



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

---

---

# FOOD CONSUMPTION PATTERNS AND THEIR IMPLICATIONS FOR SUSTAINED AGRICULTURAL DEVELOPMENT IN TRINIDAD AND TOBAGO

CURTIS E. McINTOSH

DINESH SINHA

*(Advisor in Food Economics and Nutritionist, Caribbean Food & Nutrition Institute, Trinidad & Jamaica)*

DONI PIERRE

*(Student, The University of the West Indies, Trinidad)*

---

---

## ABSTRACT

Trinidad and Tobago is a small, open petroleum-dominated economy in which trade and the service sectors, including Government, play an important role in generating economic activity. While agriculture makes only a small contribution to Gross Domestic Product (GDP), it remains a source of employment for a large segment of the population and contributes to the food availability, the majority of which comes from imported sources.

There is a strong association between the morbidity and mortality trends and food consumption patterns in Trinidad and Tobago - a situation which has implications for changes in food consumption patterns. Such changes that are likely to occur will lead to greater investment in domestic food production leading to improved technology, self-reliance, and farm income as well as life expectancy. However, these changes will not be realized if appropriate food, nutrition and health *policies* are not adopted by the State and its institutions.

## INTRODUCTION

Food is consumed primarily to provide nutrients for energy, growth and development, and protection against diseases. The pathogenesis of diseases is invariably a multifactorial phenomenon. Gene complement is

at the heart of the body's immune response. However, good nutrition throughout the lifecycle bolsters the immune system and enhances the body's capability to meet the assault by infectious organisms, stress, and toxins from a hostile environment. Breastfeeding for example, imparts basic immunity to the infant.

Three non-communicable diseases - ischaemic heart disease, diabetes mellitus and malignant neoplasms are among the five leading causes of mortality in Trinidad and Tobago. The mortality patterns have indicated an increasing trend during the 'sixties, 'seventies and 'eighties. A similar pattern could be discerned in food consumption. Since food consumption patterns reflect a derived demand for energy and nutrients, they hold implications for the patterns of food production and imports and ultimately for sustained agricultural development in Trinidad and Tobago. As people become more conscious of the interrelationships between food, nutrition and health, these concerns will be reflected in their purchasing patterns, thereby forcing adjustments in the patterns of supply.

This paper attempts to measure the association between components of the food availability profile and mortality due to these diseases and to highlight their implications for appropriate changes in consumption patterns that might militate against these diseases. The implications for the agricultural and import sectors are also presented.

## FOOD, NUTRITION AND HEALTH INTERRELATIONSHIPS

Foods are products of plant or animal origin or fabricated by man, which when consumed are broken down by the body to provide the basic materials for bodily functions, growth and development. Nutritional status is the net effect of food consumption, digestion, absorption and assimilation in relation to physical activity, health status and growth and development potential. Nutrition-related health problems arise when nutrient imbalances beyond tolerable levels occur as the body displays remarkable adaptations to different levels of nutrient intake. Both nutrient deficiencies and excesses lead to health problems. Protein-energy undernutrition is a problem of inadequate food consumption while the consequence of over-consumption is obesity. Obesity has been cited as a predisposing factor for such chronic diseases as diabetes mellitus, hypertension, heart disease, cerebrovascular disease and some cancers.

Most of the mortality between 45-64 years in English-speaking Caribbean populations has been due to these diseases (27% to 57% of all deaths). Trinidad and Tobago registered the highest overall percentage of deaths from these diseases. Age specific mortality rates show that adults in Trinidad and Tobago experienced a several times greater risk of premature mortality from ischaemic heart disease and diabetes mellitus than the other countries of the region [CFNI, 1991]. The causes of chronic diseases are complex. Dietary factors account for only a part. The major risk factors of the nutrition-related chronic diseases are heredity, indiscriminate eating habits, sedentary living, excessive alcohol consumption and cigarette smoking. Individuals, however, differ in their susceptibility to the adverse health effects of specific dietary factors.

Food availability in virtually all Caribbean countries has been increasing throughout the 'sixties, 'seventies and 'eighties, but not without fluctuations. More importantly, the nutrient composition of the food supply has also been changing as well as the contributions from various food sources.

Historically, food production in Trinidad and Tobago has been insufficient to satisfy the consumption requirements of the population. Consequently, the country is dependent upon food imports to meet the shortfall. Per caput food supplies of Trinidad and Tobago for the period 1967-77 and 1989 [CFNI, 1976, 1984] indicate that the contributions to total food availability of energy, protein and fat by various groups of foods adequately met the nutrient needs of the population with a sizeable surplus.

Problems in food availability may, however, arise at the household level. The food distribution system functions in a manner such that inequalities are created in the distribution of food. Segments of the population are unable to acquire sufficient food for various reasons. Such reasons include lack of resources to produce food, unemployment and unavailability of income to purchase available food, and food too expensive relative to income. Under such circumstances malnutrition inevitably results within the population. The prevalence of protein-energy malnutrition simultaneously with obesity within the population of Trinidad and Tobago indicates obvious maldistribution of available food between and within households of the nation.

For the past two (2) decades, trends in the retail price of food in Trinidad and Tobago have been generally upward. The increasing cost of food, therefore, makes it less likely for households within the low income classes to be adequately nourished.

A qualitative analysis of food availability reveals that contrary to the World Health Organization (WHO) recommendation, the dietary consumption pattern of Trinidad and Tobago is comprised of a low level of energy supply from complex carbohydrates (particularly roots, tubers, fruit, vegetables and pulses). Epidemiological research suggests an intimate and consistent relationship between an established dietary consumption pattern like that of Trinidad and Tobago's and the emergence of a range of chronic diseases within the population. Also, scientific research continuously provides supporting evidence of the important role of diet in the development of the most common causes of premature death [WHO, 1990].

It is often assumed that chronic diseases gradually become established within a population as a country becomes more *affluent*. Affluence is basically assessed in terms of the level of a country's Gross National Product (GNP). The change in GNP over time is taken as indication of the relative rise or fall in living standards within an economy. Trinidad and Tobago experienced a GDP average annual growth rate of 3.1% for the period 1960-1982 [Sinha, 1991].

Per caput GDP increased from TT\$1,092 in 1965 to \$1,562 in 1970, \$4,716 in 1975 and \$7,460 in 1978. According to the findings of the WHO Study Group, as a country's GNP increases, there is a progressive substitution of dietary fat from animal sources and complex carbohydrates. Additionally, free sugars, especially glucose and sucrose syrups form a much higher proportion of the total dietary carbohydrate in very affluent communities. Thus, variation in the consumption of starchy foods and animal fats is the most striking feature of the dietary pattern of a population experiencing some degree of affluence.

To what extent have the changes been related to the trends in morbidity and mortality of the chronic diseases? Using data for Trinidad and Tobago, the general linear regression model was used to measure the relationships. The food availability data was taken or constructed from food balance sheets developed by the United Nations Food and Agriculture Organization (FAO). Trends in mortality were compiled from data of the Central Statistical Office (CSO) of Trinidad and Tobago. The models tested were based on the current concepts of the nutritional linkages with the chronic diseases.

### Ischaemic Heart Disease

Otherwise known as coronary heart disease, ischaemic heart disease (CHD) has been linked to hypercholesterolemia, high blood pressure and cigarette smoking in a synergistic relationship. The fundamental importance of diet in the progression of coronary heart disease is mediated through its effect on the development of hypercholesterolemia and hypertension. The Framingham study on which these risk factors

are based found no direct relationships between the amounts and types of food consumed by participants and the levels of cholesterol in their blood. However, increased blood cholesterol was associated with weight gain in men during the study period [Ensminger, et al., 1983]. Excess energy intake leading to obesity is implicated in the aetiology of coronary heart disease as well as increases in blood cholesterol and blood pressure.

Populations consuming diets rich in plant food display lower CHD rates than other populations. The Seven-Day Adventists in the Netherlands and Norway have CHD rates that range from one-third to one-half of those in the general population. Also, Californian Seven-Day Adventists who eat meat have higher CHD rates than those who are vegetarians. Additionally, British vegetarians have a 30% lower rate of CHD mortality than non-vegetarian as long as allowance is made for the population's lower rates of cigarette smoking [WHO, 1990]. However, the chronic consumption of highly refined carbohydrates (e.g. sugar, white flour) may lead to chromium deficiency and exacerbate diabetes and cardiovascular diseases [Ensminger, et al., 1983].

The consumption of cereal fibre may also protect individuals against coronary heart disease [James, et al., 1988]. However, the reasons for this are not clear [Morris, 1987]. A fall in serum cholesterol can be produced by increasing vegetable and fruit fibre intake, but cereal fibre does not usually have this metabolic effect. The epidemiological link between coronary heart disease and the low intake of cereal fibre is, therefore, unexplained.

Alcohol consumption also influences the occurrence of coronary heart disease. A slightly lower risk of coronary heart disease occurs in light-to-moderate drinkers than in abstainers [WHO, 1990]. A study of the incidence of heart disease in over 7000 Japanese men living in Hawaii found a 50 percent lower rate among those who consumed the alcohol equivalent in one bottle of beer or two shots of whiskey per day than those who abstained. Greater consumption of alcohol did not appear to confer additional benefits. Excess alcohol consumption,

however, might lead to serious disorders of the heart such as irregular heartbeats and degeneration of the heart muscle [Ensminger, et al., 1983].

Based on the above review mortality due to coronary heart disease in Trinidad and Tobago was regressed upon energy, fat, and sugar availability. The best fit of the data was afforded by a combination of processed fats and oils (PFAT) and total energy (KCAL) available with a 15-year lag as shown in the following equation:

$$\text{CHD} = 220.413 + 14.823 \text{ PFAT} + 0.558 \text{ KCAL} \quad \dots (1)$$

(49.418)      (1.838)      (0.134)

$$N = 11 \quad F = 32.97$$

$$R^2 = 88.88 \quad DW = 2.14$$

The strong positive association between mortality from coronary heart disease and processed fat and total energy availability implies that reducing energy intake and processed fat in the diet might result in lowering mortality from coronary heart disease. A one percent increase in the availability of processed fat and total energy was associated with increases in mortality due to coronary heart disease of 1.7% and 12.8%, respectively.

### Diabetes Mellitus

Diabetes is a collection of disorders resulting from either a lack of insulin or factors depressing the action of insulin or a combination of both. Insulin plays a pivotal role in the transfer of sugars, fats and amino acids from the blood to the cells. Thus, the lack of insulin action leads literally to starvation of tissue in the midst of an abundance of nutrients [Ensminger, 1983].

There are two major types of diabetes mellitus - Insulin Dependent Diabetes Mellitus (IDDM) and Non-Insulin Dependent Diabetes Mellitus (NIDDM). IDDM occurs in less than 10% of diabetics. This condition is most observed in persons in less than 20 years of age and is believed to be caused by a genetic defect impacting on the pancreas. NIDDM contributes to approximately 90-95% of all diabetic cases and

is prevalent mainly in obese adults.

The risk factors associated with diabetes include age, gender, ethnicity, family history and obesity. The incidence of NIDDM increases with age. Thus, a continuous rise in the prevalence of diabetes mellitus can be expected as the population ages, irrespective of other determinants. Diabetes mellitus is predominant in females rather than males in all age groups. However, this characteristic is most prevalent in the African ethnic group. Epidemiological studies also indicate that diabetes mellitus is dominant in persons of Indian origin in Trinidad and Tobago compared with other ethnic groups [Morris, 1977].

There is a strong genetic link in both types of diabetes mellitus. The risk of NIDDM in offspring of patients with NIDDM is six times that of non-diabetic controls and twice if each both parents possess IDDM. It should also be noted that obese siblings of diabetic parents are three times at risk of having NIDDM three times as that of non-obese children.

Statistics show that in Trinidad and Tobago, one out of every ten adults is estimated to be diabetic. Mortality for diabetes in Trinidad and Tobago is the highest among the Americas. Approximately 11% of deaths in Trinidad and Tobago between the ages 35 and 64, are due to diabetes mellitus. Diabetes is also associated with an increased risk of cardiovascular and cerebrovascular disease.

Not surprisingly, a good fit of the data was obtained when mortality due to diabetes was regressed upon total energy (KCAL) availability as indicated in Equation 2. Inclusion of other variables, such as fat and sugar, did not yield significant coefficients. Based on Equation 2, a one percent increase in energy availability was associated with a 7.16 percent increase in mortality due to diabetes.

$$\text{DM} = 251.502 + 0.112 \text{ KCAL} \quad \dots (2)$$

(35.355)      (0.013)

$$N = 14 \quad F = 68.71$$

$$R^2 = 83.89\% \quad D.W. = 1.47$$

### Malignant Neoplasms

Malignant neoplasms (commonly known

as cancer) is defined as a group of conditions characterised by uncontrolled growth cells originating from almost any tissue of the body. When control systems governing cell growth in human fails, the carefully ordered pattern of cell growth, division and differentiation is lost and an abnormal mass of cells or cancer may arise. The factors responsible for the failure of control are not predominantly the extraneous substances existing within the diets of the population or the environment; but some of the nutrients essential for health consumed in an indiscriminate manner [Sinha, 1991]. However, tobacco is the best known and most widely used cancer-causing agent. The most important cause of lung cancer is cigarette smoking [Hagley, 1987].

Sustained heavy alcohol consumption appears to be causally linked to cancer of the upper alimentary tract and liver. Additionally, it is apparent that excessive body weight is a risk factor for endometrial and post-menopausal breast cancer. However, the association of these cancers with excessive energy intake is less established. It is also suggested that a high fat intake is associated with cancer at several sites. A review of epidemiological evidence indicates that a high intake of total fat and in some cases also saturated fat is associated with an increased risk of cancers of the colon, prostate and breast. This evidence is strongest for cancer of the colon and weakest for breast cancer.

Diets high in plant foods especially green and yellow vegetables and citrus fruits are associated with a lower occurrence of cancer of the lung, colon, oesophagus and stomach. Although the mechanisms underlying these effects are not fully understood, such diets are usually low in saturated fat and high in starches and fibre. These diets also contain several vitamins and minerals including beta carotene and vitamin A. There is, however, no conclusive evidence that the benefits derived from consuming diets high in plant food are due to the high fibre content of such foods [WHO, 1990].

The optimum intake of fat in relation to cancer is, however, uncertain [WHO, 1990] (Table 1).

The two influential explanatory variables

in relation to cancer mortality were dietary fat (DFAT) and total energy (KCAL) as indicated in Equation 3.

$$MN = -86.832 + 0.021 \text{ KCAL} + 4.410 \text{ DFAT} \quad \dots (3)$$

(15.818)    (0.005)            (0.700)

$$N = 14 \quad F = 47.64$$

$$R^2 = 87.77\% \quad D.W. = 2.72$$

The data suggest that one percent increase in energy availability was associated with a 0.83 percent increase in mortality due to cancer. The corresponding figure for dietary was 1.48 percent.

### IMPLICATIONS FOR SUSTAINED AGRICULTURAL DEVELOPMENT

Trinidad and Tobago is a small open petroleum-dominated economy in which external trade and the domestic service sectors including government play important roles in generating economic activity. While agriculture makes only a small contribution to gross domestic product (GDP) - estimated at 3.2% in 1989 - it remains a source of employment for 10-15% of the labour and makes a sound contribution to the foreign exchange earnings. Agriculture's contribution to the total food supply is estimated at 30% making Trinidad and Tobago highly food import dependent. The strong positive relationships between mortality due to coronary heart disease and total energy and processed fat availability; mortality due to diabetes mellitus and total energy availability; and mortality due to cancer and total energy dietary fat availability point to a reassessment of food production and import practices.

Reduction in total energy availability might best be achieved by cutting down the imports of highly refined carbohydrates (e.g., wheat flour), oils and fats, and increased sugar exports. Increases in the production of starchy fruits, roots and tubers, fruits and vegetables and legumes would enhance the availability of dietary fibre and valuable nutrients without unduly increasing energy levels.

While the production of fresh fruits and vegetables has been on the increase in recent

years, the dominant pattern of agricultural production remains the major export crop (sugar), and to a less extent cocoa and coffee. Apart from poultry production the livestock sector remains undeveloped.

**Table 1: Associations Between Selected Dietary Components and Cancer**

Site of Cancer	Fat	Body Wt.	Fibre	Fruits and Vegetables	Alcohol	Smoked, salted and pickled food
Lung				-	+/-	
Breast	+	+		-		
Colon	++			-		
Prostate	++			-		
Bladder				-		
Rectum	+			-	+	
Endometrium		++				
Oral Cavity				-	+ <sup>b</sup>	
Stomach				-		++
Cervix				-		
Oesophagus				-	+ <sup>b</sup>	+

Key: + = Positive association; increased intake with increased cancer.

- = Negative association; increased intake with decreased cancer.

<sup>b</sup> = Synergistic with smoking.

Source: WHO Technical Report Series No. 797, 1990; "Diet, Nutrition and The Prevention of Chronic Diseases"; A Report of a WHO Study Group, p. 67.

The long term trend in the production of sugar, cocoa and coffee has been downward. Sugar production declined from 255,000 tonnes in 1965 to 160,000 tonnes in 1975 and 81,000 tonnes in 1985. By 1990 production was 118,000 tonnes. The comparative figures for cocoa were 4997, 4181, 1307 and 2127 while those for coffee were 3849, 4024, 852 and 1935. The poor performance of these sectors makes them prime candidates for a diversification programme that will ensure the production of crops and livestock that are more in keeping with a health conscious population.

Sugar, and its derivative rum will continue to enjoy low demand both from international competition and a population concerned about obesity and its associated diabetes mellitus, coronary heart disease and cancers. These products provide only energy and their lack of essential nutrients is likely to contribute to nutrient imbalances. An agricultural production

system dominated by sugar and rum cannot be sustained. Sustainability in this context refers to the capacity of the food and agricultural production and distribution system to achieve the desired income levels and quantity and quality of foods to meet the nutrient needs of the population without jeopardizing the natural resources for use by future generations. These resources include land, water and biological species [FAO, 1988].

Sugar and rum production offers only limited protection to the nutrition status and has deleterious effects on the environment. The annual burning of sugar-cane fields adds to the emission of carbon dioxide, destroys animal species upon which higher members of the food chain depend, modifies the soil structure adversely, kills soil organism beneficial to man and generally degrades the environment. The processing activities are not any friendlier. The frequency of upper respiratory tract infections in

populations located in the environs of sugar factories during the processing season is undesirable and rum factory effluents pollute the rivers.

The system provides a source of employment and foreign exchange but at tremendous cost. The foreign exchange earned from sugar and rum is estimated at \$167.6 million in 1991. Given a food import bill of \$912.6 million in 1990, a reallocation of resources used in the production of sugar and rum may well maintain employment levels while conserving a greater amount of foreign exchange.

A healthy, long-living population is at the hub of sustained agricultural development. Over the years there has been an increasing concern among Caribbean governments about the relationships between food, nutrition and health. Several have developed food and nutrition policies and health policies. As these policies are translated into action plans and implemented, all sectors infringing on food, nutrition and health are expected to make adjustments. Within the education system, for example, good dietary practices will be promoted and myths will be dispelled. Educated consumers will then make rational food choices and force the food production and import systems as well as the food processing system to respond. This response would strengthen linkages between consumers and the domestic food production system thereby increasing self-reliance in food production, improving farm incomes and enhancing longevity.

## REFERENCES

- CARIBBEAN FOOD AND NUTRITION INSTITUTE (CFNI) (1991): *"An Analysis of the Food and Nutrition Situation in the Commonwealth Caribbean and the Role of CFNI in This Nutritional Environment"*. Prepared for the 19th Policy Advisory Committee Meeting for the Caribbean Food and Nutrition Institute. Kingston, Jamaica, 16-18 July.
- CFNI (1976): **Food Balance Sheets for the Caribbean**. CFNI.
- CFNI (1984): *"Food and Nutrition Profile of the*

*English-Speaking Caribbean Countries and Suriname - 1984. A Basis for the Scientific and Technical Approaches to the Work of CFNI"*. November.

- CENTRAL STATISTICAL OFFICE (CSO), Republic of Trinidad and Tobago: **Annual Statistical Digest**; 1970, 1978, 1980, 1984, 1986, 1988, 1990. CSO, Republic of Trinidad and Tobago: **Death Reports**; 1985, 1986, 1988.
- CSO, Republic of Trinidad and Tobago: **Overseas Trade**; 1960-1989.
- CSO, Republic of Trinidad and Tobago: **Population and Vital Statistics Report**; 1976, 1979, 1980.81, 1983/86, 1987, 1988.89.
- ENSMINGER, ET AL. (1983): **Food and Nutrition Encyclopedia**, First Edition. Pegus Press, California.
- FOOD AND AGRICULTURAL ORGANIZATION (FAO): **Food Balance Sheets** (various issues).
- FAO (1988): **Food Systems and Food Security Annex III**. FAO of the United Nations.
- HAGLEY, KNOX (1987): *"Nutrition and Mortality Trends in the Caribbean Region"*, **Cajanus**, Vol. 20, No.2, pp. 86-93.
- JAMES, W.P.T. (1988): *"Healthy Nutrition: Preventing Nutrition-Related Diseases in Europe"*. WHO Regional Publications; European Series No. 24.
- MORRIS, J.N. (1987): *"Diet and Heart: A Postscript"*. **British Medical Journal**, 2: pp. 1307-1314; 1977.

## BIBLIOGRAPHY

- THE CARIBBEAN FOOD AND NUTRITION (CFNI) (1990): *"Lifestyles and Chronic Diseases"*. **Cajanus**, Vol. 23, No. 1. CFNI Quarterly.
- CFNI (1990): *"More on Lifestyles"*, **Cajanus**, Vol. 24, No. 3, CFNI Quarterly.
- CFNI (1991): *"An Analysis of the Food and Nutrition Situation in the Commonwealth Caribbean and the Role of CFNI in this Nutritional Environment"*. Prepared for the 19th Policy Advisory Committee



- Meeting for the Caribbean Food and Nutrition Institute. Kingston, Jamaica, 16-18 July.
- CFNI (1976): **Food Balance Sheets for the Caribbean**. CFNI.
- CFNI (1984): **Food and Nutrition Profile of the English-speaking Caribbean Countries and Suriname - 1984. A Basis for the Scientific and Technical Approaches to the Work of CFNI**. November.
- CFNI (1990): *"Nutrition and Related Diseases and Food and Nutrition Security in the Caribbean"*. Prepared by Donald Simeon, Statistician, CFNI; Presented at the Meeting of National Nutrition Coordinators in the Commonwealth Caribbean. April.
- CFNI (1990): *"Report on the Workshop and Exhibition on - Developing and Implementing Food and Nutrition Plans of Action in the Commonwealth Caribbean"*, January.
- CENTRAL STATISTICAL OFFICE (CSO), Republic of Trinidad and Tobago: **Annual Statistical Digest**; 1970, 1978, 1980, 1984, 1986, 1988, 1990.
- CSO, Republic of Trinidad and Tobago: **Deaths Report**; 1985, 1986, 1988.
- CSO, Republic of Trinidad and Tobago: **Overseas Trade**; 1960-1989.
- CSO, Republic of Trinidad and Tobago: **Population and Vital Statistics Report**; 1976, 1979, 1980/81, 1983/83, 1987, 1988/89.
- FOOD AND AGRICULTURAL ORGANIZATION (FAO): **Food Balance Sheets** (Various Issues).
- FAO (1988): **Food Systems and Food Security**, Annex III, FAO of the United Nations.
- HAGLEY, KNOX (1990): *"Nutrition and Mortality Trends in the Caribbean Region"*. **Cajanus**; Volume 23, No. 2, pp. 88-96.
- HAGLEY, KNOX (1990): *"An Overview of the Problem"*. **Cajanus**; Volume 23, No. 1, pp. 8-13.
- JAMES, W.P.T. et al: *"Healthy Nutrition, Preventing Nutrition-related Diseases in Europe"*. WHO Regional Publications; European Series No. 24.
- MASON, ROBERT D. (1970): **Self Review in Business and Economic Statistics**. Learning Systems Co.
- McGLASHAN, M.D. (1981): *"Cancer Mortality in the Commonwealth Caribbean"*. **West Indian Medical Journal**; 30(3); pp. 142-148.
- MORRISON, EUSTA (1983): *"Diabetes Mellitus in Jamaica"*. Guest Editorial; **West Indian Medical Journal**; December, 32(4); pp. 199-200.
- PAN AMERICAN HEALTH ORGANIZATION (PAHO) (1980): **Health For All by the Year 2000**. PAHO.
- SINHA, DINESH, P. (1988): **Children of the Caribbean**. Caribbean Food and Nutrition Institute.
- SINHA, DINESH, P. (1984): *"Obesity and Related Diseases in the Caribbean"*. **Cajanus**; Vol. 17, No. 2, pp. 79-105.
- WORLD HEALTH ORGANIZATION (WHO) (1991): **World Health Forum**. An International Journal of Health Developments. WHO, Geneva; Vol. 12, No. 3.
- WHO (1990): WHO Technical Report Series No.797, **Diet, Nutrition and the Prevention of Chronic Diseases**. Report of a WHO Study Group.

Table 2: *Per Caput Food Availability Pattern of Trinidad and Tobago*

FOOD AVAILABILITY			
	Total Energy (Kcal)	Fat % Total Energy	Sugar % Total Energy
1961-65	2481	21.84	16.44
1967	2516	23.32	16.93
1968	2419	23.07	18.19
1969	2549	22.01	16.61
1970	2552	22.36	16.14
1971	2593	21.80	16.51
1972	2577	22.32	15.91
1973	2529	22.49	17.56
1974	2567	21.25	17.34
1975	2643	21.45	17.02
1976	2719	21.08	16.37
1977	2695	20.50	16.59
1986-88	2982	25.35	17.07
1987-89	2913	24.06	17.34

Source: Food and Agricultural Organization (FAO); "Per Caput Food Supplies"; 1961-65 Average, 1967-1977; Rome, 1980, p.107.

Table 3: *Mortality Trends in Trinidad and Tobago For Ischaemic Heart Disease, Malignant Neoplasms*

	DEATH RATE PER 100,000 MID-YEAR		POPULATION
	Malignant Neoplasms	Diabetes Mellitus	Ischaemic Heart Disease
1961-65	61.54	15.91	
1967	65.93	23.76	
1968	68.58	24.20	
1969	61.78	19.17	
1970	65.78	27.17	
1971	62.76	37.77	
1972	65.64	40.47	
1973	61.55	43.77	
1974	63.26	41.71	
1975	65.37	42.81	
1976-80	63.80	46.56	97.11
1982	67.13	55.93	112.13
1983	69.83	63.85	114.27
1984	79.68	67.03	106.70
1985	77.49	73.44	115.52
1986	83.83	69.46	109.41
1987	84.34	72.37	113.14
1988	86.41	80.89	116.55
1989	83.00	85.59	106.56

Source: Central Statistical Office (CSO), Republic of Trinidad and Tobago, and Data Compiled from Published Information by CSO.