NUTRITIONAL STATUS ASSESSMENT OF THE TECHNICAL AND VOCATIONAL STUDENTS' COMMUNITY IN RIYADH, SAUDI ARABIA

Abdullah Mohammed Ahmed Al-Saderi

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ORIGINAL COPY TIGHTLY BOUND

TO:

JAMILAH,

NAJD,

SARAH,

AND

FAISAL

WITH MY LOVE.

ABSTRACT

NUTRITIONAL STATUS ASSESSMENT OF THE TECHNICAL AND VOCATIONAL STUDENTS' COMMUNITY IN RIYADH, SAUDI ARABIA

ABDULLAH M. AL-SADERI

The General Organization for Technical Education and Vocational Training, Riyadh, Saudi Arabia, has developed a special feeding program for the students at its institutions. The effects of this program on the nutritional and health status of these students have not been evaluated yet, and since no published dietary research has been performed on Technical and Vocational young adult male students, the present work was undertaken to investigate the nutritional status of this community in Riyadh, Kingdom of Saudi Arabia.

After a pilot survey, it was decided to use a self-completed questionnaire combined with personal interview to investigate the nutritional status of 690 students randomly selected from the study population.

Dietary data was collected by two methods: usual weekly intakes "diet history" and actual daily intakes "diet diary". The nutrient intakes were calculated using the Unilever Dietary Analysis Program (UNIDAP).

The Statistical Package for the Social Science (SPSS/PC+) was employed to analyse the data; statistical significance of relationships between certain sets of data was determined by chi-square analysis.

Some general factors affecting the nutritional status of these students were identified, their nutritional habits and attitudes were investigated, and the average daily intakes of energy, the macronutrients, and selected micronutrients were calculated.

The main results of this study shows that the majority of the study population are adolescent, moderately active individuals, and have lower than the standard range of the Body Mass Index; anaemia is the most stated health problem; meal-skipping and eating between meals are common habits amongst the students. Regarding nutrient intake, there was an energy, polyunsaturated fat, and vitamin C deficiency; adequate intake of saturated fat, dietary fibre, retinol, and zinc; more than adequate intake of protein, total fat, cholesterol, thiamin, riboflavin, calcium, and iron.

Recommendations are given which aim to improve the nutrition of technical and vocational students.

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INTRODUCTION

INTRODUCTION

In the last few years, the Kingdom of Saudi Arabia has undergone a remarkable transformation. Vast amounts of money have been expended on education, housing, sanitation, agricultural and health services through a series of comprehensive Five-year Development Plans.

One of the main objectives of the fourth development plan (1985-1990) is to develop human resources and to form productive "citizen-workers" by providing them with education and health services.

In response to this objective, the General Organization for Technical Education and Vocational Training, a government agency running more than 40 Technical institutes and Vocational Training centres separated over the whole country, has developed a special feeding program for the students at its institutions.

The effects of this program on the nutritional and health status of these students have not yet been evaluated, and since no published dietary research has been performed on Technical and Vocational young adult male students,

the present work was undertaken to investigate the nutritional status of this community.

However, to serve the aim of this project within the time available, it was decided to deal with only one group: the Technical and Vocational students in Riyadh, the capital of Saudi Arabia.

The first chapter of this thesis will present some background information about Saudi Arabia to introduce the reader to the country and to provide a perspective for later chapters. It will also describe the educational provision in the Kingdom in order to put in context the study population.

Chapter two will review the literature on dietary survey methods, and will explain some nutritional terms and definitions in order to provide the reader with some basic nutritional background information.

A review of the factors influencing nutritional status, such as agricultural status, food production, food availability and supply, will be provided in chapter three, followed by a general overview of the nutritional status in Saudi Arabia.

The fourth chapter will describe the study design and the methods which were employed for collecting and analyzing the data of the present work.

Results and findings of this study are demonstrated at chapter five, evaluated at chapter six, and discussed in chapter seven which also contains the conclusions, recommendations, and future research considerations.

Therefore, it is hoped that this study will provide nutritionists and policy makers with a readable reference source on the nutritional status of the study population, which might be of help for similar groups in other parts of the country or in other developing countries, especially the Middle East Arabian countries, which have similar cultural and environmental conditions.

CHAPTER 1

SAUDIA ARABIA

CHAPTER I

SAUDI ARABIA

1.1: Introduction :

This chapter presents some background information about Saudi Arabia to introduce the reader to the country and to provide a perspective for later chapters. It will also describe, in general terms, the educational provision in the Kingdom in order to put in context the sample population, that is, technical and vocational students in Riyadh, which was the subject of this research.

1.2: Background history :

The Kingdom of Saudi Arabia was officially established in 1932 but its roots go back to 1745 when an alliance was made between a Muslim scholar and reformer named Sheikh Mohammad bin Abdul Wahab, and the local ruler of the central region of the Arabian peninsula, Mohammed bin Saud.

The agreement, to join political rule and religious principles, served as the inspiration for the growth in

power of the Al-Saud family. Over the next two hundred years they succeeded several times in extending their rule throughout most of the Arabian Peninsula. However, it was not until this century that the late King Abdul Aziz crowned this with the unification of Hijaz, Najd, Al-Ahsa and Asir regions as well as the adjoining areas. He declared this state under the name of "The Kingdom of Saudi Arabia" on the twenty-third of September 1932.

1.3: Location and geography :

The Kingdom of Saudi Arabia is situated in the southwestern part of Asia and occupies approximately four fifths of the Arabian Peninsula, located in the Middle East. It has a land area of 2,250,000 square Km (900,000 square miles) bordered to the north by Jordan, Iraq and Kuwait, to the east by the Arabian Gulf, Qatar, The United Arab Emirates and the Sultanate of Oman, to the south by the Yemeni Arab Republic and the People's Democratic Republic of Yemen and to the west by the Red Sea (see the country map in figure 1.1).

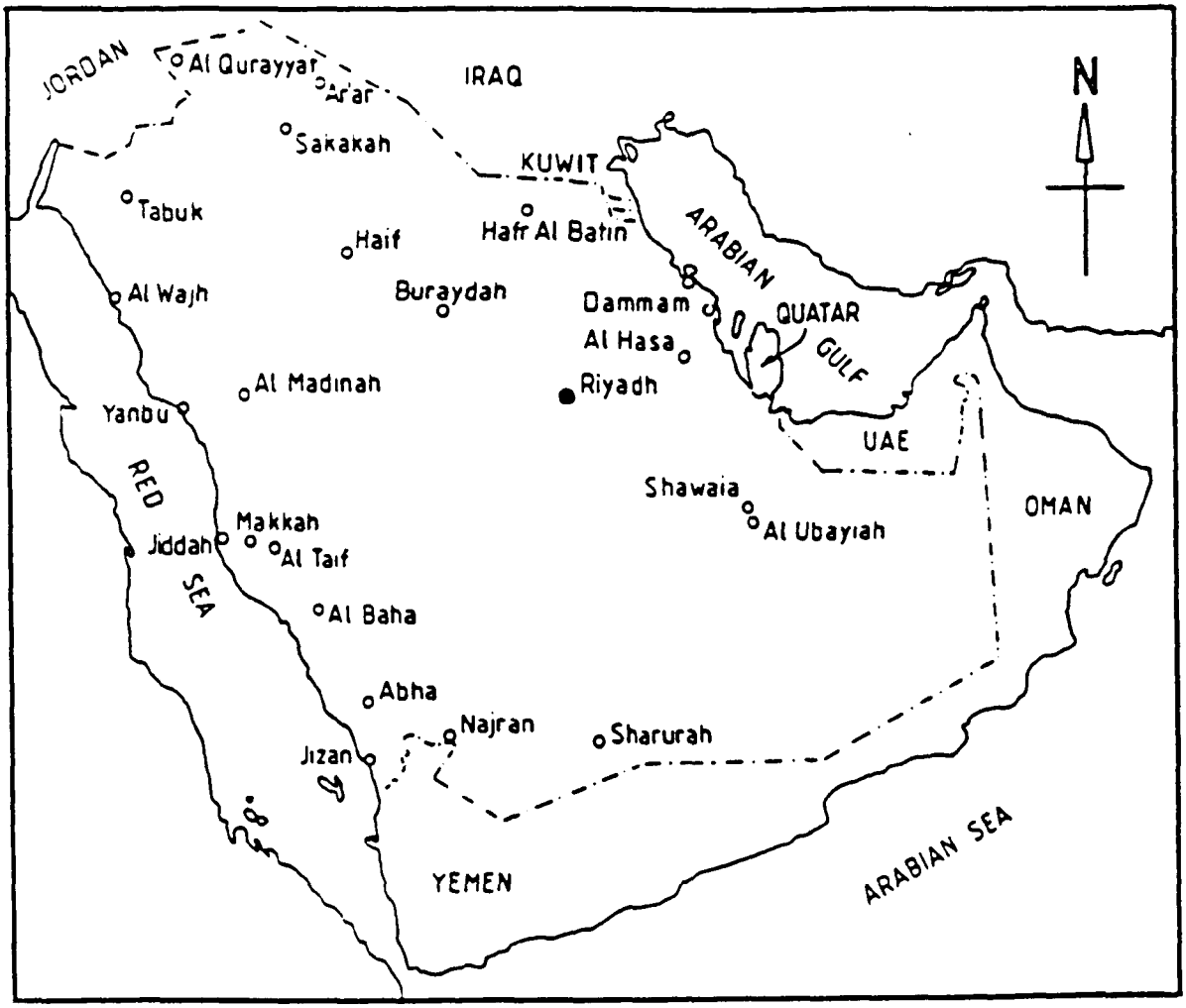


Figure 1.1:

KINGDOM OF SAUDI ARABIA

Saudi Arabia is divided into five regions that may be called provinces.

The central region, historically named Najd, is the core area of Saudi Arabia. The region is a plateau gently sloping eastwards from 5,000 feet in the west to 2,000 feet in the east. It can be described in general as an open steppe.

The region contains Riyadh, the capital of Saudi Arabia and the largest city in the kingdom (1600 km^2), with over one million inhabitants. It is the centre of all ministries and the headquarters of all government offices in the country.

The eastern region of Al-Ahsa lies along the Arabian Gulf coast. It contains most of the country's oil fields and the principal oil installations which are the source of the nation's wealth. Jubail, one of the two most industrialized cities in the Kingdom, where major developments are taking place, is located in this region.

Al-Hijaz, the western region, lies along the Red Sea coast and includes the two holy cities, Makkah (the birthplace of Islam) and Medina (the capital of Islam at the time of the prophet Mohammed). During the pilgrimage season

Makkah is the destination of Muslims from all over the world. Also, Jeddah, the commercial centre of the country and Yanbu, the second industrialized city in the Kingdom, are located in the western region.

The northern region contains the northern frontiers and the major cities in this region are Tabuk, Jawf and Hayl.

The southwestern region, traditionally named Asir, is a mountainous region with peaks up to 10,000 feet. Abha is the regional capital, Najran and Jizan are a major cities in the region.

1.4: Climate :

The country is characterised by a hot and dry climate. Variations of climate occur between the coast and the interior. The coastal areas are cooler, with temperatures seldom going above 80 degrees Fahrenheit, with high humidity. The interior is hot for much of the year, with temperatures often reaching over 100 degrees Fahrenheit in the peak summer months. Nights are usually cool throughout

the Kingdom. Saudi Arabia in general receives slight and erratic rainfall, averaging six inches per year. Only the southwestern region 'Asir' is subject to periodic monsoon rains, which can total to 20 inches in a year.

1.5: The people :

According to the 1974 census, the total population was about seven million persons, of whom 73 % were settled and 27 % were classified as bedouin. The Saudi Arabian population is a relatively young one, with about 45 % below 15 years of age and 4 % being 65 years of age or older.

The gradual increase in the birth rate (44 %) and the decrease in the death rate (13 %) has led to a great increase in the population. Recently (1986), the Ministry of Information estimated the total population to be 12 million people with an estimated annual growth rate of 3.5 percent.

Almost all Saudi Arabians have at least two characteristics in common : they share the same religion 'Islam' and the same language 'Arabic'. Although most of

the people of Saudi Arabia are engaged in business, agriculture and the private sector, a large number work in the government sector.

1.6: Political structure :

It is the fundamental assumption of the policy of Saudi Arabia that the Holy Quran is more suitable to be the country constitution. This assumption was viewed in the context that the nation is completely Islamic.

The paramount central administrative body of the Kingdom is the Saudi Council of Ministers. It was created at 1953 under the King's presidency, consisting of all active Ministers and Advisers. The Saudi Cabinet consists of twenty ministries represented in the Council of Ministers.

Stating policy within the country and abroad are under the surveillance of the Council and it can examine any matters in the kingdom.

1.7: Economy and development :

Before the discovery of oil, Saudi Arabia had no integrated national economy. Economic activity was limited to livestock raised by Bedouins, primitive agriculture, and the production of simple tools by craftsmen who lived in the small towns concentrated around sources of water. The main economic revenue was from the pilgrims visiting the holy places (Makkah and Medina) every year.

Oil was discovered in commercial quantities in 1938, but World War II interrupted the development of the petroleum industry. In the period that immediately followed the end of the war, production increased rapidly. Since then, oil has been the major source of revenue for both the private and public sectors.

In order to utilize the oil income effectively and to expand and diversify industrial and agricultural potential, the government of Saudi Arabia adopted a series of comprehensive Five-year Development Plans from 1970. The specific objectives the government hoped to achieve through its planning strategies were :

1) to increase the rate of growth of the gross domestic product (GDP).

2) to develop human resources and to form productive citizen-workers by providing them with education and health services so that the various elements of society would be able to contribute more effectively to production and to participate fully in the process of development.

3) to diversify the sources of national income with reduced dependence on oil through increasing the share of other sectors in the gross domestic product.

During the first four plans, great progress has been made in each major area of development and a progressive and intensive evolution has taken place in all sectors. In an attempt to develop a manpower programme which would reduce the shortage of skilled and semi-skilled labour, an expansion in educational and vocational training facilities was given priority.

1.8: Education :

Since the establishment of the Kingdom, educational development is considered to be one of its most characteristic features. Schools are established at a regular and speedy rate in order to provide the best possible educational chances for the coming generations. Education is free to all, and grants are paid to students during certain stages. Education provision includes different stages from kindergarten to university, in addition to technical education and vocational training.

1.8.1: General education :

Education up to university level is the responsibility of the Ministry of Education, which administers education for males, and the General Presidency for Girls' Education, which performs similar functions for females.

General education covers three stages of "elementary education" intended for the age group 6-12 years, "intermediate education" for the 12 - 15 age group and

"secondary education" for the age group 15-18. These stages are preceded by "kindergarten" which is an elective stage meant for the 4-6 age group.

In the period between 1970 and 1989, the total number of male and female students enrolled at various levels of general education rose from 432,675 to over 2 million (table 1.1).

Table 1.1
General Education Enrolment (by sex and study level)

Study Level	1970 / 1971 Male	Female	1989 / 1990 Male	Female
Elementary	267,529	114,800	841,000	676,000
Intermediate	37,389	4,400	217,000	166,000
Secondary	8,207	350	110,000	95,000
Total	313,125	119,550	1,168,000	937,000

1.8.2: Higher Education :

Higher education follows secondary education and is provided in universities or university level colleges under the purview of the Ministry of Higher Education.

At present there are seven universities in the Kingdom, which together have 63 colleges/institutes located in different parts of the country. In addition, there are 11 colleges for girls. Five of the seven universities - King Saud (KSU), King Abdul Aziz (KAAU), King Faisal (KFU), Imam Mohamed Bin Saud (Imam) and Umm Al-Qura (UAU) - enrol both male and female students. The University of Petroleum and Minerals (UPM) and Islamic University (Islamic) enrol male student only. The Girls Colleges, of course, enrol females.

Between 1970 and 1980, enrolment at these universities increased from 8,000 to 48,000, and during 1980-1989, total higher education enrolment grow to over 100,000 students (see table 1.2).

Table 1.2
Higher Education Enrolment (by sex and institution)

Institution	1984 / 1985 Male	Female	1989 / 1990 Male	Female
KSU	17,536	4,891	18,730	5,670
KAAU	10,089	3,994	16,376	6,095
KFU	1,965	1,185	3,535	1,861
UPM	3,496	-	4,533	-
Islamic	3,400	-	4,630	-
Imam	9,344	-	14,970	-
UAU	5,654	4,084	6,470	5,480
Girls Colleges	-	14,172	-	20,000
Total	51,484	28,326	69,246	39,106

1.8.3: Technical Education and Vocational Training :

The Government has been paying due attention to development of technical education and vocational training in order to prepare the qualified manpower needed for different types of technical jobs. While it was the responsibility of the Ministry of Education and Ministry of Labour and Social Affairs until 1980, the General Organization for Technical Education and Vocational Training (GOTEVT) was established. It's activities are

organized into technical education and vocational training branches.

1.8.3.1: Technical Education :

This type of education which is for males only is provided in institutes, specialized higher institutions and intermediate technical colleges. There are four main types of educational programs :

1- Industrial education :

Industrial education is provided at eight secondary institutes and six intermediate technical colleges. The main branches of study are mechanical, automobile, electrical and electronic engineering. The duration of study in the secondary institutes is three years, and two years in the intermediate colleges.

2- Commercial education :

There are eleven secondary commercial institutes and two higher institutes for financial and commercial sciences.

The commercial education curriculum includes courses in accounting, administration, secretarial practice and warehousing.

3- Agricultural education :

This type of education is provided in the Model Technical Agricultural Institute. The duration of study is three years. The institute provides training in agricultural industries, agricultural mechanization, food production and other general subjects.

4- Technical assistants institutes :

There are three secondary institutes of technical assistants which include five sections: survey, contortion foremanship , water foremanship , road foremanship and architectural drawing. The duration of study is three years. Enrolment to and graduation from the technical education programmes during 1985/1986 - 1989/1990 are shown in table 1.3.

Table 1.3
Enrolment and graduation in technical education programmes (1985/1986-1989/1990)

Institution	1985 / 1986		1989 / 1990	
	Enro.	Grad.	Enro.	Grad.
Intermediate TECHNICAL Colleges	415	53	556	160
Higher Commercial Institutes	452	181	472	200
Secondary Industrial Institutes	4675	1314	6632	1767
Secondary Commercial Institutes	6467	1815	8205	2160
Secondary Agricultural Institute	194	41	347	81
Secondary Assistants Institutes	362	146	572	200
Total	12565	3550	16784	4568

1.8.3.2: Vocational Training :

Training for vocational trades is conducted in 30 vocational training centres throughout the Kingdom. The Vocational training centres offer both morning sessions for full-time training and evening sessions for employed persons who wish to extend their vocational skills. The study programmes in the morning courses take 12-18 months, while in the evening courses they are of about 15 months duration. The trades in which training is provided include

auto mechanics, refrigeration and air conditioning, plumbing, auto body repairs, electricity, radio and TV, building.

On-the-job training is undertaken in collaboration with the private sector to enable employed workers to qualify as technical supervisors and instructors in their own firms.

There is also an instructor's training institute to train instructors for the vocational training centres. Table 1.4 is shows the enrolment to and graduation from vocational training during 1985/1986 - 1989/1990.

Table 1.4
Enrolment and graduation in vocational training programmes (1985/1986-1989/1990)

Institution	1985 / 1986		1989 / 1990	
	Enro.	Grad.	Enro.	Grad.
Morning Vocational Training	4455	3563	8424	4840
Evening Vocational Training	3182	2545	6017	3457
Instructor Training	70	70	70	70
On-job Training	150	150	300	300
Total	7857	6328	14811	8667

CHAPTER 2

NUTRITIONAL STATUS ASSESSMENT

CHAPTER II.

NUTRITIONAL STATUS ASSESSMENT

2.1: Introduction :

The assessment of nutritional status is one of the prime requisites of the nutritional sciences. The principal aim of nutritional assessment is to discover the extent of malnutrition as a health problem, to analyse the factors that are directly or indirectly responsible for this problem, and to suggest appropriate corrective actions intended to improve the nutrition and, therefore, health status of the community (Jelliffe, 1966; Jelliffe and Jelliffe, 1989).

Assessment of the nutritional status of a community is, usually, based on the findings of clinical or dietary surveys. The dietary survey was used as a tool in the present work. This chapter will review the literature on dietary survey methods but, before that, some nutritional terms and definitions will be explained in order to provide the reader with some basic nutritional background information.

2.2: Introductory terms and definitions :

As an introduction to this work, below is a brief review of the nutritional terms used in subsequent chapters :

2.2.1: Food consumption or dietary intakes :

Food consumption or dietary intake is the food and drink consumed by an individual during a given period of time expressed in terms of quantities or of frequencies of the type of food or drink. For the purpose of analysis, foods and drinks may be divided into groups according to the aims of the study. The final expression of quantities consumed is in terms of energy and nutrients (Cameron and Staveren, 1988).

2.2.2: Food supply or availability :

The gross food supply is the sum of food production and procurement minus sales, export, and decreases in stocks, whereas the net food supply is the gross food supply minus losses in transport and storage, and non-human uses of food (Cameron and Staveren, 1988).

2.2.3: Food balance sheets :

Food balance sheets or food consumption statistics are national accounts of the annual production of food, changes in food stocks, imports and exports, and distribution of food for various uses such as seed, animal feed, industrial uses, waste, and the net food availability for human consumption at the retail level. It provides an indirect estimate of the per capita supplies available for human consumption expressed in grams of food and in amounts of nutrients (Cameron and Staveren, 1988).

2.2.4: Food patterns :

Food consumption patterns or dietary patterns are the regularly repeated arrangements and practices that can be recognised when foods are eaten. This refers particularly to the types and relative proportions of foods used in meals by an individual or a community (Cameron and Staveren, 1988).

2.2.5: Recommended Dietary Intakes / Allowances (RDIs/RDAs):

The Department of Health and Social Security (1969) defined the recommended intakes of nutrients as "the amounts sufficient or more than sufficient for the nutritional needs of practically all healthy persons in a population". More recently, the report on recommended daily amounts of food energy and nutrients for groups of people in the United Kingdom (Department of Health and Social Security, 1979) defined the recommended amount of a nutrient as "the average amount of the nutrient which should be provided per head in a group of people if the needs of practically all members of the group are to be met". The RDAs for the major essential nutrients (energy, protein, vitamins, and minerals) are published by most governments and the World Health Organisation (see appendix A).

2.2.6: Anthropometric measurements :

Anthropometric indicators are useful tools for assessing nutritional status. The basic measurements are age, weight and height. Recently, the body mass index (BMI) of Quetelet (Wt/Ht^2) is being increasingly used in nutritional assessment of adults. It is a numerical index which is not related to any reference (World Health Organization, 1986).

Acceptable average value of BMI are 20-25 kg/m^2, obesity is taken to start at a BMI of 30 kg/m^2 and gross obesity at 40 kg/m^2 (Truswell, 1986).

2.3: Dietary surveys :

Dietary surveys or food consumption studies are one of the main tools for assessing the nutritional status of a community. Dietary survey is a nutritional term to describe a survey designed to obtain information about the food eaten by a population or a community within a population. A comprehensive dietary survey should include the collection of information on factors relevant to food consumption, such as social and economic factors (FAO/WHO, 1974).

Quantitative food-intake data should be converted into quantities of energy, protein, fat, carbohydrate, minerals and vitamins by using food composition tables. Subsequently, a comparison can be made between the amounts of food consumed and recommended standards.

In a food consumption study, data can be collected covering a whole nation, from families or from individuals. Until the first half of this century most dietary surveys were using the family as the basic unit. The family dietary surveys attempt to measure all the food consumed by the whole family over a period of time. It is useful for determining the food consumed by different community groups.

The limitation of the family surveys on food consumption is that no information is provided about how the food is distributed within the family and individual dietary intakes cannot be assessed from this type of survey. Thus, different methods have been developed for estimating the individual's dietary intake for different purposes (Passmore et al,1986; Marr, 1971).

2.4: Purposes of dietary surveys :

Dietary surveys could be carried out for a variety of purposes. In general, the aim of any dietary survey, whether made on individuals or on groups, is to discover the habitual intake of the persons under investigation (Marr, 1971; Fehily, 1983). Below is a brief review of some purposes of dietary surveys :

2.4.1: Estimation of nutrient requirements :

Widdowson (1947) reported that the majority of dietary surveys have been inspired by an interest in food requirements. Knowledge of the normal range of nutrient intakes of different population groups, based

on observations of the amounts of food eaten by healthy persons, is useful in planning diets and to give estimates of human dietary requirements for a particular population group (Passmore et al, 1986; Thomas, 1988).

2.4.2: Estimation of the adequacy of dietary intakes of population groups :

Judging the adequacy of dietary intakes requires the collection of food consumption data at the individual level. These judgments are made by comparing the dietary intakes with a reference value. Recommended dietary intakes or allowances (RDIs or RDAs) provide standard values for each of the major essential nutrients and they are commonly used as the reference (Cameron and Staveren, 1988).

2.4.3: Planning and evaluation of food and nutrition programmes :

Dietary surveys can play an important role in the planning and evaluation of food and nutrition programmes. Information on dietary intakes, food availability and food supply are essential for food and nutrition planning.

National data such as food balance sheets are helpful in calculating the per capita amounts of nutrients which present an indication of the adequacy of the available food supply. The planning of nutrition programmes such as food production, food regulations and food distribution are based on data obtained from food balance sheets.

Development of food guides for use in nutrition education programmes, aiming to reduce the number of persons having inadequate or imbalanced nutrient intakes, requires information on food consumption patterns (Cameron and Staveren, 1988).

2.4.4: Investigation of relationships of diet to health and nutritional status :

Dietary surveys can also be used to study the relation of diet to health status (Becker, Indik, and Beeuwkes, 1960). Investigation of relationships between dietary factors and health or nutritional status requires collection of data on the individual's dietary habits.

2.5: Methods of dietary assessment :

There are five basic methods in use for assessing the dietary intakes of free-living individuals. Two are records of present intakes, the first one with actual weights of food, and the second with estimated weights of food. The other three are recalls of past intakes. All these methods can be used to collect dietary data from individuals as a cross-sectional study 'at a particular point in time' or as a longitudinal study 'over a long period of time'.

2.5.1: Weighed records of actual consumption :

Origin :

In 1932 Wait and Roberts studied the food requirements of adolescents using weighed records of food consumption but Widdowson, in the late 1930s, was the first to attempt accurate large-scale documentation of the food intakes of free-living individuals (Bingham, 1987).

Technique :

The subjects were asked to weigh, describe and record all items of food and drink consumed during a specific period of time. Food should be weighed as it is served, and

the leftovers also weighed and recorded. Nutrient intakes can be calculated using food composition tables or by chemical analysis of adequate samples (Widdowson, 1936; Marr, 1971; Fehily, 1983).

Evaluation :

The weighed record is considered to be the most accurate method of dietary assessment. It is suitable for use in any population including free living individuals. One disadvantage of the method is the problem of snacks and meals consumed away from home, which may not be possible to weigh. It also requires varying degrees of supervision and a high degree of co-operation from subjects which is likely to affect the response rate (Bingham, 1987).

2.5.2: Estimated records of actual consumption (Diet Diaries):

Origin :

Youmans et al. (1942) is the earliest reference to the use of estimated records as a method of calculating individual intakes. Kitchin et al. (1949) use this method

to measure the food eaten by Edinburgh University students.

Technique :

In this technique the subjects are instructed to keep records of the food actually eaten using standard measures such as household measurements (cups, teaspoons, tablespoons, glasses...etc.). Food models and three-dimensional measurements may also be used to describe food amounts. These descriptive terms have then to be converted to the approximate weights. The nutrient intakes can be obtained from food composition tables (Marr, 1971 ; Bingham, 1987).

Evaluation :

The estimated records or diet diaries are suitable for collecting cross-sectional data. It does not require special equipment or direct supervision. The co-operation rates are likely to be higher than other methods. The disadvantage of this method is that subjects vary in their ability to estimate portion sizes, which might affect accuracy; however in the case of groups, the loss may be small and of little importance (Fehily, 1983).

2.5.3: Recall of actual consumption (Diet recall) :

Origin :

The first reference to this method was in 1938 by Burke and Stuart as a method of diet analysis. Wiehl (1942) investigated the diet of a group of aircraft workers in Southern California using a two-day quantitative diet history.

Technique :

In the diet recall, subjects are asked to recall all food and drink consumed over a specified period. The length of time recalled could range between a few hours and 7 days, but the most common is the 24 hour recall. Household measures, food models and three-dimension measurements are used in this method to estimate food quantities. then it can be converted into weights of nutrients. Data may be obtained by an interview, or via a self-completion questionnaire (Marr, 1971; Fehily, 1983).

Evaluation :

The 24 hour diet recall histories are commonly used to evaluate the diet of groups. It is considered to offer reliable results if the sample comprises

several hundreds. This method has several advantages; it is quick, simple to implement and it's response rate is high. The main disadvantage of this method is its dependence on subjects' memory (Cameron and Staveren, 1988).

2.5.4: Usual consumption (Diet history) :

Origin :

The first mention of this method was in 1940 by Turner who described the estimation of patient's home dietary intake. Burke (1947) later developed this method for use as a tool in research.

Technique :

The diet history, as described by Burke (1947) is an interview method composed of three parts. The first part present the subject's health habits and other factors which relate to nutrition and includes a 24- hour recall using common household measures. The second part is a 'cross-check' list of foods which are checked with the subject. The third part is a record of food intake for three consecutive days as a further measure of reliability of the study. Burke's method has

been modified and developed by several investigators (Mann et al., 1962; Hartog et al., 1965; Beal, 1967). The main modification to the original method is that the three day food record (part three) is omitted (Cameron and Staveren, 1988).

Evaluation :

The diet history has an advantage over other methods in that it assesses the individual's total nutrient intakes and usual eating pattern over an extended period of time. The disadvantage is that it requires supervision by a nutritionist who has experience in obtaining diet histories (Fehily, 1983).

2.5.5: Questionnaires and food frequency lists :

Origin :

Questionnaire methodology was developed by Wiehl and Reed (1960) to be used in epidemiological studies. Since that time, several types of questionnaire have been developed and tested, (Epstein et al.,1970; Yarnell et al., 1983).

Technique :

A number of questionnaires have been developed, either to be completed by the subjects themselves as a self-administration, or as a tool to interview the subjects in a short interview. Questionnaires in general are developed for specific purposes and specific population groups. The questions should be carefully designed to collect information that affects dietary patterns believed to exist and that are of interest. It should be simple, clear and, if possible, with specific answer choices asking subjects to mark the most appropriate answer. Open-ended questions will increase the need of manual coding. Questionnaires should include clear instructions for completion by the subjects (Oppenheim, 1972; Sinclair, 1975).

The questionnaire may contain a list of foods which offer a qualitative assessment of dietary intakes (Stefanik and Trulson, 1962) or a quantitative assessment using household measures or food samples (Abramson, Slome and Kosovsky, 1963).

Evaluation :

The advantages of the questionnaire method are that it is a simple method which can be completed by the subjects themselves, and the data can be collected quickly and from several areas. The disadvantages of this method are that the design of the questionnaire is difficult and response rates tend to be lower than those from other methods (Fehily, 1983; Bingham, 1987).

2.6: Accuracy of dietary assessment methods:

The two factors used to examine the accuracy of a dietary assessment method are validity and reliability. Those two factors are associated with two types of error, systematic and random errors. Systematic error can take place in subject selection, reported intakes, and in the data content of food composition tables. Random error can take place at the sampling stage, in the reporting and coding of intakes, and in the estimated amounts of foods consumed (Cameron and Staveren, 1988).

2.6.1: Validity :

The validity of a dietary method is its ability to measure the amount of food and nutrient intakes correctly. This requires the truth to be known, which is particularly difficult for surveys assessing dietary intakes. The 'relative' validity of such methods could be assessed by comparing its results with those of another method which has greater acceptance as a reference method (Block, 1982).

Seeking to assess the validity of the various dietary assessment methods, investigators have used various reference methods to represent the validity, using group means, individual values or classifications within a distribution.

The validity of weighed records methods have been assessed by several studies. Most of these studies have found good agreement between mean values obtained by the same method under two different circumstances (Heady, 1961; Morris et al, 1963; Hankin et al, 1970). Gersovitz et al.(1978) found a significant association of actual and recorded values in the first two days only. Consequently, the validity of this method may be limited to group mean values on studies of no more than a few days.

Recently, Livingstone et al.(1990) attempted to validate the seven day weighed dietary record against total energy expenditure estimated concurrently by the doubly labelled water technique; they found that the average recorded energy intakes were significantly lower then measured expenditure.

A number of studies have measured the validity of the recall methods (24-hour recall, seven-day recall). It is not an appropriate tool for assessing individuals intakes, but for group means, the method shows good agreement with weighed methods (Madden et al., 1976; Block, 1982).

The group mean of nutrient intakes assessed by the dietary history method are often higher than when assessed by other methods (Young et al., 1953; Paul et al., 1963; Jain et al., 1980).

When assessing the validity of a method, agreement between group means may indicate a consistent diet and an accurate method, or may indicate the tendency of people to give the same responses at different times. Disagreement may indicate a changing diet and an accurate method, or may indicate a consistent diet and an unreliable method (Block, 1982).

2.6.2: Reliability :

The reliability or reproducibility of a method is the extent to which it produces the same results when applied on two or more occasions to the same individuals under the same conditions (Moore, 1960; Marr, 1971).

It depends upon the subjects, the nutrients of interest, the time of study and the time of reference of the method. The within-subject variation is an important factor when the purpose is to assess the individual mean of intakes and it must be reduced as far as possible. When the purpose is to assess the mean intakes of a population group, the between-subject variation is also an important factor in estimating the reliability of the method. Reliability of group means can be improved by repeating the measurement and increasing the sample size (Beaton et al., 1979; Cameron et al., 1988).

Few studies have examined the reliability of dietary assessment methods. Adelson (1960) when estimating the reliability of two weighing methods being used on two occasions found that the calculated intakes were within 80 % to 120 % agreement between the two studies.

Diet histories reliability has been found to be very good for energy, protein, fat and carbohydrate, but for other nutrients it was uncertain (Block, 1982; Hankin et al., 1983). When comparing the diet history reliability with other methods, it was found that it is better than the recall method and the estimated or weighed record (Trulson and McCann, 1959; Bazzarre and Yuhas, 1983).

In general, reliability studies of dietary survey method are difficult to interpret as the intake may change from person to person and from time to time.

2.7: Conclusion :

When the purpose of a study is to estimate the adequacy of dietary intakes and to investigate the relationship of the diet to nutritional status, it is necessary for the collection of food consumption data that the study population are "free-living" and continuing with a normal lifestyle.

For the data collection, as has been described in the various sections of this chapter, different methods are available. Since each method has specific advantages and disadvantages, we can conclude that there is no single, accepted method which is generally preferred over others and, therefore, a combination of two methods seems to be appropriate and might give more valid information on dietary status.

CHAPTER 3

NUTRITIONAL STATUS IN SAUDIA ARABIA

CHAPTER III

NUTRITIONAL STATUS IN SAUDI ARABIA

3.1: Introduction:

There are several factors which influence the nutritional status of any community, such as agricultural status, food production, food availability and supply.

This chapter will provide a brief review of these factors followed by a general overview of the nutritional status in Saudi Arabia.

3.2: The state of agriculture :

The unfavourable geographical conditions, dry weather and the shortage of water, are the major factors inhibiting the development of agriculture in Saudi Arabia. Thus, the country is largely dependent on food imports. Almost all of its needs for oil, fat, fruits, rice and sugar are imported. But in spite of this, the Government has been able, during the last few years, to improve the state of agriculture through a number of projects, with the aim of achieving self sufficiency in foodstuffs.

1) Water resources:

The State has taken different steps for providing and diversifying water resources. A large number of dams (170) have been constructed in the Kingdom to augment underground water. In addition, the Kingdom is one of the world's leading countries in the conversion of sea-water into fresh water. There are now 22 water desalination projects which produce more than 500 million gallons of potable water daily.

2) Agricultural land:

The Ministry of Agriculture has made successful efforts to stop the rapid movement of the sands and has distributed agricultural land among the citizens. They were, at the same time, granted interest-free loans in order to give the people a chance to make investments in the agricultural sector. The area of arable land in the Kingdom is about 2 million hectares, producing different kinds of agricultural crops (Ministry of Information, 1986).

3.3: Food production:

Government incentives have brought about a substantial increase in foods production and the Kingdom is now self-sufficient in many crops (see table 3.1).

Milk and dairy production represented only 5 % of total consumption ten years ago; presently, the Kingdom is almost self-sufficient.

With regard to livestock, red meat production increased from 14,000 tons in 1979 to 28,000 tons in 1982 while white meat production rose from 58,000 tons to 108,000 tons in the same period. Egg production rose from 204 million in 1975 to 1,124 million in 1983. (Ministry of Information, 1988).

Table 3.1
total production of some crops in Saudi Arabia (Ton)

Crop	1976	1986
Wheat	126,000	1,650,000
Date	240,000	500,000
Citrus	12,000	43,000
Grape	24,000	100,000

Source: Saudi Arabian Food Balance Sheets (1976-1986).

3.4: Food supply:

The impact of the growth in food production, availability and population on per capita food supplies in terms of energy, protein and fat has been revealed in the Saudi Food Balance Sheets (1974-1986). These sheets, with all their limitations are, nevertheless, the best data available and they do give a general idea of the major features of food supply and availability.

The Food and Agriculture Organization (FAO) and the Arab Organization for Agricultural Development have indicated that per capita dietary energy supplies in Saudi Arabia are increasing significantly in relation to nutritional requirements. Table 3.2 shows the trends of growth of energy, protein and fat supplies per capita in Saudi Arabia (Ministry of Agriculture, 1987).

Table 3.2
Per capita energy, protein and fat supplies (1974-1986)

Years	Energy(Kcal)	Protein(Gm)	Fat(Gm)
1974/76	1807	51.3	33.6
1977/79	2399	70.6	58.2
1980/82	2867	77.7	76.7
1983/86	3012	84.2	95.0

Source: Saudi Arabian Food Balance Sheets (1976-1986)

3.5: Food patterns and dietary habits:

Information on Saudi food patterns and dietary habits is sparse. The only research conducted in this field was undertaken by the Central Department of Statistics at the Ministry of Finance and National Economy and published in 1982. The Department has implemented several major household surveys and some of the nutritional findings will be discussed below.

3.5.1: Food popularity :

The most popular food or drink consumed by the population of Saudi Arabia during the survey period (1982) was tea which was drunk for an average of 1.8 daily servings per person. The remainder of the twenty most popular foods are shown on table 3.3, which accounts for approximately 77 % of all food consumed in the Kingdom during the survey period. Despite this concentration of foods within a narrow range, the types of foods included represent a relatively high level of essential nutrients.

Table 3.3
The most popular foods in Saudi Arabia

No.	Food	servings/person/day
1	Tea	1.80
2	Onion	1.20
3	Tomatoes	1.13
4	White Bread	1.07
5	Rice	0.88
6	Whole Wheat Bread	0.53
7	Cheese	0.48
8	Lamb Meat	0.47
9	Coffee	0.44
10	Fresh Milk	0.39
11	Eggs	0.39
12	Chicken	0.34
13	Dates	0.33
14	Olives	0.32
15	Beans	0.31
16	Pepsi	0.29
17	Buttermilk	0.28
18	Oranges	0.24
19	Dry Milk	0.20
20	Watermelon	0.19

Source: Central Department of Statistics, Ministry of Finance and National Economy (1982).

3.5.2: Meal frequency :

It was found that the majority (about 96 %) of the total population ate at least three meals per day (breakfast, lunch and dinner) and most of them also supplemented their meals with between-meal snacks and drinks.

3.6: Dietary adequacy:

Very few dietary surveys have been carried out in Saudi Arabia. Most of the studies which have been published concentrated mainly on infants, pre-school children and persons with serious health problems (Al-Othaimeen, 1986).

A nutrition survey of 849 infants and pre-school children aged 0-6 years in different locations in Saudi Arabia, using a 24-hour recall to investigate dietary consumption, showed that the daily intake of protein, calcium, phosphorus, vitamin A, riboflavin and vitamin C was adequate (ranging from 80 - 190 % of the RDA) for almost all age groups. However, energy, iron and niacin intakes were grossly deficient in almost all of the children. Table 3.4 shows the average intakes of energy and some

nutrients of those children (Al-Othaimeen A.I, Sawaya W.N, Tannous R.I and Villanueva B.P., 1988).

Table 3.4
Average daily intakes for energy and some nutrients of 849 Saudi Arabian pre-schoolers according to age and percentage of RDAs (FAO/WHO and USA FNB/NAS, 1980)

Nutrients	Age groups (months) 0-12	13-24	25-36	37-48	49-60	61-72
Energy (kcal	721	865	970	1,104	1,179	1,144
% RDA	86.9	72.6	71.5	71.6	69.3	62.3
Protein (g)	25.6	29.6	32.7	35.9	39.4	40.5
% RDA	129	128.2	141.6	155.6	136.2	139.8
Calcium (mg)	764	612	696	857	713	750
% RDA	169.8	77.3	87.3	107.3	89.3	94.1
Phosphorous (mg)	566	482	484	481	514	567
% RDA	188.6	60.4	60.7	60.4	64.4	71.2
Iron (mg)	1.7	4.0	5.0	6.0	6.4	6.4
% RDA	14.3	26.9	34.0	40.3	64.1	64.1
Vitamin A (ug)	414	359	392	473	383	414
% RDA	98.7	90.6	98.4	118.8	76.5	82.4
Thiamin (mg)	0.35	0.51	0.64	0.69	0.79	0.81
% RDA	88.2	72.5	91.3	97.3	87.1	89.5
Riboflavin (mg)	0.95	0.78	0.77	0.76	0.76	0.89
% RDA	189.9	97.8	97.6	95.6	76.1	89.3
Niacin (mg)	2.0	4.4	5.7	6.6	7.5	7.4
% RDA	28.5	48.3	62.7	73.5	68.8	68.4
Vitamin C (mg)	39.9	52.5	69.6	79.6	66.1	66.3
% RDA	108.9	116.7	154.7	176.8	146.9	147.3

Source: Al-Othaimeen et al. (1988).

In another study carried out on 767 infants and children, it was reported that the daily intakes of protein, calcium, vitamin A, thiamin, riboflavin and vitamin C were higher than the RDA. But in line with the above study the daily intake of energy and iron were found to be much lower than the recommended allowances (Al-Othaimeen A.I and Villanueva B.P., 1987).

With regard to the status of vitamin D, the available data indicate that the Saudis daily intake of the vitamin is much less than the RDA (Elidrissy A.T., El-Swailem A.R., Belton N.R., Eldress A. Z., and Forfar J.O., 1986; Woodhouse H.Y. and Norton W.L. 1982).

In a study carried out to investigate the nutritional status of pre-school children in central Saudi Arabia, no cases of vitamin A deficiency were identified (Abdullah M.A., Swailem A. and Taha S.A., 1982).

A study carried out among 200 Saudi surgical patients showed that 39.5 % of the patients had evidence of malnutrition with clinically significant malnutrition present in 14 % of the patients. Obesity, however, was very common, with an incidence of 20 % and 38 % among the male and female patients respectively (Chang, Richardson, Adams and Hatton, 1985).

The only survey that has been concerned with the nutritional status of Saudi school children aged 6-18 years was carried out in 13 general education schools in different regions in Saudi Arabia and found that energy intake was low because 70 % of the children's diet did not reach RDA for animal protein and almost 100 % did not reach RDA for fat. Carbohydrate intake was too high, and vitamins and minerals were too low (Wirths, Hamdan, Hayati and Rajhi, 1977).

3.7: Anthropometry:

A study of the health and nutritional status of 337 pre-school children aged 0 to 60 months in two villages in the central region showed that malnutrition is the main factor affecting the health of the children. According to the Gomez classification, only 39.2 % were found to have normal weight-for-age whereas 60.8 % had mild, moderate and severe malnutrition (table 3.5). The weight-for-height was normal in 76.3 %, whereas 23.7 % were considered as wasted. The study also, shows that about 40 % had normal height-for-age and almost 60 % considered as stunted (Abdulla, Sebai, and Swailem, 1982).

table 3.5
Weight-for-age percentage among Saudi pre-school children

Age group (months)	Normal nutrition (>90%)	Malnutrition		
		Mild (76-90%)	Moderate (60-75%)	Severe (<60%)
0-5	53.0	26.5	20.5	-
6-11	47.3	38.9	11.1	2.7
12-23	37.5	40.6	21.9	-
24-35	38.4	53.4	8.2	-
36-47	38.8	46.8	11.3	3.1
48-60	30.0	51.4	18.6	-
Total	39.2	45.4	14.5	0.9

Source: Abdulla et al. (1982).

In 1981, Sebai carried out anthropometric measurements among 332 pre-school children in Wadi Turaba, a village in the western region of Saudi Arabia. He has found that height and weight curves for Saudi children were below those of the Harvard standard, exhibiting difference of about 3 kg in weight and 10 Cm in height at the age of three years.

Serenius and Fougerouse (1981) have conducted a survey to evaluate some of the environmental factors which might influence the growth and development of infants and pre-

school children in rural Saudi Arabia. They found that the mean weight-for-age started close to the Harvard standard but fell dramatically before the end of the first year of life. Also, the mean weight for height fell significantly before the end of the first year.

Anthropometric measurements of height-for-age and weight for age of Saudi school boys aged 6-18 years were compared to the Iowa Tables for weight-for-height-for-age (1924) and to some other standards in different countries in Europe, USA, and other middle eastern countries. It was found that Saudi Arabian boys have generally lower weights for age (lean) and heights for age (short) than their counterparts (Wirths et al, 1977).

3.8: Conclusion:

As has been indicated, nutrition surveys and associated reports for Saudi Arabia are limited in scope and not very reliable. However, the picture which emerges from this inadequate data can be summarised as follows:

1) Energy deficiency:

Almost all available studies indicate an energy deficiency for all age groups and in all parts of the country (Wirths et al, 1977; Al-Othaimeen et al, 1987; Al-Othaimeen et al, 1988).

2) Protein, Fat and Carbohydrate intakes:

Protein intakes have been reported to be high for infant and pre-school children (Al-Othaimeen et al, 1987; Al-Othaimeen et al, 1988), whereas the only available data on school children indicate that animal protein intakes were low, fat intakes were also low and carbohydrate intakes were too high (Wirths et al, 1977).

3) Vitamin and Mineral intakes:

Vitamin and mineral intakes differ from one study to another depending on age and the location of the study population and on study method.

The overall poor quality of evidence available on nutritional status in Saudi Arabia indicates that there is an urgent need for more detailed nutritional studies.

CHAPTER 4

STUDY DESIGN AND METHODOLOGY

CHAPTER IV

STUDY DESIGN AND METHODOLOGY

4.1: Purpose of study :

One of the main objectives of the fourth development plan implemented by the Ministry of Planning of the Kingdom of Saudi Arabia for the years 1985-1990 is to develop human resources and to form productive "citizen-workers" by providing them with education and health services.

In response to this objective, The General Organization for Technical Education and Vocational Training (see 1.7.3) has developed a special feeding program for students at its institutions.

Since no published dietary research has been performed on technical and vocational young adult male students, the present work is designed to investigate the dietary status of this group in Riyadh, Kingdom of Saudi Arabia.

The null hypothesis is that this group exhibits consistent distribution in respect of recommended nutrient intakes and adequate nutritional status. The alternative

hypothesis suggests that there is a deficiency or over-consumption in regard to one or more nutrients.

The aims of this dietary survey can be summarized as follows:

1) to provide principal information about the habitual nutrient intakes of the target population and to study the relationship between these habitual intakes and their dietary status.

2) to calculate the mean nutrient intakes of this group for energy, protein, fat, carbohydrate and some vitamins and minerals; and to compare these with international levels and recommended dietary intakes and allowances (RDIs and RDAs).

3) to investigate the variation between subgroups according to age cohorts and accommodation status.

4) Finally, the data collected in this study will enable preventive recommendations to be made regarding diet-related disorders and will in particular enable matching catering policy and provision to the needs of students in residential accommodation.

4.2: Target Population :

The total survey population consists of 6900 young adult (16 to 25 years old) male students at six Technical Education Institutes and Vocational Training Centres in Riyadh, the capital of Saudi Arabia for the study year 1988/89.

4.3: Sampling procedures :

A 10 % random sample (690 students) was drawn from the target population.

Random sampling procedures were conducted to identify 690 subjects from the student population using a computer method. A list of students' names of each institute was obtained and each student allocated a number. These numbers were entered into a computer and a 10% random number sample was obtained institution by institution (see table 1 for sample distribution).

Table 4.1:
Sample distribution:

No.	Institute	Sample size
1	Intermediate Technical College	90
2	Technical Assistants Institute	125
3	Industrial Secondary Institute	150
4	Commercial Secondary Institute	135
5	Vocational Training Centre No.1	130
6	Vocational Training Centre No.2	60
	Total	690

4.4: The Pilot Survey:

By way of preparing for the main survey, a pilot survey (Appendix B) was conducted. It was carried out on 75 students who were chosen systematically (Moser and Kalton, 1971) during April/May 1988. This pilot sample was divided into three groups, each group consisting of 25 students. They were surveyed using one of three methods, either :

1) Interview, or
2) Self-completed questionnaire, or
3) Self-completed questionnaire combined with interview.

These small scale investigations provided elementary nutrient information about this population. The response rate of the pilot survey was very satisfactory (73%) and the most important finding from the pilot survey was that a self-completed questionnaire combined with personal interview would be a suitable technique for collecting the data.

The main survey was designed following this pilot survey. Some of the original questions were excluded or modified and other new questions were added following this preliminary work.

4.5: The Main Survey :

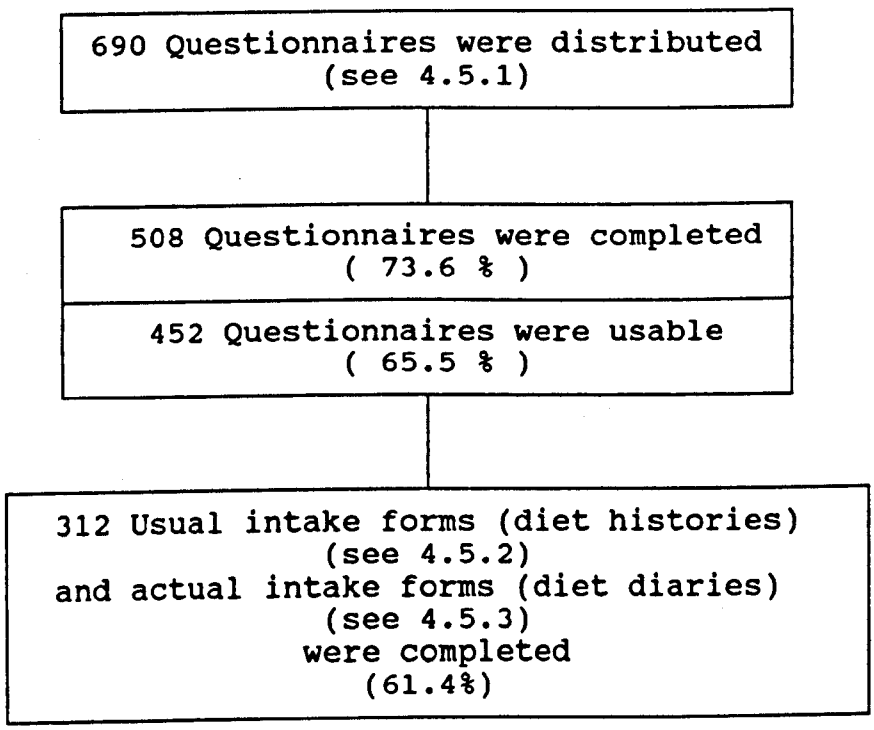
The main survey fieldwork was conducted during the period from January until May 1989. Permission for the study was obtained from the GOTEVT general manager and from headteachers of the six institutes.

A covering letter was addressed to the students explaining why this project was being carried out, and to encourage them to co-operate (Appendix C).

Since the survey population are Arabic speakers, the survey forms were translated into the Arabic language and at the end of the fieldwork their responses were back-translated from Arabic to English.

Figure 4.1 shows the flow diagram and the response rate of the whole survey.

Fig. 4.1:
Flow diagram showing response rate :



4.6: Methods of data collection :

Several dietary survey methods have been developed and described (see chapter 2). However, since each method has both advantages and limitations, it has been suggested that no single method can be placed before any other (Pekkarinen, 1970; Marr, 1971; Hartog and Staveren, 1979). Consequently, a combination of methods would seem to be a more reliable approach.

Furthermore, the choice of method is restricted by the purpose of the survey. Since this study was intended to investigate the nutritional status of the respondents in general, three methods were used to collect different subsets of information: a questionnaire, diet history and a diet diary.

4.6.1: Questionnaire :

A pre-coded structured questionnaire was designed for use in the survey (Oppenheim, 1972; Sinclair, 1975; Hoinville and Jowell, 1978) (See appendix D). On the basis of pilot work, most of the questions were given a limited number of answers from which the student could choose his reply. The respondents were asked to record their answers by placing a tick in the box which may apply to him or, in the case of open-ended questions, to describe their response in detail.

This questionnaire was aimed at collecting background information about the student such as :

1) Personal background data on identifying each student's nationality, level of study, marital status,accommodation place of origin, self-assessment of weight status, monthly income and spending. Such information could help in comparisons between sub-groups.

2) basic demographic data (age, weight and height) to be used for assessing nutritional status by the Body Mass Index (BMI) of Quetelet (WHO, 1986) in addition to the weight-for-height indices.

3) habitual activity records of each student, consisting of exercise, study time, practical classes and sleeping hours. Such information is helpful in assessing the activity status of the students and in studying its relationship to dietary status.

4) dietary habits and attitudes related to dietary status such as meal skipping, meal frequency, eating between meals, special diets, spending on food, cigarette smoking and food likes and dislikes. In addition, the student was asked if he had ever been ill from any diseases related to the diet such as anaemia, obesity and diabetes.

The questionnaire was used to interview the students in small groups consisting of 3-8 students. The interviews were performed between Saturday and Wednesday (Thursday and Friday is the weekend in Saudi Arabia).

508 of 690 forms were completed and collected (73.6 %), 56 were found unusable by reason of unclear writing or uncompleted answers, 452 (65.5%) were used in data analysis.

4.6.2: Usual weekly intakes "UWI" (Diet history) :

A simple method modified from Yarnell et al. (1983) was used to assess the usual weekly intakes. A short schedule was designed (Appendix E) consisting of 50 food items plus free spaces to add other food items which might not have been included.

The diet history asked for information concerning description of food, weekly frequency, and the daily amounts usually eaten of each of the 50 food items. The subjects estimated the amounts consumed using household measurements such as cups, spoons, plates, slices.

During subsequent data analysis, these estimates of amounts were converted into weight equivalents. The next stage was to calculate the average weekly consumption of each food item by multiplying the daily amounts consumed by the weekly frequency of this food item. This average was used in assessing the nutrient intakes, drawn from food composition tables.

Of the 508 students who completed the questionnaire and received the diet history forms, 312 students (61.4%) completed these forms.

4.6.3: Actual daily intakes "ADI" (Diet diary) :

The 24-hour record of actual consumption (Fehily, 1983) was chosen to collect data about the actual intakes of each subject in the survey population (Appendix F).

Each student was asked to record all food and drink consumed for breakfast, lunch, dinner and any food or drink consumed between meals within the following 24 hours, starting from getting up in the morning.

Descriptions of food items and portion sizes (measured in household measures) were also recorded by each student. The actual intakes of main nutrients were subsequently calculated and compared with nutrient requirements of FNB/NAS (1980/1989) and FAO/WHO (1985).

The diet diary sheets were given to the students and collected from them within two days. 61.4% (312 of 508) sheets were collected.

4.7: Data Processing and Statistical Analysis :

Since the questionnaire was pre-coded, the codes were transferred onto a code sheet. They were then transferred to a computer data file. The Statistical Package for the Social Science (SPSS/PC+) was employed to analyse the data (Frude,1987). The statistical significance of relationships between certain sets of data was determined by chi-square analysis.

The Unilever Dietary Analysis Program (UNIDAP) was used to calculate nutrient intakes employing McCance and Widdowson's The Composition of Foods (Paul and Southgate, 1978). In the case of traditional foods, Food Composition Tables for Use in the Middle East (Pellet and Shadarevian, 1970), Food Composition Tables for the Near East (FAO, 1982), Chemical and Nutritional Quality of Some Saudi Arabian Dishes Based on Cereals and Legumes (Al-Jebrin et al, 1985), and Nutritional Evaluation of Selected Meat Based Saudi Arabian Dishes (Sawaya et al, 1986) were added to the UNIDAP program to help in their analysis.

Mean nutrient intakes were calculated for subgroups and compared with Energy and Protein Requirements (FAO and WHO,

1985), Recommended Daily Amounts of Food Energy and Nutrients for Groups of People in The United Kingdom (DHSS, 1979), Dietary Reference Values for Food Energy and Nutrients for the United Kingdom (DH, 1991), and Recommended Dietary Allowances (FNB and NAS, 1980/1989).

Because of the lack of published information on the dietary status of the survey population, evaluation of the study in respect of validity and reliability was carried out by comparing the results of the usual weekly intakes with the results of actual daily intakes.

CHAPTER 5

RESULTS AND FINDINGS: 1

FACTORS AFFECTING NUTRITIONAL STATUS

CHAPTER V:

RESULTS AND FINDINGS:

5.1: FACTORS AFFECTING NUTRITIONAL STATUS:

5.1.1: Introduction:

Nutritionists have recognised that nutritional status is determined not only by internal cues such as physiological needs, but also by external cues related to the environment such as social and economic influences.

Also, there are many other factors which can be helpful in assessing nutritional status such as anthropometric measurements and habitual activities.

The purpose of this section is to describe the main demographic, social and economic factors which provide basic descriptive information about the study population.

5.1.2: Nationality:

Nutritional status could vary with nationality; thus, each subject was asked about his origins (App.D, Q.1).

The questionnaire revealed that only 3.1% of students were non-saudis or of unknown nationality (table 5.1).

Table 5.1:
Students Nationality

Nationality	n.	%
Saudi	438	96.9
Non-saudi	13	2.9
Unknown	1	0.2
TOTAL	452	100.0

It is therefore not intended to make any comparison between nationality sub-groups within this study. However, comparison can be made between the nutritional status of these Saudi students with that of other nationalities derived from other studies.

5.1.3: Age and Age Cohorts:

Nutritional requirements are influenced greatly by age. It was necessary to know the exact age of each subject and the age cohorts of the whole sample to help with the assessment of nutritional status.

For this reason, students were asked their actual age (App. D, Q.2). It was found that the sample was aged between 16 and 25 years, the largest category being aged 19 and 20 years (20.1 % each) as shown in table 5.2.

Table 5.2:
Age Frequency:

Age (years)	n.	(%)
16	8	1.8
17	29	6.4
18	77	17.0
19	91	20.1
20	91	20.1
21	64	14.2
22	39	8.6
23	27	6.0
24	16	3.5
25	10	2.2
TOTAL	452	100.0

The age bands 16-18, 19-21 and 22-25 were chosen to divide the sample into three age cohorts, to be used in all analyses of results. It was found that the majority of subjects were in the 19-21 age cohort (table 5.3).

Table 5.3:
Age Cohorts Frequency:

Age cohort	n.	%
16-18	114	25.2
19-21	246	54.4
22-25	92	20.4
Total	452	100.0

5.1.4: Marital Status:

It is possible that marital status is one of the social factors that has a great effect on food consumption and nutritional status. A working hypothesis was that the married group of subjects were more likely to meet the recommended allowances for nutrients than single persons.

Aiming to compare the two subgroups, the respondents were asked about their marital status (App D, Q. 6).

The results shows that the majority of the sample (94.5%) were single men. Marital status according to age cohorts reflect the age differences between the married and unmarried subjects. Of the 25 married students there are only 2 in the youngest age cohort (16-18 years), 7 in the middle age cohort (19-21 years), the majority (16) being in the oldest age cohort (table 5.4).

Table 5.4:
Marital status according to age cohorts:

Marital Status	16 - 18		19 - 21		22 - 25		Row Total	
	n.	%	n.	%	n.	%	n.	%
Married	2	1.8	7	2.8	16	17.4	25	5.5
Single	112	98.2	239	97.2	76	82.6	427	94.5
Total	114	100.0	246	100.0	92	100.0	452	100.0

5.1.5: Living Accommodation:

To investigate the influence of living accommodation on nutritional status, all subjects were asked about their living status (App D, Q. 7).

Of the total sample, 313 (69.2%) lived at home with their parents, 78 (17.3%) lived in a hall of residence. The remaining 13.5% were spread over other types of accommodation (table 5.5).

Table 5.5:
Living accommodation according to age cohorts:

Living Accommodation	16 - 18		19 - 21		22 - 25		Row Total	
	n.	%	n.	%	n.	%	n.	%
At Inst. Res.	21	18.4	37	15.0	20	21.7	78	17.3
With Parents	84	73.7	183	74.4	46	50.0	313	69.2
With Wife	0	0.0	3	1.2	10	10.9	13	2.9
With Friends	1	0.9	7	2.8	9	9.8	17	3.8
On Own	3	2.6	3	1.2	6	6.5	12	2.7
Other	5	4.4	13	5.3	1	1.1	19	4.2
Total	114	100.0	246	100.0	92	100.0	452	100.0

According to marital status, It was noted that those living with their parents were mostly single (98.7%) and, of those living in a hall of residence, only 9% were married.

5.1.6: Economic status:

It is clear that there is a direct relationship between peoples income and their total expenditure on food (Macdonald & Stewart, 1974; MaKenzie, 1980).

To investigate this economic factor, all respondents were asked about their monthly income, outgoings and their expenditure on food (App. D, Q. 9-11).

Table 5.6 shows that nobody received less than 500 R., 27% received between 500-1000 R., 37% received 1001-1500 R., 23% received 1501-2000 and only 12% received more than 2000 R. Almost all students income is made up of a government grant which depends on their level of study. At the same time, the table shows a strong relationship between income and outgoings.

Table 5.6:
Monthly income and outgoing of respondents (S.R.)*

Amount	Income		Outgoings	
	n.	%	n.	%
- 500	-	-	22	4.9
501-1000	124	27.4	127	28.1
1001-1500	167	36.9	156	34.5
1501-2000	105	23.3	96	21.2
+ 2000	56	12.4	51	11.3
Total	452	100.0	452	100.0

* 1 Pound = 6.5 Saudi Rials.

Regarding expenditure on food, table 5.8 shows that 31.4% of the students spend between 401-500 R. to buy food items, 26% spend 301-400 R., 20% spend more than 500 and about 20% spend less than 300 R. (table 5.7).

Table 5.7:
Monthly expenditure on food:

Expenditure on food	n.	%
- 100	6	1.3
101 - 200	17	3.8
201 - 300	75	16.6
301 - 400	118	26.1
401 - 500	142	31.4
+ 500	94	20.8
Total	452	100.0

It may seem that students do not spend enough on food but, considering that most of them (86.5%) receive free meals at their parents houses or at their institute residence, it is clear that there were not any economic constraints affecting their food consumption.

5.1.7: Habitual Activity :

Energy requirements vary substantially from person to person depending on their patterns of occupational and leisure time activities (James and Schofield, 1990).

Students were asked about the extent of their major activities such as studying, practical classes, exercise and sleeping (App. D, Q: 14, 16-19).

Table 5.8 shows that the students, on average, spend about 7 hours daily studying at school, part of it (3.5 hours) at a practical class at workshop; 1.5 hours studying at home; about the same time for exercise; finally, they spend 7.5 hours sleeping.

Table 5.8:
The average daily activity (h/d):

Activity	Min.	Max.	Ave.
Studying at sch.	6	8	7
Practical classes	2	5	3.5
Studying at home	1	3	1.5
Exercise	0	3	1.5
Sleeping	6	9	7.5

As a conclusion, according to the above activities, we can say that the study population, in general, was composed of moderately active individuals.

5.1.8: Self-assessment of Weight:

Those persons who think they are overweight may try to eat less, intending to lose weight. Those who think they are underweight may try to eat more, intending to gain weight.

To investigate this phenomenon, students were asked whether they considered themselves to be overweight, underweight or about right (App. D, Q. 13). It was found that about 16.8 % of the respondents thought they were overweight whereas 22.3 % thought they were underweight with the remaining 60.8% considering themselves about right (table 5.9).

Table 5.9:
Self-assessment of weight:

Self-assessment	16 - 18 n.	%	19 - 21 n.	%	22 - 25 n.	%	Row Total n.	%
Underweight	26	22.8	54	22.0	21	22.8	101	22.3
About right	68	59.6	154	62.6	53	57.6	275	60.8
Overweight	20	17.5	38	15.4	18	19.6	76	16.8
Column Total	114	100.0	246	100.0	92	100.0	452	100.0

5.1.9: Body Mass Index (BMI):

Weight/height ratios are frequently used when assessing adults' nutritional status. They are employed in large-scale nutrition surveys and are referred to as body mass indices (Gibson, 1990).

All study subjects gave their actual weight and height (App. D, Q. 3, 4), a small proportion using the scales available. The Body Mass Index of Quetelet (WHO, 1986) was calculated using the formula:

$$BMI = Wt(kg) / Ht^2(m)$$

The results were then compared with the BMI average value in industrialized countries (25 + 2.5 kg/m^2) (WHO, 1986).

Table 5.10 shows that only 68 students (15%) have more than 27.5 BMI, 132 students (29.2 %) has the BMI in the stanard range (22.5 - 27.5) and the majority (55.8 %) were less than the average BMI (22.5 - 27.5 kg/m^2). When subjected to the chi-squared test, these numbers were found to be statistically significant ($P<0.005$).

Table 5.10:
the BMI according to age cohorts:

BMI	16 - 18 n.	%	19 - 21 n.	%	22 - 25 n.	%	Row Total n.	%
Less than 22.5	80	70.2	131	53.2	41	44.6	252	55.8
22.5 - 27.5	23	20.2	75	30.5	34	36.9	132	29.2
More than 27.5	11	9.6	40	16.3	17	18.5	68	15.0
Column total	114	100.0	246	100.0	92	100.0	452	100.0

5.1.10: Health problems related to the diet:

There are many health problems related to diet such as anaemia, obesity, diabetes and cardiovascular diseases. To investigate any major health problems amongst the study population, all students were asked if they had ever been ill from any diseases related to diet (App. D, Q. 28). Table 5.11 shows that anaemia is the most commonly stated health problem, about one in seven students indicated that they had suffered from it at some time in their lives. Obesity comes second (9.7%) with only (0.7%) diabetes and (0.2%) cardiovascular diseases.

Table 5.11: Distribution of health problems related to diet among the study population:

Health problem	n.	%
Anaemia	59	13.1
Obesity	44	9.7
Diabetes	3	.7
Cardiovascular	1	.2
None	345	76.3
Total	452	100.0

5.1.11: Summary of Results:

About 97% of the study population were Saudi male students, aged between 16 to 25 year olds, more than 54% of them being in the middle age cohorts (19-21 years).

The majority (94.5%) were single. About 70% of them lived with their parents and only 17.3% lived at the institute's residence.

About 60% of the students have an income between 1000 and 2000 Saudi Rials; 80% spend between 300 to 500 S.R. to buy food items. At the same time, 86% of the students receive free meals at their parents houses or at institute residence.

Regarding its habitual activity, the study population is, in general, composed of moderately active individuals. 22% of them thought they were underweight, whereas the majority (60%) considered themselves as about right.

When calculating the Body Mass Index (BMI), it was found that only 30% of the students were within the standard range accepted by industrialized countries (25 ± 2.5 kg/m^2) whereas 56% were less than this.

The most commonly stated health problem was anaemia. About 13% of the respondents indicated that they had suffered from it at some time in their lives. Obesity comes second with about 10% of the sample stating the condition as a health problem.

CHAPTER 5

RESULTS AND FINDINGS: 2

DIETARY HABITS AND ATTITUDES

CHAPTER V:

RESULTS AND FINDINGS:

5.2: DIETARY HABITS AND ATTITUDES:

5.2.1: Introduction:

Dietary habits and attitudes towards food might play a major role in food consumption and it also affects nutritional status. It is important for the future health of young adults that they adopt sensible eating habits. Furthermore, if young people are to be provided with acceptable dietary advice, a detailed knowledge of their practices and opinions related to food is essential.

As no information is available on the dietary habits and attitudes of the young Saudi adults, this part of the study has been devoted to obtaining such information. The habits and attitudes which were chosen for investigation were:

1) Meal frequency.
2) Meal-skipping.
3) Eating between meals.
4) Dieting.
5) Smoking.
6) Food Preference.

5.2.2: Meal Frequency:

Those who generally take three meals daily are more likely to meet the Recommended Dietary Allowances (RDAs) for all nutrients than those who miss one or more of their meals (Steele, Clayton and Tucker, 1952).

To investigate meal frequency, all students in the sample were asked how many meals they ate daily (App. II, Q. 20). The majority (80.8%) said they ate three meals daily and 12.7% said they ate two meals daily whereas the remainder (6.5%) ate more or less (table 5.12).

Table 5.12:
Meal Frequency according to age cohorts:

Meals Frequency	16 - 18		19 - 21		22 - 25		Row Total	
	n.	%	n.	%	n.	%	n.	%
1 meal	1	0.9	0	0.0	3	3.3	4	0.9
2 meals	16	14.2	25	10.3	16	17.4	57	12.7
3 meals	86	76.1	206	84.8	70	76.0	362	80.8
4 meals	7	6.2	10	4.1	1	1.1	18	4.0
5 meals	3	2.6	2	0.8	1	1.1	6	1.3
6 meals	0	0.0	0	0.0	1	1.1	1	0.2
Total	113	100.0	243	100.0	92	100.0	448	100.0

The relationship between the meal frequencies and age cohorts has been found to be statistically significant ($P<0.02$), the oldest age group taking fewer meals than either of the others.

5.2.3: Meal-skipping:

Habitual meal-skipping has been identified as one of the factors responsible for less than satisfactory nutrient intakes amongst young people (Lee, 1978; Thomas, 1988).

According to Bull (1985), breakfast is the meal most often omitted by young people who skip meals. When lunch or dinner are missed they are frequently replaced by snacks (Greger, Divilbiss and Ascherbeck, 1979) whereas breakfast skipping has not been found to result in snacks consumption (Musgrave, Achterberg and Thornbury, 1981).

All students were asked "Do you usually miss any of your meals?. If yes, which meal do you miss usually?" (App. D, Q. 22).

The results of this study shows that meal-skipping is a common habit among these students. The majority (289 students, 64%) missing one or more of their daily meals.

Dinner or evening meal was the most often skipped meal, one in three students skipped dinner whereas one in five skipped breakfast and one in seven skipped lunch (table 5.13).

Table 5.13:
Meal-skipping according to meal:

Meal	n.	%
Breakfast	92	20.4
Lunch	69	15.3
Dinner	128	28.3

Considering the age cohorts, it was shown that the oldest group skipped breakfast significantly more often than the other age cohorts ($P<0.01$). There were no significant between age cohorts as regards skipping lunch and dinner (table 5.14).

Table 5.14:
Meal-skipping according to age cohorts:

Age cohorts	n.	Breakfast n.	%	Lunch n.	%	Dinner n.	%
16 - 18	114	19	16.7	17	14.9	35	30.7
19 - 21	246	43	17.5	42	17.1	67	27.2
22 - 25	92	30	32.6	10	10.9	26	28.3
Chi-square		P < 0.01		P < 0.01		n.s.	

Regarding accommodation status (table 5.15), it was clear that resident students skipped breakfast significantly more often than non-residents ($P<0.01$). On the other hand, the non-residents skipped lunch significantly more often than the residents ($P<0.01$).

Table 5.15:
Meal-skipping according to accommodation status:

Accommodation status	n.	Breakfast n.	%	Lunch n.	%	Dinner n.	%
Residents	78	25	32.1	4	5.1	23	29.5
Non-residents	374	67	17.9	65	17.4	105	28.1
Chi-square		P < 0.01		P < 0.01		n.s.	

5.2.4: Eating Between Meals:

Young adults today get much of their food intake as between meals snacks (Passmore and Eastwood, 1986). Many people think that it is best to eat three proper meals a day and there is some scientific evidence for this view (Steel et al, 1952). Snack foods might provide good nutrition if well chosen.

All students in the study were asked about their eating between meals habits (App. D, Q. 21). The results shows that eating between meals is a regular practice among the majority (72.3 %) of those students (table 5.16).

According to age cohorts, the youngest group (16-18 year old) ate between meals more often than the older two groups (19-21, 22-25 years), with oldest students least likely to eat between meals. This age relation could be because the older students tend to be living in more stable conditions.

Concerning marital and accommodation status, there were no differences between married and single students, nor between those who lived in institute halls of residence (residence) and those who did not (non-residence) groups.

It is noteworthy that accommodation and marital status do not apparently affect the eating between meals habit; of course, lack of any significant findings could be due to the small size of married and residence groups.

Table 5.16:
Association of eating-between-meals habit and some related factors:

Factors	Eat No.	%	Didn't eat No.	%	Total No.	%	P <
Age cohorts							
16-18	90	78.9	24	21.1	114	25.2	
19-21	177	72.0	69	28.0	246	54.4	n.s.
22-25	60	65.2	32	34.8	92	20.4	
Marital status							
marred	18	72.0	7	28.0	25	5.5	n.s.
single	309	72.4	118	27.6	426	94.5	
Accommodation status							
residence	56	71.8	22	28.2	78	17.3	n.s.
non-residence	271	72.5	103	27.5	374	82.7	
Self-assessmant of weight							
underweight	83	82.2	18	17.8	101	22.3	
aboutright	202	73.5	73	26.5	275	60.8	0.0005
overweight	42	55.3	34	44.7	76	16.8	
Taking exercise							
exercises	255	75.9	81	24.1	336	74.3	0.005
never	72	62.1	44	37.9	116	25.7	
TOTAL	327	72.3	125	27.7	452	100.0	

There was, on the other hand, a significant association between the eating-between-meals habit and self-assessment of weight ($P<0.0005$). Those students who consider themselves as overweight ate between meals significantly less often than the others. Probably, they are trying to lose weight.

Considering exercise habits, those who did take exercise also ate between meals significantly more often than those who did not take exercise ($P<0.005$). As a result of taking exercise, the body's demand for nutrients will increase. Those who took exercise and ate between meals (75.9%) will be able to cover their nutritional requirements more than those who took exercise yet did not eat between meals (24.1%).

5.2.5: Dieting :

The increasing number of people who are following special diets is of concern to nutritionists (Passmore and Eastwood, 1986).

To investigate this habit among the study population, all respondents were asked 'Are you on a special diet ?' Of the total sample, 296 (65.5%) were not on any sort of diet (table 5.17).

Table 5.17:
Dieting according to age cohorts:

Diet Reason	16 - 18 n.	%	19 - 21 n.	%	22 - 25 n.	%	Row Total n.	%
Dieting	43	37.7	85	34.6	28	30.4	156	34.5
Non-dieting	71	62.3	161	65.4	64	69.6	296	65.5
Total	114	100.0	246	100.0	92	100.0	452	100.0

With such a large majority falling in the non-dieting category, it was not possible to detect any strong relationships between dieting practices and any other factors.

All the dieting group were asked about their reasons for dieting. It was found that participation in sport was the main dieting reason, weight gain coming second, followed by losing weight and, finally, medical reasons (table 5.18).

Table 5.18:
Dieting reasons according to age cohorts:

Diet Reason	16 - 18 n.	%	19 - 21 n.	%	22 - 25 n.	%	Row Total n.	%
Medical Diet	1	2.3	12	14.1	4	14.3	17	10.9
Sport Diet	26	60.5	51	60.0	13	46.4	90	57.7
Gain Weight	9	20.9	9	10.6	8	28.6	26	16.7
Lose Weight	5	11.6	9	10.6	2	7.1	16	10.3
Other	2	4.7	4	4.7	1	3.6	7	4.4
Column Total	43	100.0	85	100.0	28	100.0	156	100.0

5.2.6: Smoking:

From a nutritional point of view, there are two circumstances in which a connection has been reported between smoking and nutrition. One is that smoking reduces the concentration of vitamin C in the body. The second is its negative effect on body weight (Yudkin, 1985).

To investigate smoking habits amongst the study population, all respondents were asked if they smoked cigarettes. It was found that the majority (73%) were non-smokers but 122 respondents were smokers. There was no difference between any of the age groups (table 5.19).

Table 5.19:
Smoking according to age cohorts:

Smoking Frequency	16 - 18 n.	%	19 - 21 n.	%	22 - 25 n.	%	Row Total n.	%
Smoking	30	26.3	67	27.2	25	27.2	122	27.0
Non Smoking	84	73.7	179	72.8	67	72.8	330	73.0
Total	114	100.0	246	100.0	92	100.0	452	100.0

With regard to smoking frequency, as shown in table 5.20, about half of the 122 smokers smoked between 15 and 20 cigarettes daily or more with the oldest age group smoking more than the other two age cohorts, 26.2% smoked between 10 and 14 cigarettes daily whilst the youngest students reach the highest percentage on this category, 19.7% smoked between 5 and 9 cigarettes a day with only 7.4% smoked between 1 and 4 cigarettes a day.

Table 5.20:
Smoking frequency according to age cohorts:

Smoking Frequency	16 - 18 n.	%	19 - 21 n.	%	22 - 25 n.	%	Row Total n.	%
1-4 c/d	2	6.7	5	7.5	2	8.0	9	7.4
5-9 c/d	5	16.7	16	23.9	3	12.0	24	19.7
10-14 c/d	13	43.3	14	20.9	5	20.0	32	26.2
15-20 or more	10	33.3	32	47.8	15	60.0	57	46.7
Column Total	30	100.0	67	100.0	25	100.0	122	100.0

5.2.7: Food Preference:

Each person has different preferences for taste, smell, colour and appearance of foods. Such individual differences mean that preference for certain foods can vary enormously from person to person and this will, in turn, affect their nutritional status.

When planning a diet for a specific group of people, a nutritionist needs to know what they prefer to eat and, for this reason, each respondent was asked to indicate his first, second and third favourite foods (that he likes to eat at meal times) for each meal.

Table 5.21 shows the numbers of mentions of the most favourite foods for breakfast. It is clear that eggs has the highest frequency (21.6%), whilst cheese comes second (15.7%), followed by broad beans (13.6%) and liver (9.4%).

Table 5.21:
favourite foods for breakfast:

No.	Food	1st.Ch.	2nd.Ch.	3ed.Ch.	Total	%
1	Eggs	119	77	39	235	21.6
2	Cheese	62	76	33	171	15.7
3	Broad beans	69	53	26	148	13.6
4	Liver	52	32	18	102	9.4
5	Bread	31	22	27	80	7.3
6	Honey	5	25	21	51	4.7
7	Olives	4	9	21	34	3.1
8	Jam	1	13	15	29	2.7
9	Chickpeas	2	7	11	20	1.8
10	Cream	2	5	11	18	1.6
	Other Foods	178	63	79	320	29.4
	Total	406	382	301	1089	100.0

Note: Some respondents were unable to give a first choice. Others, gave a first choice only.

Table 5.22 shows the favourite foods for lunch. Rice is the favourite food (34.5%), lamb meat comes second (16.2%), followed by chicken (12%) and mixed vegetables (9.8%).

Table 5.22:
favourite foods for lunch:

No	Food	1st.Ch.	2nd.Ch.	3ed.Ch.	Total	%
1	Rice	337	34	9	380	34.5
2	Lamb	19	143	16	178	16.2
3	Chicken	15	101	16	132	12.0
4	Mixed Veg.	20	24	64	108	9.8
5	Green Salad	11	19	52	82	7.4
6	Fish	5	15	15	35	3.2
7	Margoog	28	3	4	35	3.2
8	Crushed Wheat	5	16	10	31	2.8
9	Wheat wafers	2	8	15	25	2.3
10	Fruits	0	3	21	24	2.2
	Other Foods	8	31	31	70	6.4
Total		450	397	253	1100	100.0

Table 5.23 shows the favourite foods for dinner. Cheese is the favourite dinner (7.7%), mixed vegetables are second (7.2%), followed by macaroni (6.4%) and rice (5.9%).

Table 5.23:
favourite foods for dinner :

No	Food	1st.Ch.	2nd.Ch.	3ed.Ch.	Total	%
1	Cheese	43	14	4	61	7.7
2	Mixed Veg.	25	27	5	57	7.2
3	Macaroni	38	9	4	51	6.4
4	Rice	33	12	2	47	5.9
5	Olives	4	6	35	45	5.7
6	Bread	18	13	12	43	5.4
7	Chicken	14	22	6	42	5.3
8	Jam	4	28	2	34	4.3
9	Soup	15	13	5	33	4.2
10	Other Foods	186	123	72	431	48.0
Total		380	267	147	794	100.0

Students were also asked about their favourite drinks. As shown in table 5.24, gassy drinks (for example: Pepsi, Coca cola, 7-up) are the favourite drink (27%), tea is the second most popular (26.6%), followed by water (16.3%) and buttermilk (13.1%).

Table 5.24:
favourite drinks :

No	Drink	1st.Ch.	2nd.Ch.	3ed.Ch.	Total	%
1	Gassy drinks	120	76	23	219	27.0
2	Tea	120	68	28	216	26.6
3	Water	90	28	14	132	16.3
4	Buttermilk	43	49	14	106	13.1
5	Fruit juice	26	25	23	74	9.1
6	Milk	8	12	11	31	3.8
7	Orange juice	7	9	2	18	2.2
8	Coffee	5	2	3	10	1.2
9	Lemon juice	3	2	1	6	0.7
Total		422	271	119	812	100.0

5.2.8: Summary of results:

The main findings on dietary habits and attitudes may be summarized as follows:

Regarding meals frequency, the majority (80%) of the study population stated that they usually ate three meals daily.

At the same time, meal-skipping is a common habit among these students. One in three students skipped dinner whereas one in five skipped breakfast and one in seven skipped lunch. Regarding age cohorts, the oldest group skipped breakfast significantly more than the others ($P<0.005$). Also, the resident students skipped breakfast significantly more often than non-residents, whereas non-residents skipped lunch significantly more often than the residents ($P<0.01$).

Eating between meals is another regular practice among the majority (72 %) of the sample. A significant association was found between this habit and self-assessment of weight ($P<0.0005$), those students who consider themselves as overweight eating between meals significantly less than the others. Also, there was a significant relation between this habit and exercise habits, those who took exercise also ate between meals significantly more often than the others.

One in three students was on a special diet. Participation in sport was the main reason given for dieting, whereas weight control was the second.

Only 27% of the sample were found to be smokers. About half of them smoked between 15 and 20 cigarettes daily.

Finally, a list of preference foods and drinks was obtained for each daily meal in order to provide a basis meal provision.

CHAPTER 5

RESULTS AND FINDINGS: 3

NUTRIENT INTAKES

CHAPTER V:

RESULTS AND FINDINGS:

5.3: NUTRIENT INTAKES:

5.3.1: Introduction:

Determination of the nutrient intakes of technical and vocational students in Riyadh, Saudi Arabia was the object of the third part of this study. They were calculated using two methods: usual weekly intakes (U.W.I.) and actual daily intakes (A.D.I.) (see Ch. 4). The mean nutrient intakes were calculated for each method and, from these data, it was possible to compare mean daily intakes of individual nutrients obtained from each method.

The average daily intakes of energy, the macronutrients (protein, fat and carbohydrate) and selected micronutrients (vitamins and minerals) are considered mainly according to age cohort, accommodation status, meals breakdown; other factors are discussed when significant findings have emerged.

In order to evaluate the nutrient intakes of the study population mean nutrient intakes are expressed as a

percentage of corresponding actual and recommended nutrient intakes obtained from the sources listed below:

1) The United Kingdom recommended dietary amounts of nutrients (DHSS, 1979/1984;NACNE, 1983) and the Dietary Reference Values for Food Energy and Nutrients for the United Kingdom (DH, 1991).

2) The U.S.A. Recommended Dietary Allowances (Food and Nutrition Board, 1980/1989).

3) FAO/WHO Recommended Nutrient Intakes (WHO, 1974; FAO/WHO/UNU, 1985; FAO, 1988).

Note that all comparisons are drawn from data in the above references which refer to male subjects in the same age range as this study.

5.3.2: Energy Intakes:

The intake of foods is primarily determined by the energy content of the diet rather than by its content of nutrients (Walker, 1990). Thus, the energy intake can be considered by measuring the energy content of the diet.

The results of this study show that the daily energy intake of the study population was found to be about 2300 kcal, ranged between 2282 and 2312 kcal as shown in table 5.25.

Table 5.25:
Average daily intakes of energy:

Method of calculation	Mean	SD.
Usual weekly intakes	2282	591
Actual daily intakes	2312	455

It can be seen that very similar results were obtained for both types of dietary survey method.

Regarding age cohorts and accommodation status, table 5.26 shows that those who were aged between 19 and 21 years

old (54.4% of the study population) have the lowest energy intakes (ranging from 2138 to 2276 kcal).

Table 5.26:
Energy intakes according to age cohort:

Method of calculation	U.W.I.		A.D.I.	
Age cohort	Mean	SD.	Mean	SD.
15 - 18	2405	731	2305	463
19 - 21	2138	578	2276	324
22 - 25	2656	207	2542	378

According to accommodation status, resident students' intakes were about 200 kcal. lower than those of non-residents (table 5.27). However, these differences are not significant.

Table 5.27:
Energy intakes according to accommodation status:

Method of calculation	U.W.I.		A.D.I.	
Accommodation status	Mean	SD.	Mean	SD.
Residents	2143	490	2209	527
Non-residents	2357	644	2383	264

Energy is an end-product of the assimilation of carbohydrates, fats and proteins. If the body does not take in enough energy in the form of carbohydrate and fat, protein in the diet will be utilised as an energy source. This is not desirable since protein energy malnutrition may result. However, only a few cases have been reported in adults (Burton and Foster, 1988; Walker, 1990).

Energy breakdown by nutrients for the study population is shown in table 5.28. Comparing these data with the U.K. recommendations (NACNE, 1983), the study population has more protein and less carbohydrate contributing to total energy intakes than the British recommendations.

Table 5.28:
Energy breakdown by nutrients:

Nutrients	U.W.I.	A.D.I.
Protein	17.7	19.2
Fat	36.5	31.6
Carbohydrates	45.8	49.2

Considering the energy intakes by daily meals, table 5.29 shows that lunch is the main meal in this respect, providing more than one-third of daily energy intakes, followed by breakfast. Dinner or evening meal provide about one fifth whereas snacks provide about one tenth of the total energy intakes.

Table 5.29:
Energy breakdown by meals:

Meal	U.W.I.	A.D.I.
Breakfast	31.7	29.8
Lunch	35.7	39.5
Dinner	21.2	19.9
Snacks	11.4	10.8

Comparing the average daily energy intakes of Technical and vocational students in Riyadh, with the recommended energy intakes of the United Kingdom, United States of America and the World Health Organization, it is clear that those of the study population are less than four fifths of these recommendations (table 5.30).

Table 5.30:
Average daily energy intakes
as a percentage of International RDAs.

RDAs	U.W.I.	A.D.I.
U.K.	78.6	79.7
U.S.A.	78.6	79.7
W.H.O.	76.1	77.1

5.3.3: Protein Intakes:

There is no known harmful effect for healthy people of high protein intakes, although a diet low in protein is particularly harmful in the young who are still growing. Adults require protein mainly for maintenance purposes (WHO, 1974; Walker, 1990).

From the results of this study, as shown in table 5.31, the average daily intakes of protein have been found to range from 93.7 to 101.0 g/day.

Table 5.31:
Average daily intakes of protein (g/day):

Method of calculation	Mean	SD.
Usual weekly intakes	93.7	21.4
Actual daily intakes	101.0	35.5

Again, as with energy, results obtained by the two methodologies are similar.

The average daily intakes of protein increase slightly with increase in age cohort, ranged from 92.7, at 16-18 years, to 103.5, at 22-25 years (table 5.32).

Table 5.32:
Protein intakes according to age cohorts:

Method of calculation	U.W.I.		A.D.I.	
Age cohort	Mean	SD.	Mean	SD.
16 - 18	92.7	20.8	97.3	13.4
19 - 21	93.4	24.5	99.7	21.6
22 - 25	96.0	12.2	103.5	35.5

Considering accommodation status (table 5.33), the resident students have the lower protein intake compared with the non-resident group.

Table 5.33:
Protein intakes according to accommodation status:

Method of calculation	U.W.I.		A.D.I.	
Accommodation status	Mean	SD.	Mean	SD.
Residents	89.6	15.3	96.2	17.9
Non-residents	95.8	24.3	102.4	31.3

When protein intakes are expressed according to the daily meals, lunch and breakfast provide the largest proportion, almost one third each. Dinner provides about one fifth with snacks supplying the remainder (table 5.34).

Table 5.34:
Protein breakdown by meals:

Meal	U.W.I.	A.D.I.
Breakfast	36.8	32.6
Lunch	37.3	36.2
Dinner	19.5	21.7
Snacks	6.4	9.5

In comparing the daily protein intakes for the study population with the Recommended Dietary Allowances (RDAs) of the U.K., U.S.A. and WHO, as shown in table 5.35, it can be seen that intakes are high. Because there is no harmful effect of too much protein intake, as already noted, it is better to err on the high side rather than risk protein deficiency (Walker, 1990).

Table 5.35:
Average daily protein intakes
as a percentage of International RDAs.

RDAs	U.W.I.	A.D.I.
U.K.	168.8	181.9
U.S.A.	167.3	180.3
W.H.O.	191.2	206.1

5.3.4: Fat intakes:

Fat is essential to human nutrition; it is the most concentrated energy source. It exerts a sparing action on protein and a balanced fat intake is necessary to ensure the dietary supply of the essential fatty acids and of the fat-soluble vitamins.

The average daily intake of total fat in the study population diet was found to be high (ranging from 93.3 to 111 g/day), whereas the polyunsaturated fatty acid intake was inadequate (table 5.36).

Table 5.36:
daily intakes of fat :

Method of calculation	U.W.I.		A.D.I.	
Fat Category	Mean	SD.	Mean	SD.
Total Fat (g)	111	44.9	93.3	37.8
Saturated fat (g)	39.7	21.7	29.8	17.4
Polyunsaturated (g)	5.9	2.3	6.6	2.9
Cholesterol (mg)	1085	408	1206	949

Cholesterol intakes, as shown in table 5.36, would appear to be too high. A causative factor may involve consumption of foods of animal origin specially eggs, which are a common food among these students. However, blood cholesterol levels are only slightly increased when more is taken in the diet (Yudkin, 1985).

Although total fat intakes vary according to survey method, relative proportions of different fat categories are comparable.

Considering the age cohorts, the oldest group (22-25 year old) show the highest fat intakes (table 5.37).

Table 5.37:
total fat intakes according to
age cohorts and accommodation status:

Method of calculation	U.W.I.		A.D.I.	
Age cohort	Mean	SD.	Mean	SD.
16 - 18	117.0	43.5	93.2	27.7
19 - 21	102.0	43.9	90.4	32.5
22 - 25	136.0	57.1	98.7	36.8

Considered, according to accommodation status, the resident group has the lower fat intake (table 5.38).

Table 5.38:
Fat intakes according to accommodation status:

Method of calculation	U.W.I.		A.D.I.	
Accommodation status	Mean	SD.	Mean	SD.
Residents	100.0	34.2	92.3	21.4
Non-residents	117.0	50.1	96.7	34.8

The fat breakdown by daily meals shows that lunch and breakfast together are the main suppliers of fat, providing more than one third each of the total intake (table 5.39).

Table 5.39:
fat breakdown by daily meals:

Meal	U.W.I.	A.D.I.
Breakfast	35.7	32.8
Lunch	37.9	35.7
Dinner	18.2	19.6
Snacks	8.2	11.9

In comparing fat intakes with the United Kingdom recommended average daily intakes (DHSS, 1984), total fat intakes of the study population were found to be high, ranging between 107 - 144 % according to survey method. The saturated fatty acids ranged from 80% to 107% of the RDAs, whereas the polyunsaturated fatty acids were low (35-76%) compared to the recommended intakes.

There are no specific recommendations about the dietary intakes of cholesterol, but it was reported that cholesterol intake in the U.K. diet is approximately 350-450 mg/day in adults (DHSS, 1984), whereas the cholesterol intakes of the respondents was more than double this figure (table 5.40).

Table 5.40:
Daily fat intakes as a percentage of the U.K. RDAs.

Method of calculation	U.W.I.	A.D.I.
Total Fat	127.6 - 144.2	107.2 - 121.2
Saturated fat	107.3	80.5
Polyunsaturated	68.6 - 35.3	39.5 - 76.7

Note: where U.K. RDAs are expressed as a range rather than a mean figure, percentages have been calculated accordingly.

5.3.5: Carbohydrate intakes:

Carbohydrates generally make up the greater part of the dietary energy provision. Present nutritional opinion tends to favour a level of carbohydrates in the diet which supplies about 50% of the total energy requirement (Burton and Foster, 1988).

The results of this study show that carbohydrates provide about 46% of the total energy intakes of students in Riyadh (see 5.3.1: Energy intakes). Total carbohydrate intakes ranged from 257 to 281 g/day. Dietary fibre ranged between 27.6 and 39.1 g/day, as shown in table 5.41.

Table 5.41:
Carbohydrate intakes:

Method of calculation	U.W.I.		A.D.I.	
Category	Mean	SD.	Mean	SD.
Total carbohydrates	257	79.6	281	55.2
Dietary Fibre	27.6	14.6	39.1	17.8

Considering age cohorts and accommodation status, table 5.42 shows that the oldest group has the highest carbohydrate intakes, while the resident students have the lower intakes compared with the non-resident group (as shown in table 5.43).

Table 5.42:
Carbohydrate intakes according to age cohorts:

Method of calculation	U.W.I.		A.D.I.	
Age cohort	Mean	SD.	Mean	SD.
16 - 18	271	84.3	277	48.4
19 - 21	240	75.5	284	64.7
22 - 25	299	99.5	287	58.3

Table 5.43:
Carbohydrate intakes according to accommodation status:

Method of calculation	U.W.I.		A.D.I.	
Accommodation status	Mean	SD.	Mean	SD.
Residents	252	73.3	274	49.6
Non-residents	259	85.6	287	62.2

According to meals breakdown, table 5.44 shows that lunch is the main source of carbohydrate followed by breakfast and dinner with snacks providing the rest.

Table 5.44:
Carbohydrate breakdown by meals:

Meal	U.W.I.	A.D.I.
Breakfast	28.7	27.9
Lunch	28.8	32.6
Dinner	25.7	26.8
Snacks	16.8	12.7

5.3.6: Vitamin Intakes:

Vitamins are organic substances needed by the body in small amounts to help growth, metabolism and general health. There are about 20 vitamins, most of which cannot be synthesized by the body, and they must be obtained from the diet. Each vitamin performs one or several functions within the body.

It was not possible to give meaningful descriptions of all vitamins, therefore, four vitamins have been selected for special mention as a sample of the vitamins group.

Vitamin A (Retinol) is essential for growth and for the maintenance of healthy skin and mucous membranes in the eyes, ears, nose, throat, lungs and bladder. Vitamin A deficiency is a major cause of blindness in many countries of the Third World.

From the B complex vitamins, Vitamin B_1 (Thiamin) is essential for growth and metabolism. Vitamin B_2 (Riboflavin) is essential for the release of energy from foods.

Vitamin C (Ascorbic Acid) is essential for growth and it increases the absorption of protein, calcium and iron. Vitamin C deficiency is the cause of the disease Scurvy

which increases susceptibility to infections, especially colds. It is commonly held that vitamin C intakes are low or marginal in diets all over the world.

The results of this study show that the study population's dietary intakes of vitamin A and vitamin B_1 seem to be adequate. The intakes of riboflavin seem to be high whereas vitamin C intakes are too low, as shown in table 5.45.

Table 5.45:
Daily dietary intakes of some vitamins according to study method:

Method of calculation	U.W.I.		A.D.I.	
Vitamins	Mean	SD.	Mean	SD.
Retinol (A) (ug)	890	650	580	240
Thiamin (B_1) (mg)	1.3	0.5	1.6	0.6
Riboflavin (B_2) (mg)	3.0	1.5	3.0	1.2
Ascorbic acid (C) (mg)	25.0	17.5	29.6	16.2

Considering age cohorts, table 5.46 shows that the oldest group show the highest intakes of vitamins A and C. The youngest students have the highest intakes of vitamin B_1

whereas the middle age group has the highest intakes of vitamin B_2.

Table 5.46:
Vitamin intakes according to age cohorts:

Vitamins	16 - 18	19 - 21	22 - 25
Retinol (A)	510 - 720	650 - 970	750 - 1150
Thiamin (B_1)	1.4 - 1.7	1.3 - 1.6	1.2 - 1.6
Riboflavin (B_2)	2.4 - 2.8	2.6 - 3.3	2.7 - 3.2
Ascorbic acid (C)	26.8-28.6	24.4-29.2	21.4-29.8

According to accommodation status, as shown in table 5.47, the non-resident students have the higher intakes for all vitamins compared to the resident students.

Table 5.47:
Vitamin intakes according to accommodation status:

Vitamins	Residents	Non-residents
Retinol (A)	553 - 750	620 - 960
Thiamin (B_1)	1.2 - 1.6	1.3 - 1.6
Riboflavin (B_2)	2.5 - 2.8	2.9 - 3.3
Ascorbic acid (C)	23.7-27.2	25.7-30.4

Comparing the vitamin intakes of the study population with the recommended daily intakes of W.H.O., table 5.48 shows that the Technical and Vocational students in Riyadh have more than the RDAs for Thiamin (vitamin B_1) and Riboflavin (vitamin B_2) and less than the RDAs for Ascorbic acid (vitamin C). Retinol intakes are more than the RDAs according to usual weekly intakes (U.W.I.) method and less than the RDAs according to actual daily intakes (A.D.I.) method. However, these differences are not statistically significant.

Table 5.48:
Vitamins intake
compared to recommended daily intakes of W.H.O.:

Method of calculation	U.W.I.	A.D.I.
Vitamins	% of RDAs	% of RDAs
Retinol (A)	118.6	77.3
Thiamin (B_1)	108.3	133.3
Riboflavin (B_2)	166.7	166.7
Ascorbic acid (C)	83.3	98.6

5.3.7: Mineral Intakes:

Minerals are metallic or non-metallic substances that are essential to the body and must be provided by the diet. Their main functions are as components of bones and teeth, regulators of the composition of body fluids and as necessary substances for the correct functioning of many enzymes.

About 25 mineral elements are present in the body, but only 17 are known to be essential nutrients. It was beyond the scope of this study to examine all minerals, therefore, three minerals have been selected for special mention as a sample of the minerals group.

Calcium is the most abundant mineral in the body. It is found almost entirely in the bones and teeth, where it forms a hard structure. The body requires a high calcium dietary intake.

Iron is an important component of haemoglobin. Anaemia due to iron deficiency is extremely common. This is often compounded by the fact that the absorption of iron from the diet is very poor.

Zinc is an essential component of many enzyme systems. It is vital for growth and sexual maturation and it has a function in wound healing. Zinc deficiency was reported among adolescents in Egypt and in Iran, where it is responsible for retarded mental and physical development and delayed puberty (Yudkin, 1985).

The results of this study show that daily intakes of Calcium and Iron are high. Zinc daily intake is also adequate according to survey method, as shown in table 5.49.

Table 5.49:
Daily dietary intakes of some minerals according to study method:

Method of calculation		U.W.I.		A.D.I.	
Minerals		Mean	SD.	Mean	SD.
Calcium	(mg)	939	404	1218	478
Iron	(mg)	21.8	8.8	26.3	9.4
Zinc	(mg)	11.1	3.1	11.9	2.8

Considering age cohorts, the oldest age group have the lowest intakes of calcium and the highest intakes of zinc.

There was no clear differences between age cohorts with regard to iron intakes, as shown in table 5.50.

Table 5.50:
mineral intakes according to age cohorts:

Minerals	16 - 18	19 - 21	22 - 25
Calcium	895-1019	927-986	852-932
Iron	21.7-24.7	21.9-26.8	21.5-25.9
Zinc	10.8-11.6	11.1-11.9	11.2-12.2

According to accommodation status, resident students have lower intakes of all three minerals compared with non-resident students (table 5.51).

Table 5.51:
mineral intakes according to accommodation status:

Minerals	Residents	Non-residents
Calcium	932 - 1094	942 - 1232
Iron	19.6 - 24.8	23.0 - 26.6
Zinc	10.2 - 11.7	11.5 - 11.9

Comparing the results with the WHO recommended dietary amounts, as shown in table 5.52, it was found that the daily intakes of calcium and iron are higher than the RDAs, whereas the zinc intakes were adequate.

Table 5.52:
mineral intakes
compared to recommended daily intakes of W.H.O.:

Method of calculation	U.W.I.	A.D.I.
Minerals	% of RDAs	% of RDAs
Calcium	187.8	243.6
Iron	140.6	169.8
Zinc	100.0	108.2

5.3.8: Summary of results:

Nutrient intakes of Technical and vocational students in Riyadh, Saudi Arabia can be summarized as follows:

Energy intakes were found to be about 2300 kcal per day. The middle age group and the resident students have the lowest energy intakes. The energy sources are protein (17.7-19.2%), fat (31.6-36.5%) and carbohydrates (45.9-49.2%). Lunch provides about 37.5% of the daily energy intakes, breakfast provide about 30%, dinner provide about 20% and snacks provide about 11%. Compared with the RDAs, the study population has less than 80% of the energy intake recommendations.

Protein intakes were found to range between 93.7 and 101.0 g/d. Lunch and breakfast are the main suppliers of protein, almost one third each, whereas dinner provide about one fifth and snacks supply the remainder. Compared with the RDAs, the protein intakes of the respondents are high.

The total fat intakes of the study population ranged between 93.3 and 111.0 g/d. Saturated fat was 29.8-39.7 g/d. Polyunsaturated fat was 5.9-6.6 g/d. Cholesterol was 1085-1206 mg/d. Lunch and breakfast are the main suppliers of fat, providing more than one third each. Compared with the

RDAs, the total fat intakes were high, saturated fat intakes were about right, polyunsaturated fats were low.

Total carbohydrate intakes were 257-281 g/d, whereas dietary fibre intakes were 27.6-39.1 g/d. Lunch and breakfast are the main suppliers of carbohydrate.

Vitamin intakes were found to be as follows: retinol (580-890 ug/d), thiamin (1.3-1.6 mg/d), riboflavin (3.0 mg/d) and ascorbic acid (25.0-29.6 mg/d). Compared with the World Health Organization recommendations, the intakes of thiamin and riboflavin are high; ascorbic acid is low.

Mineral intakes were found to be as follows: calcium (939-1218 mg/d), iron (21.8-26.3 mg/d) and zinc (11.1-11.9 mg/d). Compared with the World Health Organization recommendations, the intakes of calcium and iron are high, whereas zinc intakes seem to be adequate.

CHAPTER 6

EVALUATION OF STUDY

CAPTER VI:

EVALUATION OF STUDY:

6.1: Introduction:

It has been generally accepted that it is not possible to measure the nutrient intakes of a random sample of free-living individuals accurately for any length of time (Marr, 1971).

The accuracy of dietary assessment studies is associated with two types of error, systematic and random errors (see 2.6). Systematic error can occur in subject selection, reported intakes, and in the information content of food composition tables. Random error can also be found at the sampling stage, in the reporting and coding of nutrients, and in the estimated amounts of foods consumed.

6.2: Subject selection and sampling:

6900 students of six Technical institutes and vocational centres in Riyadh, Kingdom of Saudi Arabia were chosen to study their nutritional status as the main object of this study.

To reduce errors on sampling, procedures were conducted to identify a 10% random sample from the student population using a computer method. A list of students names was obtained and each student was given a number. Those numbers were entered in to a computer and a 10% random number sample was identified from each of the six institutes.

6.3: Methods of nutrient data collection:

Any dietary survey method has both advantages and disadvantages. Therefore, two methods, usual weekly intakes and actual daily intakes, were chosen to investigate the nutrient intakes of the study population.

6.3.1: Usual Weekly Intakes:

To assess the students' usual weekly intakes a simple and short schedule consisting of 50 food items, plus space to add any other food items which might not be included (App. E), was used to interview the subjects in small groups. The students were asked to provide information concerning description of food, weekly frequency, and the daily amounts, estimated by reference to household measurements.

The main advantages of this method are that it gives information on diet over a period of one week, the food list acts as a memory aid, and it requires only limited effort by the subjects, which is reflected in the high cooperation rates obtained (61.4%).

A disadvantage of this method is that it depends on the subject's ability to estimate portion size correctly. To counteract this as far as possible, advice was given to the subjects with the help of different sizes of disposable plates, cups and spoons with the aim of reducing this potential estimation error.

6.3.2: Actual Daily Intakes:

Diet diary sheets were used to investigate actual daily intakes. Each student was asked to record all food and drink consumed for breakfast, lunch, and dinner, as well as any food or drink consumed between meals within the 24 hours, starting from getting up the next morning. Subjects were asked to record descriptions of food items and portion sizes, estimated by reference to household measures.

This method allowed rapid and low cost assessment of diets from large numbers of subjects, and rates of cooperation were high (312 of 508 sheets were collected).

The main disadvantage of using household measures as opposed to asking the subjects to weigh every food item consumed is a possible loss of accuracy. However, for large

samples the error may be more apparent than real (Livingstone et al, 1990).

6.4: Data Processing:

After the completed diet sheets had been collected, the descriptions of portions given by the subjects were used to compile a set of food weights, in a form suitable for computing nutrient intakes.

The Unilever Dietary Analysis Program (UNIDAP) was used to calculate nutrient intakes employing McCance and Widdowsons "The Composition of Food" (Paul and Southgate, 1978). In the case of traditional foods, the following references were employed:

1) Food Composition Tables for use in the Middle East (Pellet and Shadarevian, 1970),
2) Food Composition Tables for the Near East (FAO, 1982),
3) The Chemical and Nutritional Quality of some Saudi Arabian Dishes Based on Cereals and Legumes (Al-Jebrin et al., 1985), and
4) Nutritional Evaluation of Selected Meat Based Saudi Arabian Dishes (Sawaya et al., 1986).

These additions to the programme helped overcome the potential systematic errors involved in non-selective application of food composition tables.

6.5: Accuracy of Results:

Because of the lack of information on dietary status of adults in Saudi Arabia, and in Arab Countries in general, evaluating the two factors of accuracy, that is, validity and reliability, was assessed by comparing the results obtained here for usual weekly intakes with the results of actual daily intakes, with the help of other studies where applicable.

6.5.1: Reliability of methods:

A particular dietary survey method can be considered reliable if it gives very similar results when used repeatedly in the same situation. Conventionally, reliability has been determined using a "test-retest" design, followed by an assessment of the extent of the agreement between the nutrient intakes obtained on the two separate occasions, by the same method. This was not

possible in this survey which, due to constraints of time, was not designed as a longitudinal study.

In general, however, results of such tests suggest that recall and dietary histories techniques, over a short time frame, provide a relatively reliable estimate of usual intakes of most nutrients for a large sample (Gibson, 1990).

6.5.2: Validation of calculated nutrient intakes:

Several investigators have compared nutrient intakes calculated from food composition data with results from other assessment methods such as dietary history with actual food intake (Bray et al, 1978; Mahalko et al, 1985).

Such comparisons in respect of macronutrients (except fat) suggest that differences between the two methods can be within 10%, especially when the nutrient intake represents an average for a number of persons(Widdowson and McCance, 1943; Bingham and Cummings, 1985). In contrast, nutrients such as fat, iron, vitamin A and vitamin C often show poorer agreement, the differences amounting to 20% or more (Bransby et al., 1948; Grant Whiting and Leverton, 1960; Stock and Wheeler, 1972; Bingham et al., 1982).

In view of these discrepancies, perfect agreement between any two methods should not be expected.

One validity test used in this study is the comparison of the results obtained from the two methods employed that is, seven day recall (usual weekly intakes "UWI") and the 24 hours diary (actual daily intakes "ADI"). Table 6.1 summaries the results of the comparison between the two methods.

From this table, it is clear that there is good agreement between the two methods on energy and vitamin B_2 intakes and an acceptable agreement on protein, total fat, poly unsaturated fat, cholesterol, total carbohydrates, zinc, iron, vitamin C and vitamin B_1.

The biggest differences are to be found on the results for saturated fat, dietary fibre, calcium and vitamin A intakes.

Table 6.1:
Comparison of usual weekly intakes (U.W.I.)
with actual daily intakes (A.D.I.):

Nutrients	U.W.I.	A.D.I.	% Diff.*
Energy	2282	2312	1.3
Protein	93.7	101	7.2
Total Fat	111	93.3	- 18.9
Saturated Fat	39.7	29.8	- 33.2
Poly Unsat. Fat	5.9	6.6	10.6
Cholesterol	1085	1206	10.0
T. Carbohydrates	257	281	8.6
Dietary Fibre	27.6	39.1	29.4
Calcium	939	1218	22.9
Iron	21.8	26.3	17.1
Zinc	11.0	11.9	7.6
Retinol (A)	8.8	5.8	- 51.7
Thiamin (B_1)	1.3	1.6	18.7
Riboflavin (B_2)	3.0	3.0	00.0
Ascorbic Acid (C)	25.0	29.6	15.5

* % Difference = (A.D.I. - U.W.I.) / A.D.I. x 100.

CHAPTER 7

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Chapter VII:

Discussion, conclusions and recommendations:

7.1: Discussion:

7.1.1: General factors:

One of the main objectives of this study was to collect data to enable a comparison of the nutritional status of Saudi students with similar groups from other nationalities. Only 3.1% of this study population are non-Saudis. Therefore, it is not possible to compare nationality sub-groups within this study. Instead, comparison will be made between the nutritional status of the study population and that of other nationalities derived from other studies in relation to other countries' Recommended Dietary Allowances (RDAs).

It has been shown by various researchers that an inverse relationship exists between physiological age and nutrient needs (Steele et al, 1952; Dwyer, 1981). Taking the premise of McKigney and Munro (1975), that all boys aged between 15 and 21 are adolescents, about 80% of the study population were found to be adolescents. Biologically, adolescence is the phase of completion of growth and of sexual maturation. Because of that, there is an increased

demand for several nutrients since many nutrient-needs parallel these changes.

In order that the association between age and nutritional status could be investigated, the students were classified into three age cohorts: 16-18, 19-21 and 22-25 years old.

Marital status may be an important factor effecting nutritional status. A working hypothesis for this study was that married subjects are more likely to meet RDAs than single subjects. Unfortunately, only 5.5% of the study sample were married and, therefore, it is difficult to make any comparison between subgroups.

Regarding accommodation status, there were two groups: the 78 students who lived in institute halls of residence and the 374 who lived as non-residents (with their families, friends or alone). The residents received free meals at their institute residence, whereas about 84% of the non-residents depended on their parents. Final recommendations regarding catering provision will focus on the planning of the residents' meals, although advice may given to the non-resident group.

Nutrient needs vary according to habitual activity level. The results of this study show that the study population is composed of moderately active individuals. Thus, comparison of their nutrient intakes needs to refer to those in a similar category.

Weight may be one of the main factors reflecting nutritional status. When investigating this factor, two methods were used: the students' self-assessment of weight, and the body mass index (BMI), calculated from the students' actual weight and height. The results show that 16.8% of the students thought they were overweight, 60.8% considered themselves as about right, and 22.3% thought they were underweight. However, according to BMI standards, almost the same percentage (15%) are overweight (above the standard), about 30% are about right (in the standard range), and 55% are underweight (less than the average).

When comparing the results of the two methods, it should be borne in mind that there are no BMI data derived from studies in Saudi Arabia. It has therefor been necessary to compare the results of this study with the existing BMI average values for industrialised countries, even though, possibly, these may require some modification in the light

of further research. This could explain the differences observed.

The most stated health problem is anaemia, about 13% of the students indicating that they had suffered from it at some time in their lives. These results are comparable with those of El-Haazmi (1982), who reported that 63 out of 216 (29%) Saudi preschool and elementary school children were anaemic, suffering mainly from nutritional anaemia. Based on these findings, nutritional anaemia would seem to be prevalent and could be a common nutritional problem in Saudi Arabia. As iron intake (21.8-26.3 mg/d) and folic acid intake (13.4-15.1 mg/d) of the study population seem to be high, it is may be that vitamin B_{12} deficiency is the main reason for this anaemia. However, it should be borne in mind that the value of 13% reported in this study is based on subjects' reports of having suffered from anaemia at some time in their lives and not on actual medical diagnosis of the condition.

7.1.2: Dietary habits and attitudes:

Many people think that it is best to eat three meals a day but there is no hard scientific evidence for this view (Passmore and Eastwood, 1986). However, those who take three meals daily are more likely to meet the RDAs. (Steele et al, 1952). The results of this study show that the majority (80 %) of the study population ate three meals daily. This finding regarding meals frequency may be considered as a positive factor affecting the students' nutritional status.

At the same time, meal-skipping is a common habit amongst the study population (Howard and Al-Sudairy, in press). The majority (64 %) were found to miss one or more of their daily meals. The high incidence of meal-skipping prevalent amongst these young people is of concern as regards ensuring adequate dietary intake of essential nutrients. Given that about 80 % of the students in this sample are adolescent, it could be that the habit of adolescents to spend most of their evenings outside accounts for the almost one in three who do not eat an evening meal. However, it is likely that the missed food will be replaced by snacks (Greger et al, 1979).

Meal skipping is of particular importance when breakfast is the meal which is missed, as it is unlikely that snack substitutes will be taken (Musgrave et al, 1981). It is interesting that breakfast skipping is most common amongst the majority of the older age group. Possibly, the family commitments of non-resident students mean less time to attend to their own breakfast.

Over all age-groups, one third of resident students skip breakfast. This could be because students are often unable to get to the refectory for the fixed time at which breakfast is available, whereas non-residents can eat breakfast at more flexible times.

Lunch is the least omitted meal amongst the student population and so it assumes importance in providing a greater share of nutrients.

Younger adults seem more likely to prefer to eat some of their food as between-meals or snacks than as meals. The prevalence of the snacking habit (Poleman and Peckenpaugh, 1991) is supported by the results of this study showing that eating between meals is a regular practice amongst the majority (72 %) of the study population.

Snack foods might provide good nutrients if well chosen. There is no single perfect snack, but some snacks are more nutritious than others, and careful selection is necessary to avoid potential problems.

The contribution of between-meals foods has been studied to determine to what extent this supplementary intake improved the overall adequacy of the diet (Steele et al, 1952; Thomas and Call, 1973; Truswell and Darnton-Hill, 1981). This study shows that between-meals foods contributed about 11 % to daily energy intake, 6-9% of protein intake, 8-11 % of total fat intake and 12-16 % of total carbohydrate intake.

Snacks are also important to replace the skipped meals, which is a common habit amongst these students, but, as a general rule, snacks should not replace breakfast, which is a very important meal nutritionally (Poleman et al, 1991).

Sport interests of young people were the main reason for dieting habits in the study population. An individual who is involved in sport uses more energy and loses more fluid and minerals in perspiration (Poleman et al, 1991). These facts form a basis for defining the sportsman's

nutritional needs which can be met by eating a well balanced diet with enough calories to maintain weight. The distribution of energy-producing nutrients in the sportsman's diet should be approximately 55-60 % carbohydrate, 15 % protein and 25-30 % fat (Marcus, 1986). The students with sport hobbies may be educated on how to obtain adequate dietary intakes of essential nutrients.

According to the results of this study, only 27% of the students are smokers. Because of smoking's negative effect on vitamin C concentration and on body weight, and because of the low intakes of vitamin C in the students' diet, these students may be advised to try to give up smoking. If not, they have to obtain more fruit and vegetables which are the main sources of vitamin C.

Food preference might play a major role when planning diets for institutions. It could be helpful for the caterers to devise their menus in an acceptable way. This study provides a list of students' favourite foods for each daily meal. From a nutritional point of view, the students' favourite foods seem to constitute a good balance, containing all food groups. It would provide a useful basis for planning a balanced diet for these students, and one which they would find acceptable.

7.1.3: Nutrient intakes:

Nutrient intake results of this study show that energy intakes were low (2300 Kcal/day). When compared to the RDAs, the study population has less than 80% of the recommendations. Thus, these results indicated an energy deficiency amongst the study population. However, the data obtained here is in agreement with other reports in the literature (Wirths et al, 1977; Al-Othaimeen et al, 1987; Al-Othaimeen et al, 1988).

The energy sources are: protein (17.7-19.2 %), fat (31.6-36.5 %) and carbohydrates (45.9-49.2 %), whereas the Dietary Reference Values (DH, 1991) are: protein (15 %), fat (35 %) and carbohydrate (50 %). These results reflect the fact that these students have more protein and less carbohydrate contributing to their total energy intake than the recommendations. In these circumstances, protein in the diet will be channelled directly for use as an energy source, by-passing its normal function for growth and maintenance, and effectively depleting the body of protein. This is not desirable and a state of affairs such as this occurs in protein energy malnutrition. However, only a few cases have been reported in adults (Burton and Foster, 1988; Walker, 1990).

A breakfast may be considered optimal if it provides one-third of the daily caloric requirement (Burton and Foster, 1988). This goal has been achieved by the study population, where breakfast provided almost one third of daily energy intakes.

Protein intakes were found to be ranged between 93.7 and 101.0 g/d. Compared with the RDAs, the protein intakes of the respondents were high. These results indicate that there should be no problem with protein malnutrition amongst the study population and, because there is no harmful effect of too much protein intake it is better to err on the high side rather than risk protein deficiency (Walker, 1990). As with energy, a breakfast providing one-third or more of the daily protein requirement may be considered optimal (Burton and Foster, 1988) and this target was obtained, breakfast providing more than one third of the daily protein intakes of the sample population.

The total fat intakes of the study population have been found to be high (ranging between 93.3 and 111.0 g/d) compared to the RDAs providing about 34% of the total energy consumed. However, it is important to remember that the quantity of fat may not be as important as the quality or type of fat (DH, 1991). Saturated fat intakes were 29.8-39.7

g/d which are at acceptable levels, whereas Polyunsaturated fatty acid intakes were inadequate (5.9-6.6 g/d).

Cholesterol intakes were high (1085-1206 mg/d). A causative factor may involve consumption of foods of animal origin, especially eggs, which are a common food amongst these students (for example, eggs were the most popular preference for breakfast). Whatever the cause, there is considerable evidence to show that dietary cholesterol intake makes only a small contribution to the blood levels of cholesterol (DH, 1991 ; Poleman and Peckenpaugh, 1991). The effect of dietary cholesterol in raising blood cholesterol could be minimised by increasing dietary polyunsaturated fatty acids intake and decreasing saturated fatty acids intake (DH, 1991).

There are no specific recommendations regarding the level of carbohydrate intake, but it is recommended that a minimum daily amount of 100 g of carbohydrate is desirable (DHSS, 1979) and at least half of the energy intake should be derived from carbohydrate (DH, 1991). The results of this study show that the respondents achieved more than double this minimum amount and about 46-49 % of the total energy came from carbohydrates (including dietary fibre). An average of about 18 g of dietary fibre per day for

adults is recommended (DH, 1991) which means that the dietary fibre of the study population (27-39 g/d) is high.

Vitamin intakes were found to be as follows: retinol (580-890 ug/d), thiamin (1.3-1.6 mg/d), riboflavin (3.0 mg/d) and ascorbic acid (25.0-29.6 mg/d). Compared with the World Health Organization recommendations, the intakes of retinol seem to be adequate (ranged between 77-118 % of the RDAs); thiamin and riboflavin are high; ascorbic acid is low. The high intake of thiamin may due to the high consumption of cereals and grains, since Middle Eastern countries in general rely heavily on them in their diets (McLaren and Pellett, 1970). Consequently, thiamin deficiency is unlikely to present serious problems for the study population.

Since the requirement for riboflavin is small, these levels are not difficult to achieve through an intake of liver, milk, cheese and eggs which are consumed regularly amongst the study population. Thus, the intake of riboflavin is substantially higher than the recommended allowances. That amount of riboflavin is essential for certain enzyme systems that aid in the metabolism of carbohydrates, proteins, and fats.

Those who avoid "acid-containing foods" such as citrus fruits are at risk of ascorbic acid or vitamin C deficiency. This seems to be the main reason for the low intake of vitamin C amongst the study population. However, scurvy is not a risk, since the minimum amount of vitamin C required to prevent it is about 10 mg/day (Burton and Foster, 1988). However, inadequate vitamin C intake may finally lead to swollen and bleeding gums, loose teeth, and ruptures of small blood vessels which are early predictors of scurvy (Poleman and Peckenpaugh, 1991).

Mineral intakes were found to be as follows: calcium (939-1218 mg/d), iron (21.8-26.3 mg/d) and zinc (11.1-11.9 mg/d). Compared with the World Health Organization recommendations, the intakes of calcium and iron are high, whereas zinc intakes seems to be adequate. The high consumption of milk and milk products are responsible for high intake of calcium, whereas high iron intake emerged from a high consumption of liver, meat and grains. Consequently, calcium, iron and zinc deficiency would not present any serious problems to the study population.

Finally, it should be mentioned that, because of the lack of local dietary standards, the nutrient intake of the study population was compared against the international RDAs (UK, USA, WHO). These references may not be suitable standards for the Saudi population. However, since no comparable data exist with reference to the Middle East in particular, this study emphasizes the need for developing suitable dietary standards for Saudi and Arabian Middle East populations. For example, energy intakes were measured in this study at about 20% less than standard international recommendations. However, racial and enviromental factors could explain some of the difference. Middle Eastern populations, of lighter build, require less total energy in order to maintain a similar energy intake per unit body mass. Also, there is less demand in hot climates for energy intake for maintenance of body temperature.

7.2: Conclusions:

From all the previous results and discussion, it can be concluded that the nutritional status of technical and vocational students in Riyadh, Saudi Arabia may be outlined as follows:

1) About 80% of the study population were found to be adolescents and they need increased amounts of several nutrients for the completion of growth and of sexual maturation.

2) Regarding their habitual activities, the study population is composed of moderately active individuals.

3) Only 30% of the students has the body mass index in the standard range of the industrialized countries (25 + 2.5) whereas the majority (56%) has less than that average.

4) Anaemia is the most stated health problem, 13% of the students indicated that they had suffered from it at some time in their lives.

5) Meal-skipping and eating between meals are common habits amongst the majority of the study population.

6) There was an energy deficiency amongst the study population when compared to existing data for RDAs. Also, polyunsaturated fat and vitamin C intakes were inadequate.

7) The dietary intakes of saturated fat, dietary fibre, retinol, and zinc seem to be adequate.

8) There was an over consumption of protein, total fat, cholesterol, thiamin, riboflavin, calcium and iron intakes.

In spite of the contribution of the diet to the adequacy of different nutrients, it should not be forgotten that there is a direct relationship between the students' nutritional status and that of the community. Hence, complementary information on the community's nutritional and health status is essential and should be investigated in detail in order to build up a total picture.

It should be noted that the dietary data gathered here depends on the ability of the subjects to quantify and record their foods. But in spite of this, the data obtained here can be considered as an indication of certain obvious

trends such as low intakes of energy, polyunsaturated fat and vitamin C when compared to international standards.

Finally, these results demonstrate the nutritional status of the technical and vocational students in Riyadh, Saudi Arabia, in particular, but it may reflect the nutritional status of any subjects in the same circumstance (ie: age, activity, and environment) in the rest of the country, the Gulf countries, and in general the Arabian Middle East countries. Certainly, the nutritional data presented here has not been previously available for young adult Arab males and represents an important contribution to the nutritional assessment of the Saudi population.

7.3: Recommendations:

The findings of this study lead to several recommendation which aim to improve the nutritional status of technical and vocational students in Riyadh, Saudi Arabia. Those recommendation are as follows:

1) The students are in need of nutrition education, particularly elementary knowledge of nutrition such as the nutrient value of foods and their nutritional requirements. Also they need to be encouraged in the consumption of a healthy balance of nutrients and introduced to desirable food attitudes. This could be done both by example and/or by the provision of information.

2) To improve the nutritional quality of the resident students diet, its nutrient provision should be carefully assessed by those who plan the daily meals within the institution. The aim is to increase the intake of energy sources in a balanced way. Protein intakes should be reduced to 15 % since, although the slight overconsumption found here poses no health threat, protein is an economically inefficient means of providing for the energy requirements of a population.

Carbohydrate should be increased to 50 % of the total energy intake.

3) In terms of total fat consumption, the aim should be to increase the proportion of polyunsaturated fats (fats from plant origin) and decrease the proportion of saturated fats (mainly red meat and butter). Also, providing alernatives to eggs in breakfast will help to reduce cholesterol intake.

4) Vitamin C intakes should be increased to 40 mg through the consumption of citrus fruits and their juice, and green vegetables.

5) Institutions should consider the introduction of a more flexible breakfast time, and students educated about its importance as part of a balanced diet.

6) Regarding eating between meals or snacking habit, catering policy in halls of residence must take this into account by ensuring that there is access to snacks which are chosen to help augment meal-provision in achieving recommended nutrient intakes.

7) Those who plan the daily meals within the institution should give due consideration to the students favourite foods and drinks which are identified in this study.

7.4: Future research consideration:

The findings of this study emphasize the need for future research as follows:

1) The results of this study indicate a deficiency in energy, polyunsaturated fat, and vitamin C and it is important to study in more details the implications of this for the students' health.

2) It is also recommended that the students' energy expenditure be measured and its relationship to energy intakes investigated.

3) This study identified anaemia as a common health problem amongst the study population. Thus it is recommended that this problem should be investigated in more detail and vitamin B_{12} intake examined.

4) Dietary habits and attitudes are dependent on general cultural experience obtained early in life, and from patterns of behaviour which are characteristic of a group or community. This study identifies some of the students' dietary habits and attitudes and it is recommended that the relationship between community habits and attitudes and those of the students be studied.

5) The technical and vocational students are a small sample of the Saudi Arabian population and it is important to assess the nutritional status of the whole population and to study its relationship to that of the students.

6) This study has dealt with limited age, sex, occupation, and location subgroups. It might be of interest to assess the nutritional status of other community subgroups according to these factors to compare with the results of this study.

7) Finally, this study highlights the important demand for developing suitable dietary standards for Saudi Arabia and the Arabian Middle East countries in general.

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APPENDICES

Appendix A-1

U.K. Dietary Reference Values

Source:
Department of Health. (1991). Dietary Reference Values for Food Energy and Nutrients for the United Kingdom. Report of the Panel on Dietary Reference Values of the Committee on Medical Aspects of Food Policy, HMSO, London.

Estimated Average Requirements (EARs) for Energy

Age	EARs MJ/d (kcal/d)	
	males	females
0-3 months	2.28 (545)	2.16 (515)
4-6 months	2.89 (690)	2.69 (645)
7-9 months	3.44 (825)	3.20 (765)
10-12 months	3.85 (920)	3.61 (865)
1-3 years	5.15 (1,230)	4.86 (1,165)
4-6 years	7.16 (1,715)	6.46 (1,545)
7-10 years	8.24 (1,970)	7.28 (1,740)
11-14 years	9.27 (2,220)	7.92 (1,845)
15-18 years	11.51 (2,755)	8.83 (2,110)
19-50 years	10.60 (2,550)	8.10 (1,940)
51-59 years	10.60 (2,550)	8.00 (1,900)
60-64 years	9.93 (2,380)	7.99 (1,900)
65-74 years	9.71 (2,330)	7.96 (1,900)
75 + years	8.77 (2,100)	7.61 (1,810)
Pregnancy		+ 0.80 (200)
Lactation:		
1 month		+ 1.90 (450)
2 months		+ 2.20 (530)
3 months		+ 2.40 (570)
4-6 months (Group 1)		+ 2.00 (480)
4-6 months (Group 2)		+ 2.40 (570)
> 6 months (Group 1)		+ 1.00 (240)
> 6 months (Group 2)		+ 2.30 (550)

Dietary Reference Values for fat and carbohydrate for adults as a percentage of daily total energy intake (percentage of food energy)

	Individual minimum	Population average	Individual maximum
Saturated fatty acids		10 (11)	
Cis-polyunsaturated fatty acids		6 (6.5)	10
	n-3 0.2		
	n-6 1.0		
Cis-monounsaturated fatty acids		12 (13)	
Trans fatty acids		2 (2)	
Total fatty acids		30 (32.5)	
TOTAL FAT		33 (35)	
Non-milk extrinsic sugars	0	10 (11)	
Intrinsic and milk sugars and starch		37 (39)	
TOTAL CARBOHYDRATE		47 (50)	
NON-STARCH POLYSACCHARIDE (g d)	12	18	24

The average percentage contribution to total energy does not total 100% because figures for protein and alcohol are excluded. Protein intakes average 15 per cent of total energy which is above the RNI. It is recognised that many individuals will derive some energy from alcohol, and this has been assumed to average 5 per cent approximating to current intakes. However the Panel allowed that some groups might not drink alcohol and that for some purposes nutrient intakes as a proportion of food energy (without alcohol) might be useful. Therefore average figures are given as percentages both of total energy and, in parenthesis, of food energy.

Reference Nutrient Intakes for Protein

Age	Reference Nutrient Intake[a] g/d
0-3 months	12.5[b]
4-6 months	12.7
7-9 months	13.7
10-12 months	14.9
1-3 years	14.5
4-6 years	19.7
7-10 years	28.3
Males:	
11-14 years	42.1
15-18 years	55.2
19-50 years	55.5
50+ years	53.3
Females:	
11-14 years	41.2
15-18 years	45.0
19-50 years	45.0
50+ years	46.5
Pregnancy[c]	+ 6
Lactation[c]:	
0-4 months	+11
4+ months	+ 8

[a] These figures, based on egg and milk protein, assume complete digestibility.

[b] No values for infants 0-3 months are given by WHO. The RNI is calculated from the recommendations of COMA. (See Table 7.1)

[c] To be added to adult requirement through all stages of pregnancy and lactation.

Reference Nutrient Intakes for Vitamins

Age	Thiamin	Riboflavin	Niacin (nicotinic acid equivalent)	Vitamin B6	Vitamin B12	Folate	Vitamin C	Vitamin A	Vitamin D
	mg/d	mg/d	mg/d	mg/d†	μg/d	μg/d	mg/d	μg/d	μg/d
0–3 months	0.2	0.4	3	0.2	0.3	50	25	350	8.5
4–6 months	0.2	0.4	3	0.2	0.3	50	25	350	8.5
7–9 months	0.2	0.4	4	0.3	0.4	50	25	350	7
10–12 months	0.3	0.4	5	0.4	0.4	50	25	350	7
1–3 years	0.5	0.6	8	0.7	0.5	70	30	400	7
4–6 years	0.7	0.8	11	0.9	0.8	100	30	500	—
7–10 years	0.7	1.0	12	1.0	1.0	150	30	500	—
Males									
11–14 years	0.9	1.2	15	1.2	1.2	200	35	600	—
15–18 years	1.1	1.3	18	1.5	1.5	200	40	700	—
19–50 years	1.0	1.3	17	1.4	1.5	200	40	700	—
50 + years	0.9	1.3	16	1.4	1.5	200	40	700	**
Females									
11–14 years	0.7	1.1	12	1.0	1.2	200	35	600	—
15–18 years	0.8	1.1	14	1.2	1.5	200	40	600	—
19–50 years	0.8	1.1	13	1.2	1.5	200	40	600	—
50 + years	0.8	1.1	12	1.2	1.5	200	40	600	**
Pregnancy	+ 0.1***	+ 0.3	*	*	*	+ 100	+ 10	+ 100	10
Lactation:									
0–4 months	+ 0.2	+ 0.5	+ 2	*	+ 0.5	+ 60	+ 30	+ 350	10
4 + months	+ 0.2	+ 0.5	+ 2	*	+ 0.5	+ 60	+ 30	+ 350	10

*No increment **After age 65 the RNI is 10 μg/d for men and women ***For last trimester only †Based on protein providing 14.7 per cent of EAR for energy

Reference Nutrient Intakes for Minerals

Age	Calcium	Phosphorus[1]	Magnesium	Sodium	Potassium	Chloride[4]	Iron	Zinc	Copper	Selenium	Iodine
	mg/d	mg/d	mg/d	mg/d[2]	mg/d[3]	mg/d	mg/d	mg/d	mg/d	μg/d	μg/d
0–3 months	525	400	55	210	800	320	1.7	4.0	0.2	10	50
4–6 months	525	400	60	280	850	400	4.3	4.0	0.3	13	60
7–9 months	525	400	75	320	700	500	7.8	5.0	0.3	10	60
10–12 months	525	400	80	350	700	500	7.8	5.0	0.3	10	60
1–3 years	350	270	85	500	800	800	6.9	5.0	0.4	15	70
4–6 years	450	350	120	700	1,100	1,100	6.1	6.5	0.6	20	100
7–10 years	550	450	200	1,200	2,000	1,800	8.7	7.0	0.7	30	110
Males											
11–14 years	1,000	775	280	1,600	3,100	2,500	11.3	9.0	0.8	45	130
15–18 years	1,000	775	300	1,600	3,500	2,500	11.3	9.5	1.0	70	140
19–50 years	700	550	300	1,600	3,500	2,500	8.7	9.5	1.2	75	140
50 + years	700	550	300	1,600	3,500	2,500	8.7	9.5	1.2	75	140
Females											
11–14 years	800	625	280	1,600	3,100	2,500	14.8[5]	9.0	0.8	45	130
15–18 years	800	625	300	1,600	3,500	2,500	14.8[5]	7.0	1.0	60	140
19–50 years	700	550	270	1,600	3,500	2,500	14.8[5]	7.0	1.2	60	140
50 + years	700	550	270	1,600	3,500	2,500	8.7	7.0	1.2	60	140
Pregnancy	*	*	*	*	*	*	*	*	*	*	*
Lactation:											
0–4 months	+ 550	+ 440	+ 50	*	*	*	*	+ 6.0	+ 0.3	+ 15	*
4 + months	+ 550	+ 440	+ 50	*	*	*	*	+ 2.5	+ 0.3	+ 15	*

*No increment

[1]Phosphorus RNI is set equal to calcium in molar terms

[2]1 mmol sodium = 23 mg

[3]1 mmol potassium = 39 mg

[4]Corresponds to sodium 1 mmol = 35.5 mg

[5]Insufficient for women with high menstrual losses where the most practical way of meeting iron requirements is to take iron supplements (see table 28.2)

Appendix A-2

U.S.A.
Recommended
Dietary
Allowances

Source:

FNB/NAS (1980). Recommended Dietary Allowances. 9th Edition, Food and Nutrition Boared, National Research Council, National Academy of Science, Washington D.C.

FNB/NAS (1989). Recommended Dietary Allowances. 10th Edition, Food and Nutrition Boared, National Research Council, National Academy of Science, Washington D.C.

Mean heights and weights and recommended energy intakes for the USA

Category	Age (years)	Weight (kg)	Weight (lb)	Height (cm)	Height (in)	Energy needs (with range) (kcal)		(MJ)
Infants	0.0–0.5	6	13	60	24	kg × 115	(95–145)	kg × 0.48
	0.5–1.0	9	20	71	28	kg × 105	(80–135)	kg × 0.44
Children	1–3	13	29	90	35	1300	900–1800	5.5
	4–6	20	44	112	44	1700	1300–2300	7.1
	7–10	28	62	132	52	2400	1650–3300	10.1
Males	11–14	45	99	157	62	2700	2000–3700	11.3
	15–18	66	145	176	69	2800	2100–3900	11.8
	19–22	70	154	177	70	2900	2500–3300	12.2
	23–50	70	154	178	70	2700	2300–3100	11.3
	51–75	70	154	178	70	2400	2000–2800	10.1
	76+	70	154	178	70	2050	1650–2450	8.6
Females	11–14	46	101	157	62	2200	1500–3000	9.2
	15–18	55	120	163	64	2100	1200–3000	8.8
	19–22	55	120	163	64	2100	1700–2500	8.8
	23–50	55	120	163	64	2000	1600–2400	8.4
	51–75	55	120	163	64	1800	1400–2200	7.6
	76+	55	120	163	64	1600	1200–2000	6.7
Pregnancy						+300		
Lactation						+500		

The data have been assembled from the observed median heights and weights of children, together with weights for adults given by life insurance companies. The energy allowances for the young adults are for men and women doing light work. The allowances for the two older age groups allow for a decrease in resting metabolic rate and reduction in activity. Energy allowances for children through age 18 are based on median energy intakes of children of these ages followed in longitudinal growth studies. The values in parentheses are 10th and 90th percentiles of energy intake to indicate the range of energy consumption among children of these ages.

FOOD AND NUTRITION BOARD, NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL
RECOMMENDED DIETARY ALLOWANCES,[a] Revised 1989

Designed for the maintenance of good nutrition of practically all healthy people in the United States

							Fat-Soluble Vitamins				Water-Soluble Vitamins							Minerals					
Category	Age (years) or Condition	Weight[b] (kg)	Weight[b] (lb)	Height[b] (cm)	Height[b] (in)	Protein (g)	Vitamin A (μg RE)[c]	Vitamin D (μg)[d]	Vitamin E (mg α-TE)[e]	Vitamin K (μg)	Vitamin C (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg NE)[f]	Vitamin B_6 (mg)	Folate (μg)	Vitamin B_{12} (μg)	Calcium (mg)	Phosphorus (mg)	Magnesium (mg)	Iron (mg)	Zinc (mg)	Iodine (μg)	Selenium (μg)
Infants	0.0–0.5	6	13	60	24	13	375	7.5	3	5	30	0.3	0.4	5	0.3	25	0.3	400	300	40	6	5	40	10
	0.5–1.0	9	20	71	28	14	375	10	4	10	35	0.4	0.5	6	0.6	35	0.5	600	500	60	10	5	50	15
Children	1–3	13	29	90	35	16	400	10	6	15	40	0.7	0.8	9	1.0	50	0.7	800	800	80	10	10	70	20
	4–6	20	44	112	44	24	500	10	7	20	45	0.9	1.1	12	1.1	75	1.0	800	800	120	10	10	90	20
	7–10	28	62	132	52	28	700	10	7	30	45	1.0	1.2	13	1.4	100	1.4	800	800	170	10	10	120	30
Males	11–14	45	99	157	62	45	1,000	10	10	45	50	1.3	1.5	17	1.7	150	2.0	1,200	1,200	270	12	15	150	40
	15–18	66	145	176	69	59	1,000	10	10	65	60	1.5	1.8	20	2.0	200	2.0	1,200	1,200	400	12	15	150	50
	19–24	72	160	177	70	58	1,000	10	10	70	60	1.5	1.7	19	2.0	200	2.0	1,200	1,200	350	10	15	150	70
	25–50	79	174	176	70	63	1,000	5	10	80	60	1.5	1.7	19	2.0	200	2.0	800	800	350	10	15	150	70
	51+	77	170	173	68	63	1,000	5	10	80	60	1.2	1.4	15	2.0	200	2.0	800	800	350	10	15	150	70
Females	11–14	46	101	157	62	46	800	10	8	45	50	1.1	1.3	15	1.4	150	2.0	1,200	1,200	280	15	12	150	45
	15–18	55	120	163	64	44	800	10	8	55	60	1.1	1.3	15	1.5	180	2.0	1,200	1,200	300	15	12	150	50
	19–24	58	128	164	65	46	800	10	8	60	60	1.1	1.3	15	1.6	180	2.0	1,200	1,200	280	15	12	150	55
	25–50	63	138	163	64	50	800	5	8	65	60	1.1	1.3	15	1.6	180	2.0	800	800	280	15	12	150	55
	51+	65	143	160	63	50	800	5	8	65	60	1.0	1.2	13	1.6	180	2.0	800	800	280	10	12	150	55
Pregnant						60	800	10	10	65	70	1.5	1.6	17	2.2	400	2.2	1,200	1,200	320	30	15	175	65
Lactating	1st 6 months					65	1,300	10	12	65	95	1.6	1.8	20	2.1	280	2.6	1,200	1,200	355	15	19	200	75
	2nd 6 months					62	1,200	10	11	65	90	1.6	1.7	20	2.1	260	2.6	1,200	1,200	340	15	16	200	75

[a] The allowances, expressed as average daily intakes over time, are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stresses. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined. See text for detailed discussion of allowances and of nutrients not tabulated.

[b] Weights and heights of Reference Adults are actual medians for the U.S. population of the designated age, as reported by NHANES II. The median weights and heights of those under 19 years of age were taken from Hamill et al. (1979) (see pages 16–17). The use of these figures does not imply that the height-to-weight ratios are ideal.

[c] Retinol equivalents. 1 retinol equivalent = 1 μg retinol or 6 μg β-carotene. See text for calculation of vitamin A activity of diets as retinol equivalents.

[d] As cholecalciferol. 10 μg cholecalciferol = 400 IU of vitamin D.

[e] α-Tocopherol equivalents. 1 mg d-α tocopherol = 1 α-TE. See text for variation in allowances and calculation of vitamin E activity of the diet as α-tocopherol equivalents.

[f] 1 NE (niacin equivalent) is equal to 1 mg of niacin or 60 mg of dietary tryptophan.

Appendix A-3

W.H.O. Recommended Dietary Intakes

Source:
World Health Organization (1974). Handbook on human nutritional requirements. WHO Monograph series No.61.

World Health Organization Recommended Intakes (Passmore et al)

Age	Body weight (kg)	Energy (kcal)	Energy (MJ)	Protein[a] (g)	Vitamin A[b] (μg)	Vitamin D[c] (μg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Folic acid (μg)	Vitamin B_{12} (μg)	Ascorbic acid (mg)	Calcium (g)	Iron[d] (mg)
Children														
<1	7.3	820	3.4	14	300	10.0	0.3	0.5	5.4	60	0.3	20	0.5–0.6	5–10
1–3	13.4	1360	5.7	16	250	10.0	0.5	0.8	9.0	100	0.9	20	0.4–0.5	5–10
4–6	20.2	1830	7.6	20	300	10.0	0.7	1.1	12.1	100	1.5	20	0.4–0.5	5–10
7–9	28.1	2190	9.2	25	400	2.5	0.9	1.3	14.5	100	1.5	20	0.4–0.5	5–10
														5–10
Male adolescents														
10–12	36.9	2600	10.9	30	575	2.5	1.0	1.6	17.2	100	2.0	20	0.6–0.7	5–10
13–15	51.3	2900	12.1	37	725	2.5	1.2	1.7	19.1	200	2.0	30	0.6–0.7	9–18
16–19	62.9	3070	12.8	38	750	2.5	1.2	1.8	20.3	200	2.0	30	0.5–0.6	5–9
Female adolescents														
10–12	38.0	2350	9.8	29	575	2.5	0.9	1.4	15.5	100	2.0	20	0.6–0.7	5–10
13–15	49.9	2490	10.4	31	725	2.5	1.0	1.5	16.4	200	2.0	30	0.6–0.7	12–24
16–19	54.4	2310	9.7	30	750	2.5	0.9	1.4	15.2	200	2.0	30	0.5–0.6	14–28
Adult man (moderately active)	65.0	3000	12.6	37	750	2.5	1.2	1.8	19.8	200	2.0	30	0.4–0.5	5–9
Adult woman (moderately active)	55.0	2200	9.2	29	750	2.5	0.9	1.3	14.5	200	2.0	30	0.4–0.5	14–28
Pregnancy (later half)		+350	+1.5	38	750	10.0	+0.1	+0.2	+2.3	400	3.0	50	1.0–1.2	e
Lactation (first 6 months)		+550	+2.3	46	1200	10.0	+0.2	+0.4	+3.7	300	2.5	50	1.0–1.2	e

a As egg or milk protein.
b As retinol.
c As cholecalciferol.
d On each line the lower value applies when over 25 per cent of calories in the diet come from animal foods, and the higher value when animal foods represent less than 10 per cent of calories.
e For women whose iron intake throughout life has been at the level recommended in this table, the daily intake of iron during pregnancy and lactation should be the same as that recommended for non-pregnant, non-lactating women of childbearing age. For women whose iron status is not satisfactory at the beginning of pregnancy, the requirement is increased; and in the extreme situation of women with no iron stores, the requirement can probably not be met without supplementation.

APPENDIX

B

PILOT SURVEY

Dear respondent:

This is a survey to investigate nutritional status of Technical and Vocational students in Riyadh. I hope that you will be able to co-operate with this work. Please accept my thanks for your help.

Yours sincerely

Abdullah M. Al-Sudairy

1) What is your age? [ ] Years.

2) What is your weight? [ ] kg.

3) What is your height? [ ] Cm.

4) What is your level of study? .....

5) Are you: single [ ]

married [ ]

6) Do you live: with your parents [ ]

with your wife [ ]

with your friends [ ]

in a hall of residence [ ]

on your own [ ]

other, please specify: .....

7) Would you say that you are:

overweight [ ]

about right [ ]

underweight [ ]

8) Do you take exercise? yes [ ]

no [ ]

If yes, how many times weekly? [ ]

9) Do you smoke cigarettes? yes [ ]

no [ ]

If yes, how many cigarettes daily? [ ]

10) Do you eat Breakfast: daily [ ]

sometimes [ ]

never [ ]

11) Do you eat breakfast: at home [ ]

at school [ ]

at another place [ ]

please specify .....

12) What did you eat for your last breakfast?

Food name	Amount	Unit

13) What did you eat for your last lunch?

Food name	Amount	Unit

14) What did you eat for your last dinner?

Food name	Amount	Unit

APPENDIX

C

MAIN SURVEY

1: COVERING LETTER

Dear respondent:

I am undertaking a survey to investigate the nutritional status of Technical and Vocational students in Riyadh. This survey form is a part of a research project being carried out for Ph.D degree at Liverpool Polytechnic. It is designed to meet the specific needs of the students in Saudis community from the nutritional point of view.

I hope that you will be able to co-operate with this important part of the research and complete the questionnaire as accurately as possible.

Please accept my apologies for troubling you and my thanks for your help.

Yours sincerely

Abdullah M. Al-Sudairy

APPENDIX

D

MAIN SURVEY

2: QUESTIONNAIRE

Office use.

1) What is your nationality? Saudi [ ] non-Saudi [ ]

2) What is your age (years)? [ ]
3) What is your weight (kg.)? [ ]
4) What is your height (Cm.)? [ ]

5) What is your level of study? .....

6) Are you: single [ ] married [ ]

7) Do you live: with your parents [ ] with your wife [ ] with your friends [ ] in a hall of residence [ ] on your own [ ] other, please specify: .....

7) Originally, are you from: a city [ ] a village [ ] other, please specify .....

8) What is your monthly income?
less than 500 SR [ ]
501-1000 [ ]
1001-1500 [ ]
1501-2000 [ ]
more than 2000 [ ]

9) What is your monthly spending?
less than 500 SR [ ]
501-1000 [ ]
1001-1500 [ ]
1501-2000 [ ]
more than 2000 [ ]

11) How much do you spend monthly on food?
less than 100 SR [ ]
101-200 [ ]
201-300 [ ]
301-400 [ ]
401-500 [ ]
more than 500 [ ]

Office use.

12) Are you on a special diet? yes [ ] no [ ]

If yes, why? .....

13) Would you say that you are:

overweight [ ]
about right [ ]
underweight [ ]

14) Do you take exercise? yes [ ] no [ ]

If yes, how many times weekly?

every day [ ]
5-6 times a week [ ]
3-4 times a week [ ]
1-2 times a week [ ]

15) Do you smoke cigarettes? yes [ ] no [ ]

If yes, how many cigarettes daily?

15-20 or more [ ]
10-14 [ ]
5-9 [ ]
1-4 [ ]

16) How many hours do you sleep daily? [ ]
17) How many days do you go to study weekly? [ ]
18) How many hours do you study daily? [ ]

19) Do you have any practical classes? yes [ ] no [ ]

If yes, how many hours daily? .....

20) How many meals do you eat daily? [ ]

21) Do you usually eat between meals? yes [ ] no [ ]

22) Do you usually miss any of your daily meals yes [ ] no [ ]

If yes, which meal do you miss usually?

breakfast [ ]
lunch [ ]
dinner [ ]

Office use.

23) Given a choice, what do you like to eat for your breakfast?
1) .....
2) .....
3) .....

24) Given a choice, what do you like to eat for your lunch?
1) .....
2) .....
3) .....

25) Given a choice, what do you like to eat for your dinner?
1) .....
2) .....
3) .....

26) What do you like to drink with your meals?
1) .....
2) .....
3) .....

27) Are there any foods or drinks you dislike?
yes [ ]
no [ ]

If yes, what are those?
1) .....
2) .....
3) .....

28) Have you been ill from any of this list of diseases?
Anaemia [ ]
Obesity [ ]
Diabetes [ ]
Cardiovascular [ ]

APPENDIX

E

MAIN SURVEY

3: USUAL WEEKLY INTAKE SHEETS

Please give the number of times per week and amount per day that you usually eat or drink the following items:

Note: To estimate your food use weight (gm) or use the appropriate unit of measurements such as: cups, teaspoons, tablespoons, and plates nombers and size.

No	Food name	Description	frequency week								daily amounts
			7	6	5	4	3	2	1	0	
01	Bread										
02	Butter										
03	Cheese										
04	Cream										
05	Olive										
06	Honey										
07	Jam										
08	Sesame sweet										
09	Eggs										
10	Broad beans										
11	Crushed beans										
12	Chickpeas										
13	Lentils										
14	Liver										
15	Kidney										
16	Yoghurt										
17	Macaroni										

No	Food name	Description	frequency week								daily amounts
			7	6	5	4	3	2	1	0	
18	Rice										
19	Crushed wheat										
20	Wheat wafers										
21	Lamb										
22	Beef										
23	Camel meat										
24	Chicken										
25	Fish										
26	Sambusa										
27	Soup										
28	Potatoes										
29	Green beans										
30	Okra										
31	Squash										
32	Tomato										
33	Cucumber										
34	Carrot										
35	Lettuce										
36	Orange										
37	Apple										
38	Banana										
39	Pears										
40	Grapes										
41	Dates										
42	Jelly										

No	Food name	Description	frequency week								daily amounts
			7	6	5	4	3	2	1	0	
43	Custard										
44	Milk										
45	Buttermilk										
46	Orange juice										
47	Lemon juice										
48	Gassy drinks										
49	Tea										
50	Coffee										

If you eat any things different, please list it here:

No	Food name	Description	frequency week								daily amounts
			7	6	5	4	3	2	1	0	
51											
52											
53											
54											
55											
56											
57											
58											
59											
60											
61											
62											
63											

No	Food name	Description	frequency week								daily amounts
			7	6	5	4	3	2	1	0	
64											
65											
66											
67											
68											
69											
70											
71											
72											
73											
74											
75											
76											
77											
78											
79											
80											

APPENDIX

F

MAIN SURVEY

4: ACTUAL DAILY INTAKE SHEETS

24 HOURS FOOD RECORD

* Keep this part with you, measure and write down everything you eat or drink within 24 hours starting from getting up next morning.
* Read the instructions before you begin and follow them carefully.

HOW TO FILL IN YOUR RECORD:
You need to fill in three columns:

Column 1: Food name:
* Write down the name of food or drink.
* For each food or drink use a new line.
* If the dish is a mixture of several foods, name the dish and all the separate ingredients you can see in it or know are there.
* For sandwiches, name each ingredient.

Column 2: Food description:
* Write down the type and the brand name.
* If the food was cooked, write down how it was cooked.
* Remember to record foods added to other foods (e.g: sugar in tea).

Column 3: Food amount:
* Measure and write down the amount you eat or drink.
* When possible, give the amount by (gm) for foods and (ml) for drinks.
* If you could not use (gm) and (ml), use the appropriate unit of measurements such as: cups, teaspoons, tablespoons, and plates number and size.
* Where cups, spoons and plates won't work, use dimension units (long, wide, and thick) by (Cm).

BREAKFAST

No	Name	Description	Amount
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			
11			
12			

SNACKS

No	Name	Description	Amount
01			
02			
03			
04			
05			
06			
07			
08			

LUNCH

No	Name	Description	Amount
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			
11			
12			

SNACKS

No	Name	Description	Amount
01			
02			
03			
04			
05			
06			
07			
08			

DINNER

No	Name	Description	Amount
01			
02			
03			
04			
05			
06			
07			
08			
09			
10			
11			
12			

SNACKS

No	Name	Description	Amount
01			
02			
03			
04			
05			
06			
07			
08			

APPENDIX

G

ARABIC SURVEY FORMS

بسم الله الرحمن الرحيـــــــم

أخي العزيـــــز:

السلام عليكم ورحمة الله وبركاته وبعـــــد:-

حيث أقـــوم بعمل بحـــث علمي عن تغذية الشـــــــباب بالمملكة العربيـــة السعودية .

فانني أرجـــــــو أن أجد لديك الاستعداد لمســـاعدتي لانجاز مهمتـــــي التي أرجـــو من الله أن يتحقق من نتائجها مصلحة لجميع شـــباب بلادنـــــا العزيزة .

وشـــــــكرا لتعاونكم معـــــــي .

أخيكـــــــــــــــم

عبدالله الســـــــديري

ملاحظات :-

أخي العزيز :-

١- عند اجابتك على هذا الاستفتاء فانني أرجو أن تتحرى الدقه باجاباتك قدر المستطاع .

٢- عند الاجابة على الاسئلة ضع علامة (x) داخل المربع الذى يمثل الاجابة الصحيحة أو املاء الفراغ

٣- اذا كان الفراغ المحدد للاجابة غير كافي استخدم الصفحة الخلفيه من الورقه الاخيرة

٤- عند تقدير الكميات المتناولة في الوجبات أرجو مراعاة مايلى :-

أ- الانواع الرئيسية (مثل الفول أو الارز أوالسلطة .....الخ) .

استخدام التقديرات التالية :- صحن صغير = ٥٠جراما تقريبا .

صحن متوسط= ١٠٠========== .

صحن كبير = ١٥٠========== .

ب- في الاشياء المعدودة (مثل البيض أو الفواكه .....الخ) .

(استخدم العدد)

ج- في السوائل : استخدم التقديرات التالية :-

اللبن والعصير...الخ اذكر عدد الكووس .

الشاى والقهوة ..الخ ======= الفناجيل.

البيبسي والمرطبات..الخ====== العلب .

٥- اذا كان لديك أى معلومات اضافيه تتعلق بغذائك أرجو كتابتها في الصفحة الاخيرة

٦- اذا كان لديك أى ملاحظات بخصوص طريقة هذا الاستفتاء أرجو كتابتها في الصفحة الاخيرة .

١- أ- كم عمـــرك ؟ ..... سنه

ب- كم وزنـــك ؟ .....كجم

ج- كم طولـــك ؟ .....متر

٢- في أى مســـتوى دراســـي تدرس حاليـــا ؟.....

٣- هل تسكـــــن:- ☐ مع والديـــــك

☐ مع اسرتك(ان كنت متزوجا)

☐ في سكن المعهد أو الكليـــة

☐ غير ذلك اذكرها:.....

٤- هل تتناول طعام الافطـــار:- ☐ يوميـــا .

☐ أحيـــانا .

☐ لاأفطـــر .

٥- هل تتناول وجبة الافطـــار:- ☐ في المنـــزل.

☐ في المعهد أو الكلية.

☐ في مكان آخر،اذكره:.....

٦- ماذا تناولت في آخر وجبة أفطار أكلتها ؟.

النـــــــــــــوع	الكمية أو الـــوزن

٧- أ- هل تتناول شيئا بين وجبتي الافطار والغـــداء؟

☐ دائمـــا ☐ أحيانا ☐ لا .

ب- اذكر النوع والكمية ان وجـــــد:-

.....

.....

.....

٨ـ ماذا تناولت في آخر وجبة غـــداء أكلتهـــا ؟.

النـــــــــــــــــوع	الـكمية أو الوزن

٩ـ أ ـ هل تتناول شيئا بين وجبتي الغداء والعشاء؟.

☐ دائما ☐ أحيانا ☐ لا .

ب ـ اذكر النوع والكمية ان وجـــــــــد :

.....

.....

.....

١٠ـ ماذا تناولت في آخر وجبـــة عشـــــاء أكلتها:

النـــــــــــــــــوع	الكمية أو الـوزن

١١ـ أ ـ هل تتناول شيئا بعد وجبة العشـــــــاء ؟.

☐ دائما ☐ أحيانا ☐ لا .

ب ـ أذكر النوع والكمية ان وجـــــــــد ؟.

.....

.....

.....

١٢- أ- هل تدخن ؟ ☐ نعـــم ☐ لا

ب- كم سيجارة يوميا ان وجد:.....سيجارة / يوميـــــــــــــــــــا

١٣- أ- هل تمارس أى نوع من الرياضة ؟. نعـــم لا .

ب- مانوع تلك الرياضـــة وكم مرة تمارسها بالاســـبوع :.....

.....

١٤- هل تعتقد أن وزنك :- ☐ أقل من اللازم .

☐ أكثرمن اللازم .

☐ معتـــــــدل .

١٥- اذا كان لديك أى اضافات أو معلومات أخرى أرجو ذكرهـــــا :-

أ- بخصوص غذائك:.....

.....

.....

.....

.....

ب- بخصوص هذا الاستفتاء:.....

.....

.....

.....

.....

(شـــــــكرا جزيـــلا لتكرمك بالاجابـــة على هذا الاستفاء) .

بسم الله الرحمن الرحيم

المملكة العربية السعودية
المؤسسة العامة للتعليم الفني والتدريب المهني
الإدارة العامة

الرقم _____
التاريخ _____
المشفوعات _____

.....

اخي العزيز :

السلام عليكم ورحمة الله وبركاته ، وبعد :

تقوم ادارة الاسكان والاعاشه بالمؤسسه بدراسة الحاله الغذائيه لطلاب التعليم الفني والتدريب المهني وذالك رغبة في معرفة افضل السبل لتطوير الحاله الغذائيه للطلاب .

نجاح هذه الدراسه يتوقف على مدى تعاونك معنا بتعبئة الاستماره المرفقه و تحري الدقه عند اعطاء المعلومات المطلوبه ، تذكر ان نجاح هذه الدراسه سوف يعود عليك بالمنفعه ان شاء الله .

شاكرين تعاونك معنا وتقبل تحياتي .

اخيك

رئيس قسم الاعاشه بالمؤسسه

عبدالله بن محمد السديري

لا تكتب هنا

١) الجنسيه :
() سعودي. 1
() غير سعودي. 2

٢) العمر : ..... سنه . 2) .....

٣) الوزن : ..... كجم . 3) .....

٤) الطول : ..... سم . 4) .....

٥) المستوى الدراسي: الكليه او المعهد: ..... 5) .....
التخصص: .....
السنه : .....

٦) الحاله الاجتماعيه :
() متزوج. 1
() اعزب. 2

٧) السكن :
() مع زوجتك. 1
() مع والديك او احدهما . 2
() في سكن المؤسسه . 3
() مع بعض الاصدقاء . 4
() لوحدك. 5
() غير ذالك،اذكره : ..... 6 ...

٨) في الاصل،هل انت من :
() مدينه . 1
() قريه . 2
() غير ذالك،اذكره : ..... 3 ...

٩) كم يبلغ دخلك الشهري؟
() اقل من ٥٠٠ ريال. 1
() من ٥٠١ الى ١٠٠٠ ريال. 2
() من ١٠٠١ الى ١٥٠٠ ريال. 3
() من ١٥٠١ الى ٢٠٠٠ ريال. 4
() اكثر من ٢٠٠٠ ريال. 5

١٠) كم يبلغ مصروفك الشهري؟
() اقل من ٥٠٠ ريال. 1
() من ٥٠١ الى ١٠٠٠ ريال. 2
() من ١٠٠١ الى ١٥٠٠ ريال. 3
() من ١٥٠١ الى ٢٠٠٠ ريال. 4
() اكثر من ٢٠٠٠ ريال. 5

١١) كم تصرف شهريا لشراء الاطعمه؟
() اقل من ١٠٠ ريال. 1
() من ١٠١ الى ٢٠٠ ريال. 2
() من ٢٠١ الى ٣٠٠ ريال. 3
() من ٣٠١ الى ٤٠٠ ريال. 4
() من ٤٠١ الى ٥٠٠ ريال. 5
() اكثر من ٥٠٠ ريال. 6

لا تكتب هـ

١٢) ا- هل تتبع نظام غذائي معين؟ () نعم.
() لا.
ب - اذا كانت اجابتك "نعم"، ماهو السبب؟
() طبي.
() رياضي.
() لزيادة الوزن.
() لنقص الوزن.
() لسبب اخر،اذكره:.....

١٣) هل تعتقد ان وزنك: () اكثر من اللازم.
() مناسب.
() اقل من اللازم.

١٤) ا- هل تمارس الرياضه؟ () نعم.
() لا.
ب - اذا كانت اجابتك "نعم"، كم مره في الاسبوع؟
() كل يوم.
() ٥-٦ ايام في الاسبوع.
() ٣-٤ ايام في الاسبوع.
() ١-٢ ايام في الاسبوع.

١٥) ا- هل تدخن؟ () نعم.
() لا.
ب -اذا كانت اجابتك "نعم"، كم سيجاره في اليوم؟
() ١٥-٢٠ سجاثراو اكثر.
() ١٠-١٥ سجاثر.
() ٥-١٠ سجاثر.
() ١-٥ سجاثر.

١٦) كم ساعه تنام يوميا؟ ..... ساعه.

١٧) كم يوم تاتي للدراسه ،اسبوعيا؟ ..... يوم.

١٨) كم ساعه تقضيهافي الدراسه ،يوميا؟ ..... ساعه.

١٩) ا- هل تتطلب دراستك اداء بعض الدروس العمليه؟
() نعم.
() لا.
ب - اذا كانت اجابتك "نعم"، كم ساعه يوميا؟ .....ساعه

٢٠) كم وجبه غذائيه تتناول في اليوم؟..... وجبه.

٢١) هل تتناول اي ماكولات خفيفه بين الوجبات الرئيسيه؟
() نعم.
() لا.

A- 1 2
B- 1 2 3 4 5-...
1 2 3
A- 1 2
B- 1 2 3 4
A- 1 2
B- 1 2 3 4
...
...
...
A- 1 2
B-...
...
1 2

لا تكتب هنا

٢٢) أ- عادة ،هل تترك احدى الوجبات الرئيسيه دون ان تتناولها ؟ A- 2)
() نعم . 1
() لا. 2

ب - اذا كانت اجابتك "نعم"، اي وجبه عادة ،وماهوالسبب؟ B-
() الافطار . السبب:..... 1-...
() الغداء . السبب:..... 2-...
() العشاء . السبب:..... 3-...

٢٣) ماذا تفضل ان تاكل في وجبه الافطار؟ ١-..... 1)
٢-..... ...
٣-..... ...

٢٤) ماذا تفضل ان تاكل في وجبه الغداء؟ ١-..... 1)
٢-..... ...
٣-..... ...

٢٥) ماذا تفضل ان تاكل في وجبه العشاء؟ ١-..... 5)
٢-..... ...
٣-..... ...

٢٦) ماذا تفضل ان تشرب مع او بعد الاكل؟ ١-..... 5)
٢-..... ...
٣-..... ...

٢٧) ماهي الماكولات او المشروبات التي لاتحبها؟ 7)
١-..... ...
٢-..... ...
٣-..... ...

٢٨) هل سبق ان اصبت باحد الامراض التاليه: 9)
١- السمنه . () نعم . () لا. 1- Y N
٢- فقرالدم (الانيميا). () نعم . () لا. 2- Y N
٣- السكري. () نعم . () لا. 3- Y N
٤- امراض القلب والشرايين. () نعم . () لا. 4- Y N

٢٩) أ) كم مره في الاسبوع تتناول كلا من الاغذيه الموجوده في القائمه المرفقه ، وماهي الكميه اليوميه المتناوله من كلا منها:
ملاحظه: لتقدير الكميه اليوميه استخدم الوزن التقديري (جم) او استخدم الوحدات المناسبه مثل: فنجال ، كاس ، ملعقه صغيره ،ملعقه كبيره ، صحن صغير ، صحن كبير .....الخ.(الجدول في الصفحه التاليه)

الرقم	الاسم	النوع	التكرار الاسبوعي ٧	٦	٥	٤	٣	٢	١	٠	الكميه اليوميه جم : وحده
١	خبز	.....	.	.	.	.	.	.	.	.	.....
٢	زبدة	.....	.	.	.	.	.	.	.	.	.....
٣	جبنة	.....	.	.	.	.	.	.	.	.	.....
٤	فشطة	.....	.	.	.	.	.	.	.	.	.....
٥	زيتون	.....	.	.	.	.	.	.	.	.	.....
٦	عسل	.....	.	.	.	.	.	.	.	.	.....
٧	مربى	.....	.	.	.	.	.	.	.	.	.....
٨	حلاوه طحينيه	.....	.	.	.	.	.	.	.	.	.....
٩	بيض	.....	.	.	.	.	.	.	.	.	.....
١٠	فول	.....	.	.	.	.	.	.	.	.	.....
١١	فلافل	.....	.	.	.	.	.	.	.	.	.....
١٢	حمص	.....	.	.	.	.	.	.	.	.	.....
١٣	عدس	.....	.	.	.	.	.	.	.	.	.....
١٤	كبده	.....	.	.	.	.	.	.	.	.	.....
١٥	كلاوي	.....	.	.	.	.	.	.	.	.	.....
١٦	روب	.....	.	.	.	.	.	.	.	.	.....
١٧	مكرونه	.....	.	.	.	.	.	.	.	.	.....
١٨	ارز	.....	.	.	.	.	.	.	.	.	.....
١٩	هريش	.....	.	.	.	.	.	.	.	.	.....
٢٠	قرصان	.....	.	.	.	.	.	.	.	.	.....
٢١	لحم غنم	.....	.	.	.	.	.	.	.	.	.....
٢٢	لحم بقر	.....	.	.	.	.	.	.	.	.	.....
٢٣	لحم جمل	.....	.	.	.	.	.	.	.	.	.....
٢٤	دجاج	.....	.	.	.	.	.	.	.	.	.....
٢٥	سمك	.....	.	.	.	.	.	.	.	.	.....
٢٦	سمبوسه	.....	.	.	.	.	.	.	.	.	.....
٢٧	شوربه	.....	.	.	.	.	.	.	.	.	.....
٢٨	بطاطس	.....	.	.	.	.	.	.	.	.	.....
٢٩	فاصوليا	.....	.	.	.	.	.	.	.	.	.....
٣٠	باميا	.....	.	.	.	.	.	.	.	.	.....
٣١	كوسه	.....	.	.	.	.	.	.	.	.	.....
٣٢	طماطم	.....	.	.	.	.	.	.	.	.	.....
٣٣	خيار	.....	.	.	.	.	.	.	.	.	.....
٣٤	خس	.....	.	.	.	.	.	.	.	.	.....
٣٥	جزر	.....	.	.	.	.	.	.	.	.	.....
٣٦	برتقال	.....	.	.	.	.	.	.	.	.	.....
٣٧	تفاح	.....	.	.	.	.	.	.	.	.	.....
٣٨	موز	.....	.	.	.	.	.	.	.	.	.....
٣٩	كمثرى	.....	.	.	.	.	.	.	.	.	.....
٤٠	عنب	.....	.	.	.	.	.	.	.	.	.....
٤١	تمر	.....	.	.	.	.	.	.	.	.	.....
٤٢	جيلي	.....	.	.	.	.	.	.	.	.	.....
٤٣	كريمه	.....	.	.	.	.	.	.	.	.	.....
٤٤	حليب	.....	.	.	.	.	.	.	.	.	.....
٤٥	لبن	.....	.	.	.	.	.	.	.	.	.....
٤٦	عصير برتقال	.....	.	.	.	.	.	.	.	.	.....
٤٧	عصير ليمون	.....	.	.	.	.	.	.	.	.	.....
٤٨	بيبسي	.....	.	.	.	.	.	.	.	.	.....
٤٩	شاهي	.....	.	.	.	.	.	.	.	.	.....
٥٠	قهوه	.....	.	.	.	.	.	.	.	.	.....

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ب) اذا كانت هنالك اي اطعمه اخرى غير التي سبق ذكرها ، ارجو توضيحها في الجدول التالي:

الرقم	الاسم	النوع	التكرار الاسبوعي								الكميه اليوميه		لا تكتب هنا	
			٧	٦	٥	٤	٣	٢	١	٠	جم	وحده	WF	DA
٥١	.....	.....	.	.	.	.	.	.	.	.	....	.....	....	.....
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٣) سجل الغذاء لفتره ٢٤ ساعه :

* قم بتقدير كل ما تتناوله من طعام او شراب خلال مده ٢٤ ساعه ابتداء من استيقاظك في الصباح وسجل ذالك في الجدول المرفق.

كيفيه تعباءة الجدول:

مطلوب منك تعباءة ثلاثه اعمده :

العمود الاول: الاسم

* قم بكتابه اسم الطعام او الشراب الذي تناولته .
* لكل نوع من انواع الطعام او الشراب استخدم سطرا جديدا .
* اذا كان طبق الطعام يتكون من عده انواع مخلوطه مع بعضها (مثل الكبسه) ،اذكر اسم الطبق الرئيسي واسماء جميع الانواع الداخله في تركيبه .
* في حاله السندوتش ، اذكر جميع المحتويات الموجوده داخله .

العمود الثاني: النوع (او الوصف)

* قم بكتابه النوع (مثال:- الخبز : ابيض ،اسمر ،صامولي...الخ)
* اذا كان الطعام مطبوخا ، اذكر طريقة الطبخ او الاعداد (مثال:مسلوق ، مقلي، مشوي....الخ) .
* تذكر ان تسجل الاشياء المضافه الى الاطعمه او المشروبات (مثال:السكر ، الملح، البهارات...الخ).

العمود الثالث: الكميه

* قم بتقدير وتسجيل كميه كل ما تتناوله من طعام او شراب.
* سجل الكميه بالجرام (جم) للماكولات او بالمليلتر (مل) للمشروبات كلما امكن ذالك.
* اذا لم تتمكن من اعطاء الكميه ب (جم) او (مل)، استخدم الوحدات المناسبه للقياس مثل: فنجال ، كاس ، ملعقه صغيره ، ملعقه كبيره ، صحن صغير ، صحن كبير ....الخ.
* في الحالات التي لاتنطبق فيها الوحدات السابقه ، استخدم الابعاد (الطول ، العرض ، الارتفاع) ب (سم). (الجدول في الصفحه التاليه).

الوجبه	الاسم	النوع (الوصف)	الكميه
الافطار			
بين الافطار والغدا			
الغداء			
بين الغداء والعشا			
العشاء			
بعد العشاء			

لا تكتب هنا	
No	Amount