \( p - q \).

Taking:
- \( p = 0.17 \)
- \( q = 0.33 \)
\[ Z_a = 1.96 \] (the normal standard deviate that corresponds to 95% level of significance) 
\[ Z_b = 1.64 \] (the normal standard deviate that corresponds to 90% power of confidence).

Then \( n > 89 \) households from each income group. This number was then multiplied by 3, giving a minimum sample size of 267 households which was rounded to 300. Secondly, the number of households to be surveyed from each income group was then determined by proportional sampling using the following formula:

\[ s_j = \frac{n_j \times n}{N} \]

Where \( s_j \) = The number of households to be surveyed from each income group.
\( N \) = The total number of households in Nakuru Municipality.
\( n_j \) = The total number of households represented by each income group.
\( n \) = The minimum sample size required.

The following figures were arrived at: A sample size of 45 households from the high income group, 100 from the mid, and 155 from the low income group, to give the minimum sample size of 300. However, the actual number of households selected from each income group was, 60 from the high income group, 120 from the mid income group and 180 from the low income group (refer to Figure 1). This was done to make an allowance for the possibility of discarding some of the questionnaires due to unforeseen errors in recording responses.
A sampling interval \( I \) was calculated using the following formula:

\[
N = \frac{\text{Total number of households in residential area}}{\text{Number of households to be selected from the area}}
\]

After selecting a household at random every \( I \)th household was then included in the survey.

### 3.3.2 Determination of household Income Group

The following criteria were used in determining the income group of a household:

a) **Residential area**: Households were placed in the income group to which the residential area they were located belonged (according to the Municipal Council categorization). Residential area was considered as a good indicator for income bracket as it is generally known to reflect income status.

b) **Occupation of head of household**: Households were grouped into income groups. Respondents were interviewed using the questionnaire (Appendix A) to establish the specific position held in the place of employment.

c) **Amount of cash income earned by each of the**
household members: This was decided upon the observation that in most cases the incomes reported, though not the precise figures were generally reflective of the income group. This information was collected by asking the respondents about the income of the working household members. Table 2 (over-leaf) was used as a guideline to place household members into their respective income groups according to the income.

Table 2 Income group by household earnings per month

<table>
<thead>
<tr>
<th>Income Group</th>
<th>Household earnings per month (Ksh)</th>
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</thead>
<tbody>
<tr>
<td>Low</td>
<td>0 - 1,999</td>
</tr>
<tr>
<td>Middle</td>
<td>2,000 - 6,999</td>
</tr>
<tr>
<td>High</td>
<td>7,000+</td>
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</table>


d) Observation of durables in the household: These were assessed and rated according to their money's worth (as to whether they were expensive, inexpensive, or very expensive). The pilot study had shown that the observable durables in a household reflected its income group. An observation table in which the
durables could be rated was included as part of the questionnaire (see Appendix A).

To categorize the households into income group, the category into which the majority (more than 50%) fell was noted and the household grouped into the respective category. For example, if the majority of the items were rated as being inexpensive then the household was categorized as being low income. Likewise, the very expensive category corresponded to the high income group while the expensive category corresponded to the mid income group.

In cases where 50% of the items were found to be in one rating category and the other 50% in the other categories, then only the other criteria for classifying the households into income group were considered (such cases were however negligibly few).

The households were finally categorized into income group by taking into consideration all the criteria discussed above. A household was placed into the income group indicated by more than 50% of the criteria. For example if the household income, occupation of head of household, and the residential area indicated that a household was in the low income group, then the household was categorized as being a low income household. In few cases where 50% of the criteria
indicated on income group and 50% another, the questionnaires were disregarded as then it was not possible to place the household into an income group.

3.3.3 Determination of the number of times and the amount of selected food items consumed in a week

a) Single food items rather than a combination of foods were selected as the form in which to study the foods because they were purchased as single items. These included all the food items that were found to be eaten during the pilot study, and which are important nutrient sources (Appendix B).

The seven-day recall method was used to collect the information after looking into other methods of collecting dietary data, and considering time and financial restrictions. The alternative methods such as that of sitting in the household and observing what was consumed in a week was not feasible neither was the record method (of asking the respondents to record what they ate) feasible for various reasons. Firstly, it is a method that requires a high compliance level and may therefore have a high level of non-compliance and secondly, there was the possibility of encountering respondents whose education level did not render them competent to carry out the recording exercise. Thus, using the record method would have
meant taking a risk of getting a smaller sample size than required. These methods were also disregarded on the ground that single records and observation periods are not regarded as good estimators of usual intakes (Johnson, 1989).

The 24-hour recall was not feasible either as a day's consumption would not provide a reliable reflection of the expenditure pattern. This method could also not be used in combination with the 7-day recall because it resulted in a lengthy questionnaire which led to lack of co-operation on part of the respondents. Diet history was seen as an unreliable method as difficulty in recalling would introduce much error in the results.

Other factors that were considered in choosing the selected method were that it has been regarded as a suitable method for estimating current food intakes (Johnson, 1989), and that the frequency method has been used by others to determine how often specified foods are eaten in a given period of time (Burk, 1976). The method was also used in food consumption surveys to determine the cost and foods used by households (Peterkin, 1988).

In the selected method the respondents were asked by use of the questionnaire (Appendix A) how many times
in the past week (the past seven days) they had consumed each of the selected food items.

As already mentioned, for the food items mentioned above, it was easy for most respondents to recall how much of each had been consumed. In the few cases where the respondents were not able to recall the amount, they were asked how long it took the household to consume a known measure of the food item in question. The pilot study had revealed that most of the respondents knew how long it usually took a household to consume a known measure of a food item. Appropriate calculations were then made to determine the amount that would be consumed in a week as described below.

b) The amounts consumed per week of milk, eggs, beef, chicken, fish, beans, maize meal, maize, rice, wheat flour, bread, sugar, and fats were determined. These food items were the major sources of protein and calories. They could be reliably quantified using the selected method, as their measurements in weights or numbers were generally known by the respondents and are sold in fairly standard measures.

In the few cases where the respondents were not able to recall the amount, they were asked how long it took the household to consume a known measure of the food item in question. Appropriate calculations were then
made to determine the amount that would be consumed in a week, using the information on the amount consumed in a given period of time.

3.3.4 Determination of weekly household expenditure on food items

This was done by asking the respondents how much money they spend on the food items they had consumed in the past one week. In some cases the answers were given in terms of the amount spent in a certain time period. In such cases appropriate calculations were made to approximate the amount spent in a week. It was assumed that the expenditure during the week of survey was typical of the whole period.

3.3.5 Determination of the amount of nutrients consumed in a household

The amount of nutrients was calculated from the information on the amount of food items consumed using food composition tables.

3.3.6 Statistical analysis:

To compare the food consumption patterns among the income groups the following statistical tools were used: 1) Analysis of Variance (ANOVA) was used to
determine if there was any statistically significant difference in various variables for the three groups.

ii) Tukey-test was used to establish where the significance lay amongst the groups.

The minimum level of significance acceptable was taken to be \( p < 0.05 \).

Adjustment for the number of household members was done by performing the statistical tests mentioned above on the same number of household members from each income group. For example, the tests were performed on the households with 1 to 2 members only, then 3 to 4, 5 to 6, 7 to 8, and 9 to 10 at a time.
As stated in Chapter 1, the objectives of this study were: (i) To determine household income group.

(ii) To determine household weekly consumption frequency of selected food items.

(iii) To determine the amounts of the selected food items consumed in a household.

(iv) To determine approximate household nutrient consumption.

In this Chapter, the findings of the study are presented in different sections. In each section the findings of each of the study objectives are presented.

4.1 Distribution of the households by Income group

The number of households in each income group was determined by the area of residence, type of employment and occupation of household members, quality of observable household durables, and the total household income (section 3.3.2).
The results show that out of the 311 households in the study, 51 (16%) were in the high income group, 102 (33%) in the mid income group, and 158 (51%) in the low income group.

4.2 Weekly frequency of consumption of selected food items

Figure 2 shows the weekly frequency of consumption of selected food items determined as described in Section 3.3.3. The consumption frequency of sugar and milk was notably high compared to that of the other food items (see also Appendix C). The consumption rate for beans, wheat flour and maize which were least consumed, was notably low compared to that of the other food items. With the exception of maize, maize meal, and beans, which were consumed least frequently by the mid income group, the consumption rate of the food items was least in the low income group and highest in the high income group. Maize meal was consumed most frequently by the low income group.

Statistical analysis on the consumption rate of individual foods showed significant difference among the groups in the consumption of the various food items such
Figure 2 - Mean household consumption frequency by Income Group
that the consumption of wheat flour, bread and eggs was significantly different \((p<0.001)\) between the high- and the other two income groups. For difference \((p<0.005)\) was between the low- and mid income groups, and for fats \((p<0.001)\) between the high and low income groups. Consumption of beef by each group was significantly different \((p<0.001)\) from the other two. Analysis on all the food items together showed there was a significant difference \((p<0.001)\) among the groups. The Tukey-test showed that there was a significant difference between the high income group and the other two income groups even when adjustment for the number of household members was made.

4.3 Amounts of food items consumed

The results for amounts of the selected food items consumed in a week as determined by a 7-day recall (see Section 3.3.3) show that the high income group consumed the highest amounts of rice, wheat flour, bread, fats, milk, eggs and beef while the low income group consumed the least (Figure 3). The high income group consumed the highest amount of maize meal while the mid income group consumed the least. The mid income group consumed the least amounts of maize, beans and sugar while the high
Figure 3 - Mean amounts of selected Food items consumed by Income Group
income group consumed the most.

Analysis of variance showed that the groups consumed significantly different ($p<0.001$) amounts of rice, wheat, flour, milk, sugar, bread, eggs, beef and beans. Further analysis using the Tukey test, showed that the differences for wheat flour, bread, sugar, eggs and beans was between the high and both the low- and mid income groups, for rice between the low and both the mid- and high income groups, while that of milk and beef was between each of the groups.

There was also a significant difference ($p<0.001$) between the mid- and low income groups in the amounts of all the food items consumed. When adjustment for number of household members was made, a significant difference ($p<0.05$) was still found to exist.

4.4 Household Expenditure on Food Items

Results for household expenditure on the selected food items are shown in Figure 4. Except for maize, maize meal, and beans whose mean expenditures were highest in the high income group and lowest in the mid income group, the mean expenditures were highest in the high
Figure 4 - Mean household expenditure on selected food items per Income Group
income group and lowest in the low income group. The variation in individual group mean expenditure for beef was remarkably high compared to that of the other food items. i.e., Ksh.164.00 for the high income group, Ksh.103.00 for the mid income group and Ksh.53.00 for the low income group.

Further analysis showed a significant difference among the groups in the amount of money spent on rice, sugar, fats, milk, and beef (at p<0.001) beans (p<0.01) and wheat flour (p<0.05). The Tukey-test showed that the differences in expenditures for sugar, fats, eggs and beans were between the high and both the low- and mid income groups while that for rice was between the low and both the mid- and high income groups, for wheat flour it was between the low- and high income groups. Expenditure for milk and beef was different for each group. There was a significant difference (p<0.001) between the low- and both the mid- and high income groups in the total amount of money spent on all the food items together even after adjustment for the number of household members had been made.

These results also indicate that the groups spent a notably different proportion of their total income on
food items. The high income group spent the lowest proportion (26%) while the mid income group spend 68% and the low income group 105% (Fig. 5).

4.5 Household nutrient intake

Approximate household calorie and protein consumption calculated from the amounts of food items are shown in figure 6. These show that the level of calorie consumption was highest in the high income group (2.7 kcal per capita per day) followed by the mid income group (2.5 kcal per capita per day) and the low income group (2.4 kcal per capita per day). The pattern for protein consumption—highest in the high income group (120 gm per household per day) followed by the mid income group (105 gm per household per day) and was lowest in the low income group (100 gm per household per day).
Figure 5 - Proportion of household income spent on food items per income group
Figure 6 - Nutrient consumption per Income Group

Protein consumption

Calorie consumption
CHAPTER 5

DISCUSSION

In this Chapter the findings of the present study are discussed. They are presented in a manner similar to that in which the results have been presented in the previous Chapter. The findings on each of the study objectives are discussed in different sections. The hypotheses and the implications of their outcome are then discussed.

5.1 Distribution of households by Income Group

The results show that the distribution of households by income group corresponds very closely to the numbers expected by the principal investigator. These figures were arrived at using figures given in the 1979 census report (Government of Kenya, 1979), as well as information pertaining to classification of residential areas by income group given by Nakuru Municipal council officials. The estimated figures were 15% high income households, 33% in the mid income, and 52% low income households. The results showed that 16% of the households were in the high income group, 33% in the mid income group and 51% in
the low income group. This suggests the criteria used were reliable determinants of household income group.

5.2 Food consumption patterns

5.2.1 Weekly consumption frequency of selected food items

Sugar and milk were the most frequently consumed food items in all the income groups. This is not surprising given the high frequency of tea consumption among the Kenyan urban population. The mean consumption frequency for most of the other foods was highest in the high income group and lowest in the low income group. This is similar to other studies done elsewhere which show that the rate of consumption of certain food items such as sugar, rice, beef, oil, bread, maize meal, milk and tomatoes increases with rise in income group (Kwofie et al., 1988). There were few food items which differed from this general trend. For example, the mean consumption frequency of maize was highest in the low income group. This is in agreement with observations made in other studies (Berg, 1973; Rao, 1976; Chernichovsky et al., 1982; India Monitoring Bureau, 1984) suggesting that as household income
increases, the tendency to consume certain staples (of which cereals form the largest part) decreases. This supports the observation that the introduction of processed foods or refined cereals in developing countries has led urban populations to regard traditional staples as non-prestigious.

The large variation observed in the various income groups in milk and/or beef consumption has been documented previously (Amorozo et al., 1984; Rao, 1976; Chernichovsky et al., 1982; Gray, 1982). Such a variation would be expected. Since these food items are among the most expensive ones, a difference in their variation will be more pronounced than would be the case with less expensive ones.

As is evident from Figures 2 and 3, the consumption pattern for most of the food items is similar in as far as the frequencies and the amounts consumed are concerned. The consumption for sugar however is different. While the frequencies are high, the amounts consumed are comparatively very low. The reason for such an observation may be due to the fact that sugar is consumed in small quantities at a time, while the other foods are consumed in much larger quantities. For
example, milk which is consumed almost as frequently as sugar, is consumed in much greater amounts. Assuming that most of the sugar and milk is used in tea, such an observation would be expected as a cup of tea may contain one teaspoon of sugar and as much as 1/8 litre of milk.

The results indicate a positive relationship between the frequency of consumption of the selected food items and income group. These results confirm the widely held view that income influences the consumption frequency of certain foods.

5.2.2 Amounts of selected food items consumed

The general pattern observed in which the high income group consumed the highest amounts and the low income group the least of most of the food items is not unexpected in the light of the shown influence of household income (section 5.2.1). The increase in the amounts of food items consumed may be explained by the fact that increase in income not only increases a household's capability to purchase more food items but also more expensive types. The observation that maize and maize-meal do not follow this general trend is not
surprising either. As already stated, other studies (Berg, 1973; Rao, 1976; Chernichovsky et al., 1982; India Monitoring Bureau, 1984) have shown there is a general trend for households to consume less of certain cereals as income increases. It is also not unexpected that quantity of beans consumed follows a similar pattern to that of the cereals mentioned above since beans are often eaten together with maize as a single dish. The pattern for the quantity of sugar consumed is however unexpected. The consumption was highest in the low income group. This observation may suggest that the consumption of tea in the low income group is highest. The high consumption may be an indication that the households in the low income substitute tea for other foods more often than do the other income groups.

The increase in the amounts of food items consumed as income rises is similar to the results of another study which compared the food consumption patterns of two income groups (Amorozo et al., 1982). The study found that the mean intakes for virtually all the food items studied were higher in the high income group. The variation among the different income groups in the amount of food items consumed was found to be
statistically significant. These results therefore strongly suggest that the level of household income influences not only the frequency but also the amount of certain food items consumed in the household.

5.2.3 **Household expenditure on food items**

The observed increase in expenditure on food items as income increases suggests an increase in expenditure on food items. The expenditure on food items was not influenced by the number of household members since the difference between income groups was significant (p<0.05) even after adjusting for the number of household members.

The lack of significant difference in the expenditure on maize and beans observed here may be explained by the fact that these food items are considered non-prestigious and are also inexpensive, hence are affordable by the low income group. Moreover, the two are often consumed together in one dish. The high variation in the expenditure on beef among the three groups has been observed elsewhere (section 5.2.1). The high price of beef may have influenced the large variation observed.
The results showed that not only does food expenditure increase with income, but also that the proportion of income spent on food items follows Engel's law which states that the proportion of income spent on food declines as income rises. This is in agreement with many other studies (Berg, 1973; Mellor, 1978; Chernichovsky et al., 1982; Vander Moortle et al., 1982; Government of Kenya, 1985; Nyonyintono, 1983; Meilink, 1987).

The trend in which high income group's expenditure on food is highest is similar to what was shown in another study (FAO, 1986). In this report, surveys conducted in ten different countries of the world, indicated that there was a general tendency to consume more of certain food items as income increased.

The significant variation observed here in the amount of money spend on the food items led to the conclusion that increase in income influences an increase in expenditure on food items.

The proportions of income spent on food items of 26%, 69% and 105% for the high-, mid- and low income groups respectively differ in level with those reported in other studies (specially for the high and low income
groups). For example, one such study (Government of Kenya, 1985) reported proportions of 39%, 49%, and 52% for the high-, mid- and low income groups respectively. Vander Moortle et. al. (1982) found that the proportion of income spent on food by low income groups was 56% compared to 32% for the high income groups. Another study (Chernichovsky et. al., 1982) reported that the low income group spent 78% of the total income on food, while the high income group spent 59%. Nevertheless the results do still confirm that a greater proportion of income is spent on food as income decreases.

The unexpectedly high percentage expenditure in the low income group of 105% (which is over 100%) on the one hand may have been influenced by under-reporting of income by some of the respondents. On the other hand, the reporting may have been accurate, in which case the observation reflects a genuine situation in which those in the low income group spend all their cash income, and in fact borrow some for food, thus being perpetually in deficit. It may also reflect the fact that some low income households got some of their food from the small gardens they had acquired within the municipality.
As is evident, in comparison to the findings of the other studies mentioned previously, the results of the present study show the largest variation between the income groups in the proportion of income spent on food. The reason for this may be due to the existence of the widest variation in income between the income groups of the study population.

5.3 Nutrient Consumption

The observation that the nutrient consumption was highest in the high income group and lowest in the low income group suggests that the high income group on the average either consumes the largest quantity of the food items, or food items in which the nutrients are most concentrated while it is vice-versa for the low income group. The results of this study confirm the former argument as a significant difference was found between the groups in the amount of food items consumed.

The results indicate that the consumption of the two nutrients studied, i.e., calories and protein, was highest in the high income group and lowest in the low income group. These findings are in agreement with others that have been reported which indicate an
increase in nutrient consumption with rise in income (Aylward et. al., 1975): Reutlinger et. al., 1976). The findings suggest that an increase in income may influence the amount of nutrients consumed. Thus, these findings further confirm the observation that the level of household income influences the amounts of foods and thus nutrients consumed.

In summary, the results of this study show that the three income groups investigated differ significantly in their food consumption patterns, indicating a positive relationship between income and food consumption. This is evident if the mid income group is taken as a representative group. When this is done, it is observed that an increase in income results in an increase in each of the variables denoting food consumption patterns and vice versa.

As stated in the hypotheses of the present study, it was expected that the level of household income would influence the weekly consumption as well as the amounts consumed of the selected food items. The level of household income was also expected to influence expenditure on the food items. These hypotheses have been retained as from the findings it may be said that income has a positive influence on food consumption.
patterns, such that as income rises, food consumption patterns change in such a way that households spend more money on food, buy increased amounts of food items, and also increase the frequency of consumption of certain foods.

In view of the proven hypotheses indicating that income influences food consumption patterns, it may be rightly stated that income is an important factor affecting food consumption patterns.

To what extent has this important point been recognized and effected by different governments? This can most readily be answered by examining National Food Policies. In Kenya, while it has been recognized that income is a crucial factor leading to improved nutritional status (Government of Kenya, 1982), and that policy responses to inavailability of food at household level may take the form of boosting levels of income of affected households, (Government of Kenya, 1984) the National Food Policy does not address the issue concretely. Its policies are mainly aimed at intensifying agricultural production (Government of Kenya, 1982). While this is a move in the right direction, it is suggested that income be included as a major component of the policy.
CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

The present study set out to establish whether there was a relationship between income and food consumption patterns in urban Nakuru. Food consumption patterns were defined in terms of consumption frequency, expenditure, and the amounts consumed of selected food items. The approximate nutrient consumption was also looked into.

The results have shown that there is a distinct variation among the different income groups leading to the conclusion that there is a relationship between income and food consumption patterns of the population studied. This conclusion suggests that income influences how much food and therefore how much nutrients are consumed. A higher frequency consumption may mean an increase in the amounts of food (and possibly nutrients) consumed. Increase in the quantity of foods consumed will needless to say result in an increase in the amount of nutrients consumed. Expenditure on food items will influence the amounts
bought as well as the nutrient quality. Increase in expenditure may mean increase in the amount of foods purchased, or it may mean more expensive food items (probably of higher nutrient quality) are purchased.

6.2 Recommendations

The results of this study suggest income influences the food consumption and consequently, nutrient consumption and as would be expected, nutritional status. Therefore it is recommended that:

1. Income be considered as an important factor in the planning of nutrition intervention strategies.

2. Nutrition programs address malnutrition in economic terms, and give priority to nutrition-related programs that generate income.

3. Income be included as a major component of National Nutrition Policies.

6.3 Suggestions for further research

1. The present study has established the existence of a relationship between income and food consumption patterns in which there is a tendency for households to increase the amount of nutrients consumed as income
rises. This observation would suggest a change in nutritional status as income rises. Therefore the question "Does income affect the nutritional status of the indigenous African population of urban Nakuru?" remains unanswered. It may be that as income rises overnutrition tends to set in. The question can be best answered if a study is carried out to establish the facts. It is therefore suggested that in the future, research should be carried out to establish the relationship between income and nutritional status. The information would be useful in formulating nutrition education programs aimed at combating malnutrition.

2. It is evident from the results of the present study that the people in the low income group spend almost all their cash income on food. This suggests that they have little money left to spend on the rest of their needs. This leaves the question, how do these people in the low income households meet their other basic needs?. It is therefore suggested that research be done to determine how those in the low income households meet their basic needs. The information would be useful in designing ways in which the people in the low income group can be helped to meet their basic needs, a necessity for the well-being of any person and of which nutrition is an important aspect.
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APPENDIX A

SURVEY TO DETERMINE THE RELATIONSHIP BETWEEN INCOME AND FOOD CONSUMPTION PATTERNS IN URBAN NAKURU
BY D.M. WATHOME
UNIT OF APPLIED NUTRITION
UNIVERSITY OF NAIROBI
FEBRUARY TO JUNE 1989

INCOME AND HOUSEHOLD PROFILE QUESTIONNAIRE

Name of Interviewer______________________ Date:__/__/__

 Cluster No.:_______ Household No.:_______

1. Sex of Head of Household!Codes
   1-Male
   2-Female

2. Place of work of head of household

3. Specific position held

4. Education level of head of household
   1-University and above
   2-College (diploma or certificate)
   3-Form 6
   4-Form 4
   5-Std. 7(8)
   6-Below Std. 7
   7-Other (specify)

5. Dominant religion in household
   1-Muslim
   2-Catholic
   3-SDA
   4-Akorino
   5-Other (specify)

6. Place of origin of head of household
   (District)

7. Place of origin of wife
   (if husband is head of household)

8. Length of urban residence of head of household (in years-if less than one year write in months and specify).
9. Length of urban residence of wife (if husband is head of household) 

10. Number of household members (this is considered as anyone who has lived in the household in the past one month). 

11. Number of working household members 

FILL IN THE ANSWERS TO QUESTIONS 12-15 IN THE TABLE PROVIDED.

<table>
<thead>
<tr>
<th>Relation of household member to head of household</th>
<th>Place of work</th>
<th>Position held</th>
<th>Monthly income</th>
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</table>
16. What is the monthly income of the head of household? ___.

17. Are there any other sources of income for the household? ___.
   1-yes
   2-no

IF SO, FILL IN THE ANSWERS TO QUESTIONS 19-20 IN THE TABLE PROVIDED.

18. What are the sources?

19. How often is the money received?

20. How much money is received?

<table>
<thead>
<tr>
<th>Source of income</th>
<th>Number of times received (specify units of time)</th>
<th>Amount of money received at a time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
FOOD CONSUMPTION QUESTIONNAIRE

FILL IN THE ANSWERS TO QUESTIONS 21-23 IN THE TABLE BELOW.

21. How many times were the following foods eaten in the past one week?

22. How much of each food was eaten during the week?

23. How much money was spent on each of these foods during the week?

<table>
<thead>
<tr>
<th>Food item</th>
<th>Number of times consumed</th>
<th>Amount consumed (specify units)</th>
<th>Amount consumed (in gms)</th>
<th>Amount of money spend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize meal</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maize</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat flour</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bread</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Millet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sorghum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green bananas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arrow roots</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fats &amp; oils</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat (or product) (specify (type))</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicken</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food item</td>
<td>Number of times consumed</td>
<td>Amount consumed (specify units)</td>
<td>Amount consumed (in gms)</td>
<td>Amount of money spend</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------</td>
<td>--------------------------------</td>
<td>--------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tomatoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sukuma wiki</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cabbage</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carrots</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spinach</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bananas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oranges</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mangoes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pawpaw</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pineapple</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passion fruit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avocado</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other fruits (specify)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

24. Are there any foods that were consumed in the household in the past one week that have not been mentioned?  
   - Yes  
   - No

IF SO, FILL IN THE ANSWERS TO QUESTIONS 25-27 IN THE TABLE PROVIDED.

25. How many times was each of the foods consumed?
26. How much of each of the foods was consumed?

27. How much money was spent on each of the foods?

<table>
<thead>
<tr>
<th>Food item</th>
<th>Number of times consumed</th>
<th>Amount consumed (specify units)</th>
<th>Amount consumed (in gms)</th>
<th>Amount of money spent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

28. Does the household get food from any other source other than buying?  
   If so, fill in the answers to questions 29-32 in the table below.

29. What is the source?

30. What is the food obtained?

31. How much? (specify amounts).

32. How often is the food got?

<table>
<thead>
<tr>
<th>Food item</th>
<th>Source</th>
<th>How often got (specify time units)</th>
<th>Amount got (specify units)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

33. Are there any household members who eat any meal outside the home?  
   If so, fill in the answers to questions 29-32 in the table below.
IF SO, FILL IN THE ANSWERS TO QUESTIONS 34-38 IN THE TABLE PROVIDED.

34. Who are the household members who eat away from home (i.e. relation to the head of household)?

35. How many times in a week does each one of them eat away from home?

36. What are the foods eaten? (if different types of foods are eaten each day, what was eaten the day before the interview?

37. What are the ingredients?

38. How much does it cost? (if applicable).

<table>
<thead>
<tr>
<th>Relationship of member to head of HH</th>
<th>Number of times meal is eaten away from home</th>
<th>Foods eaten</th>
<th>Ingredients</th>
<th>Cost of meal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1. Are the following items present?

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes</th>
<th>No</th>
<th>Inexpensive</th>
<th>Expensive</th>
<th>Very expensive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Television</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Radio/cassette</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Radio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Wall unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Table</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Sideboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Cupboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Carpet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Fridge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Telephone</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note any other item that is not included in the list and fill it in the spaces provided above (be sure to complete the table for the item added).
APPENDIX B

SURVEY TO DETERMINE THE RELATIONSHIP BETWEEN INCOME AND FOOD CONSUMPTION PATTERNS IN URBAN NAKURU
BY D.M. WATHOME

UNIT OF APPLIED NUTRITION
UNIVERSITY OF NAIROBI
FEBRUARY-JUNE 1989

TEST TO ASSESS THE COMPETENCE OF TRAINEE RESEARCH ASSISTANTS

The test consists of 17 questions, answer all the questions as instructed.

Maximum time allowed- 2 Hours

ANSWER THE FOLLOWING QUESTIONS IN THE SPACE PROVIDED.

1. What in your understanding is a 'Research'?

2. What do you think would be the use of the information that will be collected from the study being undertaken in which you have so far been involved?

3. What is the first thing you do when you enter a household for the purpose of interviewing one of the members? Give an example.

4. What would you do if a respondent said that he/she did not know the answer to a question?

5. What would you do to best obtain information that is not forthcoming from a respondent?

6. What would you do if you had reason to think that a respondent was not giving you the correct information on a certain question?

7. Why is it important to follow precisely the instructions given when filling in the questionnaire?
8. What are the two important factors that the study being undertaken seeks to establish?

9. What in your understanding is a meal?

10. If a household consumes 30/- worth of maize meal in 5 weeks, how much money would you say the household spends on maize meal in a week?

11. If a respondent tells you that they roasted 3 cobs of maize the past week, used 2 for cooking githeri 3 times, and boiled 4 twice, what is the total number of cobs of maize consumed in the household in a week?

ANSWER THE FOLLOWING QUESTIONS BY WRITING EITHER "TRUE" OR "FALSE" IN THE BLANK SPACES PROVIDED.

12. Most of the questions in the questionnaire are relevant, while a few are not._____

13. It is not necessary to administer the number of questionnaires indicated per day, as one can always catch up another day._____

14. In the study being undertaken, it is only the income of the head of household that really matters._____

15. The observation part of the questionnaire is only useful as an indicator of the income level of the household, therefore if time does not allow it can be left out and time be given to the more important parts of the questionnaire._____

16. It is alright to bypass a question if one does not really know what to write._____

ANSWER THE FOLLOWING QUESTION BY CIRCLING THE LETTER CORRESPONDING TO THE CORRECT ANSWER.

17. Which of the following is not a food item?
   - a. Sugar
   - b. Fat
   - c. Margarine
   - d. Jam
   - e. None of the above
## Mean weekly consumption frequency of selected food items

<table>
<thead>
<tr>
<th>FOOD ITEMS</th>
<th>HIGH INCOME GROUP</th>
<th>MID INCOME GROUP</th>
<th>LOW INCOME GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of times/week</td>
<td>No. of times/week</td>
<td>No. of times/week</td>
</tr>
<tr>
<td>Maize meal</td>
<td>5.1</td>
<td>5.1</td>
<td>6.6</td>
</tr>
<tr>
<td>Maize</td>
<td>1.9</td>
<td>1.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Rice</td>
<td>3.9</td>
<td>3.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Wheat flour</td>
<td>2.6</td>
<td>2.0</td>
<td>1.8</td>
</tr>
<tr>
<td>Bread</td>
<td>7.9</td>
<td>7.7</td>
<td>6.6</td>
</tr>
<tr>
<td>Potatoes</td>
<td>5.3</td>
<td>4.7</td>
<td>4.4</td>
</tr>
<tr>
<td>Sugar</td>
<td>16.8</td>
<td>16.6</td>
<td>14.1</td>
</tr>
<tr>
<td>Milk</td>
<td>17.4</td>
<td>16.5</td>
<td>12.3</td>
</tr>
<tr>
<td>Beef</td>
<td>9.5</td>
<td>6.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Eggs</td>
<td>5.9</td>
<td>4.4</td>
<td>3.6</td>
</tr>
<tr>
<td>Beans</td>
<td>2.2</td>
<td>1.7</td>
<td>1.8</td>
</tr>
</tbody>
</table>
APPENDIX D

Mean amounts of money spent on selected food items by income group

<table>
<thead>
<tr>
<th>FOOD ITEM</th>
<th>HIGH INCOME GROUP</th>
<th>MID INCOME GROUP</th>
<th>LOW INCOME GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize meal</td>
<td>35.00 Ksh.</td>
<td>33.00 Ksh.</td>
<td>33.00 Ksh.</td>
</tr>
<tr>
<td>Maize</td>
<td>9.00 Ksh.</td>
<td>6.00 Ksh.</td>
<td>8.00 Ksh.</td>
</tr>
<tr>
<td>Rice</td>
<td>36.00 Ksh.</td>
<td>28.00 Ksh.</td>
<td>18.00 Ksh.</td>
</tr>
<tr>
<td>Wheat flour</td>
<td>25.00 Ksh.</td>
<td>18.00 Ksh.</td>
<td>17.00 Ksh.</td>
</tr>
<tr>
<td>Bread</td>
<td>37.00 Ksh.</td>
<td>32.00 Ksh.</td>
<td>27.00 Ksh.</td>
</tr>
<tr>
<td>Sugar</td>
<td>27.00 Ksh.</td>
<td>21.00 Ksh.</td>
<td>18.00 Ksh.</td>
</tr>
<tr>
<td>Fats</td>
<td>26.00 Ksh.</td>
<td>18.00 Ksh.</td>
<td>17.00 Ksh.</td>
</tr>
<tr>
<td>Milk</td>
<td>79.00 Ksh.</td>
<td>60.00 Ksh.</td>
<td>45.00 Ksh.</td>
</tr>
<tr>
<td>Beef</td>
<td>164.00 Ksh.</td>
<td>103.00 Ksh.</td>
<td>53.00 Ksh.</td>
</tr>
<tr>
<td>Eggs</td>
<td>39.00 Ksh.</td>
<td>23.00 Ksh.</td>
<td>19.00 Ksh.</td>
</tr>
<tr>
<td>Beans</td>
<td>21.00 Ksh.</td>
<td>12.00 Ksh.</td>
<td>12.00 Ksh.</td>
</tr>
</tbody>
</table>
## Mean amounts of selected food items consumed per income groups

<table>
<thead>
<tr>
<th>FOOD ITEMS</th>
<th>HIGH INCOME GROUP</th>
<th>MID INCOME GROUP</th>
<th>LOW INCOME GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize meal</td>
<td>5618</td>
<td>4956</td>
<td>6151</td>
</tr>
<tr>
<td>Maize</td>
<td>2742</td>
<td>1720</td>
<td>2097</td>
</tr>
<tr>
<td>Rice</td>
<td>2773</td>
<td>2212</td>
<td>1580</td>
</tr>
<tr>
<td>Wheat flour</td>
<td>3095</td>
<td>1875</td>
<td>1863</td>
</tr>
<tr>
<td>Bread</td>
<td>4082</td>
<td>3461</td>
<td>3128</td>
</tr>
<tr>
<td>Sugar</td>
<td>3379</td>
<td>2492</td>
<td>2148</td>
</tr>
<tr>
<td>Fats</td>
<td>1147</td>
<td>795</td>
<td>872</td>
</tr>
<tr>
<td>Milk</td>
<td>9901</td>
<td>8030</td>
<td>6179</td>
</tr>
<tr>
<td>Beef</td>
<td>5286</td>
<td>3333</td>
<td>1793</td>
</tr>
<tr>
<td>Eggs</td>
<td>1245</td>
<td>803</td>
<td>764</td>
</tr>
<tr>
<td>Beans</td>
<td>2406</td>
<td>1217</td>
<td>1347</td>
</tr>
</tbody>
</table>
APPENDIX F

Statistical Analysis of Food Consumption Patterns by food items per Income Group

<table>
<thead>
<tr>
<th>FOODITEM</th>
<th>CONSUMPTION AMOUNTS</th>
<th>EXPENDITURE AMOUNTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FREQUENCY CONSUMED</td>
<td>CONSUMED</td>
</tr>
<tr>
<td>Maize meal</td>
<td>**</td>
<td>ns</td>
</tr>
<tr>
<td>Maize</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Rice</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Wheat flour</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Bread</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Sugar</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Fats</td>
<td>**</td>
<td>ns</td>
</tr>
<tr>
<td>Milk</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Eggs</td>
<td>***</td>
<td>**</td>
</tr>
<tr>
<td>Beef</td>
<td>***</td>
<td>***</td>
</tr>
<tr>
<td>Beans</td>
<td>ns</td>
<td>**</td>
</tr>
</tbody>
</table>

ns = no significant difference

* = p<0.05

** = p<0.01

*** = p<0.001
Statistical Analysis of Food Consumption Patterns by food items per Income Group

<table>
<thead>
<tr>
<th>FOOD ITEM</th>
<th>CONSUMPTION FREQUENCY</th>
<th>AMOUNTS CONSUMED</th>
<th>EXPENDITURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize meal</td>
<td>C</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Maize</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Rice</td>
<td>B,C</td>
<td>B,C</td>
<td>B,C</td>
</tr>
<tr>
<td>Wheat flour</td>
<td>A,B</td>
<td>A,B</td>
<td>B</td>
</tr>
<tr>
<td>Bread</td>
<td>A,B</td>
<td>A,B</td>
<td>ns</td>
</tr>
<tr>
<td>Sugar</td>
<td>B,C</td>
<td>A,B</td>
<td>A,B</td>
</tr>
<tr>
<td>Fats</td>
<td>B</td>
<td>ns</td>
<td>A,B</td>
</tr>
<tr>
<td>Milk</td>
<td>B,C</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Eggs</td>
<td>A,B</td>
<td>A,B</td>
<td>A,B</td>
</tr>
<tr>
<td>Beef</td>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Beans</td>
<td>ns</td>
<td>A,B</td>
<td>A,B</td>
</tr>
</tbody>
</table>

ns = no significant difference

A = difference is between high and mid income groups.

B = difference is between the high and low income groups.

C = difference is between the mid and low income groups.

D = difference is between each of the income groups.