

**STATISTICAL STUDY ON NUTRITION AND PRICES  
OF FOOD ITEMS TO RECOMMEND LOW COST  
NUTRITIONAL MEALS FOR DIFFERENT SEASONS.**

By

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## DECLARATION

The work described in this thesis was carried out by me under the supervision of Dr B.M.S.G. Banneheka (Department of Statistics and Computer Science, University of Sri Jayewardenepura, Nugegoda, Sri Lanka). I declare that a report on this has not been submitted in whole or in part to any university or any other institute for another Degree /Diploma.

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## DECLARATION OF THE SUPERVISOR

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## ABSTRACT

A healthy person is an asset to the society. There is a significant progressive annual increase in the Government's expenditure on provision of health care to the people. Most of the health problems in Sri Lanka are preventable through community health education. Household poverty, lack of knowledge about nutrition and negligence on food consumption patterns are the principal factors leading to nutrition problems.

Nutritional components vary in different foods. Consumer's knowledge about the nutrition value of food is very important to ensure a healthy balanced diet. An intelligent consumer can reduce the cost of meals in several ways. This study focuses on one way of reducing food cost yet ensuring adequate nutrition. Prices of vegetables, fruits and fish show seasonal variations. Several sets of low cost balanced diets are introduced here for different months of the year.

Further, the study highlights the low intake of calcium in the daily diet of many individuals (a trace mineral element which is an essential micronutrient) that is likely to create public health problems in the near future.



## CHAPTER 1

### Introduction

#### 1.1 Country

Sri Lanka is an island in the Indian Ocean located near the equator; between 6-10°N latitude and 79-81°E longitude. This topography provides the island nation a hot and humid tropical climate all year around. The central mountainous regions are cooler, but the humidity is relatively low in the surrounding coastal areas. The average annual temperature is 32.2° C (90° F) in the lowlands and 21.1° C (70° F) in the higher mountainous regions (Statistical Abstract, 2004).

Annual rainfall is characterized by wide seasonal and regional variations. The south-west monsoon season is from May to September, at which time the rainfall is exceptionally heavy. The hills and the lowlands of the south-western section, which is known as the wet zone, normally have some rainfall throughout the year, but peaks in May, June, October and November. In the northern dry zone the main precipitation of about 1,016 mm (40 inches) annually occurs during the north-east monsoon season, which runs from December to February. Most crops in the dry zone use irrigated water (Microsoft ® Encarta ® Encyclopedia © 1993-2004 Microsoft Corporation).

Topographically, the country is divided in to three main parts, the coastal plain, the Penne plain and the central hills. It also has a marked difference between the dry zone and the wet zone. Sri Lanka's economy traditionally has been agricultural but there is a recent trend towards industrialization. Agro economy is seen mostly in the dry zone and in the central hills. A majority of people in Sri Lanka still earn their living from

agriculture based economic activities. Recent statistics show that 36 per cent of the present national workforce are engaged in agriculture or related activities involving hard laborious outdoor work (Statistical Abstract, 2004).

The last census conducted in the year 2001 recorded a population of 19 million with an annual growth rate of 1.5 per cent. Being a developing country, Sri Lanka exhibits a range of impressive socio - economic indicators compared to many other third world countries in the South Asian region (Statistical Abstract, 2004).

### **1.1.1 Health, required nutrition level and risk**

Health is recognized as a basic human right and the Sri Lankan Government is committed to provide free health care facilities to its people. Government-sponsored health services are delivered through an extensive network of hospitals and dispensaries. Several special campaigns focusing on preventive health care and a programme of family planning, all based on western medical technology have significantly improved health conditions in Sri Lanka. These services coexist with a smaller private sector providing western medicine. Several indigenous traditions of curative health care, some of which receive government sponsorship, remain largely in the private sector but play an important role in Sri Lankan medical practice.

Food, nutrition and health are intimately connected aspects in our lives. Food nourishes the body. Food may also be defined as anything eaten or drunk which can be absorbed by the body to be used as an energy source or as a building, regulating or protective material. Lack of food causes major health problems including malnutrition and various

gastrointestinal infectious diseases. There are a number of deficiency diseases. They may vary from anaemia (as a result of iron or vitamin deficiency) to Kwashiorkor (which is the extreme lack of proteins). Many studies on the nutrition value of food show that consumer's knowledge and attention continue to remain low on the nutrition value of the foods consumed. The improvement of consumer's knowledge on nutrition value and the ability to obtain the best nutrition from economically accessible foods could be a significant step in preventing deficiency disorders (Nutrition Guide, Ministry of Health, 2000).

A person's nutrition requirement depends on age, gender, occupation and on some special circumstances like illness, convalescence, pregnancy or being a nursing mother. Nature and quantity of food consumed by a person varies with factors like the availability, family income, price, geographical location, traditions, beliefs, customs and climatic conditions (Nutrition Guide, Ministry of Health, 2000).

Poverty is related to almost every human activity in day to day life. Household Income and Expenditure Survey (HIES) conducted by the Department of Census and Statistics (DCS) in the year 2002 highlighted that 19.2 per cent of Sri Lankan households lie below the poverty line. The situation is worst among the estate sector population where the percentage was 24.3 in 2002. People in estate sector are engaged in hard work outdoors and burn many calories. Albeit the fact that their nutrition requirements are higher than most others, these people can rarely meet their nutrition requirements. In the year 2002, the average monthly household income in the estate sector was Rs. 7303. Poverty resulting in low purchasing power is one of the main causes of under nutrition

because poor families cannot buy adequate food for themselves. Therefore especially estate sector population has higher risks to face malnutrition situations (HIES Report, 2002).

### **1.1.2 Malnutrition**

Life is governed by certain definite and unchanging natural laws. Illness and diseases are the results of violation of these laws. Malnutrition is the dietary condition caused by an insufficiency or excess of one or more nutrients in the diet. A person is at risk of malnutrition if the amount of energy and/or nutrients in the diet does not meet his or her nutritional needs. If a diet is lacking in energy, the body's fat stores, followed by proteins from the muscles and organs, are used to provide energy. The body eventually becomes too weak to function properly or to fight infection.

Children, especially those under the age of five, suffer from the effects of starvation more quickly than adults. They develop a condition called protein-energy malnutrition (PEM). The two most common forms of PEM, marasmus and kwashiorkor, are seen in all developing countries and are life-threatening conditions. Marasmus occurs when a child is weaned early on to foods low in energy and nutrients. The child may also suffer repeated infections (such as gastroenteritis) due to poor hygiene and may be "treated" with non-nutritious fluids such as water. A child with marasmus is very underweight, and has no body fat and wasted muscles. Kwashiorkor occurs when a child is weaned late on to a traditional starchy diet low in protein. It often follows an acute infection. A severe lack of body weight is often masked by water retention, which makes the face moon-shaped and the belly swollen.

In developed countries, the consequences of having a diet extremely low in energy can be seen in people who suffer from anorexia nervosa and sometimes among the elderly population. In these countries, the most common form of energy malnutrition is over nutrition, for example, obesity. Obesity increases the risk of contracting diseases such as heart disease and diabetes.

If an individual's diet is lacking in nutrients, he or she will eventually develop the symptoms of deficiency. Deficiency diseases are usually associated with lack of vitamins or minerals. Most are rare in developed countries. The effects of nutrient deficiency can be severe and have a strong effect on morbidity and mortality figures (relating to incidents of disease and death respectively) in the developing countries in which they are prevalent. A vitamin or mineral deficiency can occur for a variety of reasons. Most obviously, a diet that contains few foods may lack nutrients. For example, in countries where maize is the staple food and few other foods are eaten, diets may lack in vitamin B. As a result, the deficiency disease pellagra sometimes occurs.

Some other people find it difficult to meet their nutritional requirements. Some women, for example, have a very high requirement of iron which may cause them to develop anaemia if they cannot satisfy it or have a genetic disorder which causes deficiency. Another reason for deficiency can be geographical, as in some remote areas where the soil (and therefore the plants grown) contains little iodine. As few other foods contain

significant amounts of iodine, people living in these areas may suffer prolonged iodine deficiency.

The effects of a vitamin or mineral deficiency on the body depend on the function of the particular element lacking. For example, because vitamin A is important for good vision, severe deficiency causes blindness. Some vitamins or minerals have many functions, so prolonged deficiency therefore has a wide-range of effects on the health.

(Microsoft ® Encarta ® Encyclopedia © 1993-2004 Microsoft Corporation.)

### **1.1.3 Food availability and seasonal variations of food prices**

There is no denying the fact that food is a fundamental human need among many other secondary needs. About 30 per cent of Sri Lanka's land is under cultivation, with another 7 per cent being permanent pasture. More acreage is devoted to the cultivation of paddy than to any other crop (Agriculture Statistics, 2000).

Sri Lanka's staple food is rice. Rice has a rich caloric value and also has many essential vitamins and minerals. Paddy cultivation is based on major, minor and rain-fed irrigation systems and usually produces two harvests a year in "Yala" and in "Maha" seasons. The estimated annual production of paddy in 2003, 2004 and 2005 were 3071, 2628, 3369 (FBS, 2005) thousand metric tones respectively. Farmers in the dry zone cultivate Kurakkan, Soya bean, Meneri, gingerly, green gram, black gram and sorghum. Prices of these cereal crops are normally higher than the cost of rice, because production of these crops is very low. The entire requirement of wheat flour and dhal is

imported every year. In the last two decades there was an increasing demand for wheat flour (FBS, 2004).

Vegetables are the most affordable and sustainable dietary sources of vitamins, trace elements and other bioactive compounds. They are the major source of most micronutrients and offer the only practical and sustainable way to ensure that micronutrients are supplied through the diet. Vegetables are a vitally important dietary component, not just a side dish to add flavour. Furthermore, vegetables can release and make available "bound" micronutrients in other staple crops for effective absorption in the gastro-intestinal tract. The diversity of vegetables permits year-round production and forms the basis of a more balanced diet. Improved vegetable production and consumption is thus the most direct, low-cost method for many of the urban and rural poor to increase micronutrients in their diet. Annual vegetable production was around 735,100 metric tons and per capita consumption of vegetable was 102.6 grams per day in the year 2004. Natural disasters like floods and droughts are the main problems leading to the low production of vegetables in the wet zone where farmers depend entirely on rain water for cultivation. Prices of vegetables show seasonal variations through out the year and normally "up-country" vegetables fetch higher prices than "low-country" vegetables (FBS, 2004).

Indian Ocean is a good marine resource. Majority of the coastal area people are directly engaged in the fishing industry. Both traditional and modern fishing techniques are employed by the fishermen. Fish is the principal source of protein for Sri Lanka's population and play a vital role in meeting basic nutritional and livelihood needs.