



**FOOD CONSUMPTION PATTERNS  
AND  
DIETARY HABITS  
IN  
THE ARAB COUNTRIES OF THE GULF**





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## FOREWORD

Foods constitute an essential aspect of people's cultural heritage, historical background and environmental conditions. During the last three decades, numerous internal and external influences have affected the structure of the society, disrupted old traditions and created new opportunities as well as new life-styles of the population of the Arab countries of the Gulf.

The high rate of urbanization, the labour migration from various countries in the world, and the increase of income have affected the socio-economic situation in the Gulf and resulted in a drastic change in the food habits of the population of this area. Traditional food which consisted of date, rice, milk and fish have changed to more western foods. This led to a shift in the nutritional status of this area, and resulted in a prevalence of undernutrition and the up surge of nutrition related non-communicable diseases which became wide-spread as a major public health problem.

Data on food consumption surveys are useful on determining change in food habits and trends in consumption of various foods in the different geographic locations and between socio-economic groups. Food consumption and dietary habits information are essential for the promotion of nutrition improvement programmes. They are also an important item in policies related to food subsidies, nutrition intervention programmes and nutrition education to prevent and control of nutritional problems.

It is particularly timely to disseminate the knowledge accumulated, concerning food consumption and food habits of the people in the Arab countries of the Gulf. It is also necessary to provide a bibliographic guide for the application of present knowledge, for avoiding duplication of efforts and for identifying needed additional information and fruitful areas for research. The FAO Regional Office takes pleasure in placing on record its grateful acknowledgement to the five nutritionists from the five Arab countries of the Gulf which are covered in this publication.

The FAO Regional Office for the Near East is very pleased to put this publication at the disposal of its member countries.

with the hope it would benefit to all those who are working in this field. This publication is the fruit of a cooperative effort to collaborate with the United Arab Emirates University Al Ain, United Arab Emirates which prepared it and printed it.

A.Y. Bukhari  
ADG/Regional Representative  
for the Near East

## PREFACE

Changes in food consumption patterns during the past two decades in the Arabian Gulf countries have had a great impact on the nutritional status of their communities. These changes, together with the adaptation of sedentary lifestyle by many people in this region account for the increase in nutrition related chronic diseases. These diseases have become major public health problems and represent more than half of the mortality in the Arabian Gulf countries.

Understanding the food consumption patterns of the community is basic information that is needed to formulate a food and nutrition policy in any country. Such information is also essential for school and university programmes for introducing relevant nutrition material into their curricula. Data on food consumption and factors affecting food habits in the Arabian Gulf countries are few and limited in their scopes. The Faculty of Agricultural Sciences at the United Arab Emirates University in cooperation with the Food and Agricultural Organization, Near East Office in Cairo have initiated this project to produce a publication which includes useful information on food habits of the Arabian Gulf people.

The present document contains seven papers written by nutritionists in the region. Most of these papers are based on field surveys which provide valuable nutritional information on various Gulf countries. It is hoped that this publication will be useful for nutritionists and health specialists interested in food habits in this region.

Prof. N. Dagher  
Dean, Faculty of Agricultural Sciences



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# SOCIO-ECONOMIC FACTORS AFFECTING PER CAPITA FOOD CONSUMPTION IN BAHRAIN

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## INTRODUCTION

Food consumption surveys provide useful information on determining change in food habits and trends in the consumption of various foods. They are used in agriculture, food and nutrition planning and programming. They can also be used to determine the impact of food subsidy programmes on food consumption patterns and nutritional status of the population (FAO, 1986).

Studies on food consumption patterns in Bahrain are limited in their scope and objectives. Most of these studies concentrated on food habits of certain groups such as pregnant and lactating mothers (Musaiger, 1982a), infant feeding habits (Musaiger, 1983) and meal patterns of mothers (Musaiger, 1981). Some studies focused on dietary habits of college students (Al-Dallal and Al-Shehabi, 1982), and school children (Ministry of Education, 1982). None of these studies have investigated the per capita food intake and the socio-economic factors determining this intake.

It is well documented that social and economic factors have a potent effect on nutritional status of children and other family members. A recent study by Musaiger (1993) showed that food consumption patterns in the Arab world are influenced by several socio-economic factors.

The objective of this report is to provide data on socio-economic factors associated with per capita food consumption in Bahrain based on the Household Expenditure and Income

Survey. Such information is valuable for nutritionists and planners in order to formulate an effective nutrition intervention programme.

## METHOD

Data for this report were abstracted from the National Household Expenditure and Income Survey carried out during 1983-1984 in Bahrain. Detailed information on the methodology have been provided elsewhere (CSO, 1985). In short, a multistage stratified sampling technique was used to select the households. Information on the number of households in Bahrain was obtained from the population census, 1981 (CSO, 1982). The sampling procedure has performed according to the proportional distribution of households by nationality and educational level of head of households in each geographical area; Bahrain is divided into 11 geographical areas for the purposes of population census. The total number of households included in the survey was 1632, of which 1103 were Bahraini and 529 were non-Bahraini households.

The food records method was used to register foods and drinks purchase or brought into the household from other sources. All raw foods or drinks available for consumption were weighed in kilograms or counted in number during a seven day period. The collection of data was carried out four times a year for each household. The four intervals were; March-June, 1983; June-September, 1983; September-December, 1983; and December-March, 1984. Well trained interviewers first explained to the heads of the households the purpose of the survey and steps for completing the specially designed forms. This procedure was supported by a pre-survey campaign in all mass media to prepare the public for the survey and ask for their cooperation. Frequent visits were then carried out during the week of collecting the data to follow the recoding of the foods and other items in the forms. In the case of illiterate household members, the interviewers visited the household daily for filling in the forms asking the head of household for the information.

Seven socio-economic factors were included in this survey; nationality, urban/rural differences, household size, type of house, age, income and occupation of head of household. It is important to mention that foods included in this report are only

those which can be weighed or counted accurately. Some other foods were excluded because they were recorded by number of cans or pieces without giving the size or weight of the cans or pieces. Therefore the data presented in this report showed the association of socio-economic factors with per capita consumption of certain foods, but cannot provide sufficient information to evaluate nutrient intake.

## RESULTS AND DISCUSSION

### Nationality

Daily per capita food consumption was calculated by nationality (Table 1). Bahrainis were more likely to consume rice, bread, fish, fruits and sugar, whereas the non-Bahraini consumed more whole milk, eggs, fat, vegetables, legumes, and nuts. The high intake of rice and bread indicates that these foods are the staples in the Bahraini diet. Rice is the main food consumed at lunch, while bread is usually eaten at breakfast and supper. It is difficult to conclude the food consumption patterns of non-Bahraini because they are a heterogeneous population. They consist of the mixture from Indian-Subcontinent, Far East, Middle East and Western population. Each category of these nationalities has their own food habits. For example, rice is an essential food for Indian-Subcontinent and Far Eastern people, but it has low preference among Middle Eastern and Western people, as they prefer bread.

The daily per capita fish consumption in Bahrain has risen from 39.2 grams in 1979 to 70.2 grams in 1986 (FSS, 1987). The 1986 figure is less than that reported by this survey, as the daily per capita consumption was 93.9 grams, and the consumption was higher among Bahrainis (98.1 grams) than non-Bahrainis (75.3 grams). Possibly the difference in per capita fish consumption between this survey and that of the Fisheries Statistical Services (FSS) is due to the fact that fishing is a hobby of many Bahraini families, and consequently these families consumed fish caught by their members.

Sugar consumption was high among both Bahrainis and non-Bahrainis. Sugar is usually used to sweeten tea, coffee and milk, as well as in preparation of traditional sweets. It is commonly believed that the frequent intake of sweets and refined

**Table 1**

Daily per capita food consumption by nationality of household's head (gram/day).

Food	Bahraini	Non-Bahraini
Rice	367.1	211.8
Bread	144.3	106.0
Meat, red	127.1	146.3
Poultry	72.9	72.6
Fish, fresh	98.1	75.3
Whole milk, liquid	58.6	97.0
Eggs <sup>a</sup>	38.6	46.6
Oil and fats	74.0	103.6
Fruits, fresh	446.4	310.1
Vegetables, fresh	280.5	341.1
Legumes	18.9	20.8
Nuts	8.5	12.6
Sugar	176.7	114.5

<sup>a</sup> Calculated as the average weight of egg is 50 grams.

sugar in addition to inadequate oral hygienic practices, plays an important role in the high occurrence of dental caries, particularly among children and teenagers. A study on oral health of Bahraini school children has shown that the prevalence of dental caries increased by 26% during 1980-1986 (Westwaster, 1986).

### **Urban/Rural Differences**

Food consumption patterns have been compared between urban and rural households for Bahrainis only, because the great majority of non-Bahrainis were living in urban areas. Since the data in the Household Expenditure and Income Survey were analyzed for each geographical area rather than grouping them in urban and rural categories, it was decided to select one urban area (Manama City, the capital) and another rural area (Sitra area) for the sake of comparison in food consumption between urban and rural areas (Table 2).

With the exception of fish and possibly poultry, high protein foods such as meat, and milk, in addition to vegetables were more consumed by the urban community. However, the rural population were more likely to consume rice, bread, fish, oil and fat, fruits, legumes and sugar. These findings agreed with those reported by Musaiger (1981) who showed that urban mothers eat more meat and cheese, but the intake of rice was higher among rural mothers.

The reasons behind the differences in food intakes between urban and rural households in Bahrain is largely due to the low income and educational levels of the rural population, with the result that they purchase less expensive foods.

### **Educational Level of Head of Household**

The educational level of parents has a potent influence on food consumption patterns of family members. Educated mothers provided a better diet for their families than those who were less educated. Data in Table 3 revealed that the consumption of rice, bread and sugar decreased with the increase of educational level of head of households. The annual per capita consumption of rice, for example, dropped from 149.3 kilograms in families with

Table 2

Annual per capita food consumption according to geographical location (Bahraini only) (Kg/yr).

Food	Geographical location		
	Urban (Manama city) (N=274)	Rural (Sitara area) (N=71)	% Diff- erence
Rice	114.5	217.3	+ 89.8
Bread	53.3	57.4	+ 7.7
Meat, red	52.0	38.3	- 26.3
Poultry	28.6	25.7	- 10.1
Fish, fresh	36.5	36.5	- 5.2
Whole milk, liquid	30.8	9.1	- 70.5
Eggs	296.0	280.0	- 5.4
Oil and fats	30.2	33.7	+ 11.6
Fruits, fresh	175.8	178.0	+ 1.3
Vegetables, fresh	244.4	203.7	- 16.7
Legumes	33.2	56.5	+ 70.2
Nuts	19.3	6.6	+ 65.8
Sugar	60.2	85.2	+ 41.5

Table 3

Annual per capita food consumption according to educational level of household's head (Bahrain only) (Kg/yr).

Food	Educational Level						
	Illite- rate	Read & write	Prim- ary	Inter- mediate	Secun- dary	Dip- loma	B.Sc. above
Rice	149.3	137.2	116.3	109.5	104.7	119.7	88.1
Bread	53.7	54.1	52.0	52.0	48.7	45.2	49.4
Meat, red	38.4	47.0	50.8	50.2	63.7	59.7	73.0
Poultry	22.3	27.8	28.4	33.3	33.3	34.2	37.9
Fish, fresh	34.1	35.4	36.9	38.1	38.2	46.1	35.3
Whole milk, liquid	18.0	20.1	23.1	26.1	24.8	39.2	38.8
Eggs*	236.0	295.1	308.0	349.0	349.2	353.0	366.1
Oil & fats	32.0	33.3	33.0	35.0	34.7	39.0	46.0
Fruits, fresh	242.8	160.0	164.5	170.1	184.7	191.9	242.8
Vegetables, fresh	93.1	99.0	111.7	115.1	118.0	124.2	145.6
Legumes	5.6	7.4	8.6	8.4	7.8	8.5	10.4
Nuts	2.5	3.2	3.9	4.0	4.6	3.8	4.6
Sugar	72.8	59.2	62.8	59.1	56.5	51.3	30.9

\* Eggs in number.

illiterate householders to 88.1 kilograms for those with Bachelor degree or above, a decline of 41%. On the other hands the consumption of high protein foods such as meat, poultry, milk and eggs as well as fruits and vegetables increased with educational level. The exception was the fruit intake among illiterate people, where it is equal to the higher degree householders (B.Sc. and above). There is no explanation for this finding, it may be due to a high intake of dates among the illiterate group.

The annual per capita consumption of meat in families with highly educated heads was almost double than that with an illiterate ones (73 and 38.4 kilograms, respectively). Fish was an exception as the per capita intake was very similar among most of educational levels. This confirms our previous conclusion that many families do fishing and can provide fish with little or no cost.

### **Age of Head of Household**

Age of head of household has a variable affect on food consumption patterns. When the head of household get older the annual per capita consumption of rice increased (113.4 for less than 25 years compared to 177.3 for those of 65 years and above). The per capita consumption of poultry, fish and vegetables slightly decreased with age, but in general there have no systematic trends in per capita food intake with various age groups of head of households (Table 4). The differences in food consumption due to age of householders may be attributed to other confounding factors such as education and family size. Older parents in Bahrain usually have lower educational levels and belong to a larger family than younger parents (CSO, 1982).

### **Type of House**

The type of house can give a good indication on the socio-economic status of the households. People who were living in villas have a higher annual per capita intake of poultry (44 kg), eggs (386 pieces), fruits (204.k kg) and meat (73.5 kg). Those who were living in traditional Bahraini houses consumed more carbohydrate foods such as rice (148.8 kg), bread (54.9 kg) and sugar (68.6 kg) (Table 5). This may reflect the income level as people living in villas have the highest income, followed by those

Table 4

Annual per capita food consumption according to age of household's head (Bahraini only) (Kg/yr).

Food	Age (years)					
	<25	25-	35-	45-	55-	65+
Rice	113.4	118.6	124.8	133.4	152.3	177.3
Bread	54.1	49.5	51.3	56.5	51.0	55.0
Meat, red	39.0	54.9	45.1	44.9	45.7	38.3
Poultry	30.0	29.0	26.1	26.1	26.0	24.7
Fish, fresh	39.6	39.7	35.7	33.8	34.7	33.9
Whole milk, liquid	18.9	23.1	22.2	20.3	20.1	22.6
Eggs*	297.9	314.8	287.2	267.4	259.1	277.6
Oil & fats	34.7	34.7	35.0	31.7	33.3	32.3
Fruits, fresh	151.7	161.5	170.7	157.2	154.4	153.9
Vegetables, fresh	106.5	114.9	100.7	100.4	96.6	95.7
Legumes	8.8	7.7	7.1	6.4	6.7	5.9
Nuts	3.2	3.9	3.2	3.0	2.9	2.3
Sugar	56.9	56.5	69.3	64.2	71.6	55.7

\* Eggs in number.

**Table 5**  
Annual per capita food consumption according to type of house (Bahrain only) (kg/yr).

Food	Type of House			
	Villa	Flat	Traditional Arab	Conventional
Rice	106.4	107.8	148.8	120.4
Bread	49.7	48.9	54.9	50.7
Meat, red	73.5	67.5	39.2	49.1
Poultry	44.0	37.3	22.2	28.9
Fish, fresh	38.4	38.9	34.7	36.4
Whole milk, liquid	31.6	38.8	19.6	19.8
Eggs*	385.6	368.5	243.0	310.0
Oil & fats	33.0	44.3	32.3	33.3
Fruits, fresh	208.4	197.9	154.4	156.4
Vegetables, fresh	130.9	131.1	97.9	100.3
Legumes	7.7	8.9	6.5	7.1
Nuts	5.1	4.5	2.7	3.4
Sugar	56.4	68.9	68.6	59.5
Others				
				134.0
				37.0
				37.7
				7.1
				21.3
				18.3
				155.7
				24.7
				108.7
				91.3
				8.0
				3.7
				49.8

\* Eggs in number.

living in flats, traditional and finally conventional houses (CSO, 1985).

### **Household Size**

The fact that large household size more often includes young children means that they use more food and spend more on food than small households, but the amount of food for each member is less (Wilson 1971; Riely, 1973). Data shown in Table 6 confirmed that the per capita annual consumption of food decreased sharply as the household size increased. For example, the annual per capita consumption of meat was 33.8 kg in households with more than 11 members compared to 76.1 in households with 2-3 members. This trend can be observed in all food items.

Some families in Bahrain, particularly in the rural sector, separate the diet into two divisions, one of the best quality and quantity presented to the men, the other to the women and young children. This division decreases the chances of mothers and children getting their recommended allowances especially in large households (Musaiger, 1982 b). Alawia and Janjihiy (1980) found that in rural areas in Bahrain, 76.8% of the households ate together, and 23.2% segregated the sexes. About 68.7% divided the food equally between males and females, while the rest (31.3%) gave the males more food. Therefore, age and sex characteristics of families should be taken into consideration in any nutrition intervention programme.

### **Occupation of Head of Household**

Occupation is one of the indicators used to measure economic status of the family. The highest per capita intake of animal foods (meat, poultry, fish and eggs) and fruits was among families with the head working in administrative and managerial occupations, while the lowest was among families with head working in agricultural occupation (Table 7). This may reflect the income as well as educational levels. People working in administrative and managerial works have better income than others.

Table 6  
Annual per capita food consumption according to household size (Bahraini only) (Kg/yr).

Food	Household Size						
	1	2-3	4-5	6-7	8-9	10-11	12+
Rice	250.2	211.9	154.6	115.1	117.2	134.3	135.3
Bread	110.6	64.5	56.0	51.9	53.5	51.2	49.2
Meat, red	128.0	76.1	67.0	53.5	42.5	39.9	33.8
Poultry	86.5	45.6	33.7	31.1	26.2	24.2	18.9
Fish, fresh	90.0	62.1	44.1	37.9	33.1	33.4	29.5
Whole milk, liquid	36.8	44.6	29.4	23.4	19.4	16.4	17.4
Eggs*	875.0	474.4	391.3	307.4	276.0	253.3	199.4
Oil & fats	71.7	60.0	43.3	34.3	32.0	30.3	26.7
Fruits, fresh	360.9	251.2	199.7	173.5	148.3	151.6	133.5
Vegetables, fresh	255.6	169.3	127.5	114.0	100.2	91.7	79.9
Legumes	7.3	12.4	8.3	6.5	7.6	5.7	5.7
Nuts	10.0	5.7	4.1	3.5	3.2	2.7	2.3
Sugar	164.1	120.7	70.1	65.5	59.3	61.3	57.7

\* Eggs in number

Table 7

Annual per capita food consumption according to occupations of household's head (Bahraini only) (kg/yr).

	Professional & Technical workers	Admin. & Managerial workers	Clerical & related workers	Sales workers	Service workers	Agricul- tural workers	Production & related workers
Rice	122.0	91.2	110.5	133.5	135.7	203.3	128.2
Bread	52.9	46.1	48.7	53.1	52.0	56.0	53.3
Meat, red	53.3	76.1	53.6	58.2	39.8	33.7	42.4
Poultry	29.2	37.9	29.6	30.9	24.3	13.2	25.0
Fish, fresh	37.8	43.4	38.6	34.8	35.4	36.8	36.4
Whole milk, liquid	21.9	32.2	22.5	34.7	14.9	23.7	16.5
Eggs*	309.6	363.3	328.1	322.7	274.1	169.9	266.1
Oil and fats	33.0	37.7	35.3	39.7	31.7	30.3	31.7
Fruits, fresh	174.6	211.4	165.0	192.1	146.3	141.6	151.2
Vegetables, fresh	110.8	106.6	88.0	101.6	75.1	91.9	95.7
Legumes	8.3	34.7	26.5	25.0	29.7	3.9	6.3
Nuts	12.0	14.0	15.3	15.7	16.9	1.8	3.0
Sugar	50.6	53.6	54.0	58.1	72.8	70.5	67.4

\* Eggs in number

Table 8

Annual per capita food consumption according to household income (Bahrain only) (Kg./yr).

Food	Household Income (U.D.)*													
	< 2400	2400	3600	4800	6000	7200	8400	9600	10800	12000	13200	14400	15600	16800-17999
Rice	173.8	137.7	126.5	140.2	137.9	140.5	147.3	153.8	133.5	122.3	143.5	92.4	80.9	151.4
Bread	60.7	55.7	52.2	52.8	51.8	52.6	55.3	52.2	49.6	41.3	70.0	50.8	48.6	60.7
Meat, red	38.3	41.0	36.1	42.2	42.7	43.6	43.0	43.4	45.9	52.6	59.1	47.2	54.7	55.9
Poultry	26.3	21.7	20.6	23.8	23.7	21.9	28.3	24.2	29.6	32.3	33.9	30.3	20.0	38.9
Fish, fresh	39.9	35.9	33.3	36.4	35.7	30.8	35.4	32.4	33.3	36.9	40.1	32.7	33.7	44.2
Whole milk, liquid	22.0	18.3	15.0	17.0	18.6	17.5	25.6	24.4	17.4	21.0	24.8	16.4	28.6	24.3
Eggs**	288.2	273.8	247.2	267.8	270.7	253.7	259.1	287.1	268.0	324.8	339.2	319.9	357.3	329.9
Oil and fats	10.6	10.5	8.7	10.0	8.9	8.2	9.3	9.9	9.1	10.7	12.8	9.2	13.0	16.9
Fruits, fresh	161.8	142.8	140.0	152.5	147.7	152.6	156.3	149.3	155.9	189.4	179.4	159.0	219.9	181.4
Vegetables, fresh	112.1	96.8	90.7	92.9	95.5	88.7	98.5	92.9	99.9	113.0	132.1	96.1	95.8	119.6
Legumes	4.3	8.1	5.7	6.8	8.5	4.8	6.3	5.7	6.5	7.2	9.3	4.9	8.7	11.8
Nuts	1.4	2.3	2.1	2.6	3.7	2.7	2.9	2.5	3.2	3.8	3.4	3.4	4.4	6.3
Sugar	105.5	79.5	60.6	71.3	65.9	56.4	58.6	61.2	67.8	57.6	49.0	54.6	49.2	65.0

\* Bahraini Dinar = 2.7 US Dollar

\*\* Eggs in number

## Household Income

Income is considered one of the most important factors determining food consumption patterns. Data provided in Table 8 indicate that the effect of household income on food consumption patterns is varied. In general meat, poultry, fruits and nuts show an increase with rise in household income. The per capita consumption of rice decreased sharply at household income level 14400-15599 Bahraini Dinars (B.D.), and then increased suddenly at the income level 16800-17999 B.D. In all food items there were fluctuations in food consumption patterns. This fluctuation may be due to several factors. First, the food subsidy policy of the government which made many food items within the purchasing power of most inhabitants. The government subsidized meat, rice, wheat flour, whole milk powdered, sugar, oil and fats. The price of these foods remain staple for the past 15 years. Secondly, it was found in this Household Expenditure Survey, that most families with high income have a large number of members. This means that the per capita food consumption will be less.

Thirdly, income in Bahrain and other Arabian Gulf countries, does not necessary link positively with education. The rapid change in economic condition in Bahrain (due to oil production) has led to a sharp increase in income, but not in the educational level, which needs time to rise. The result is high purchasing power combined with low education and poor knowledge on sound nutrition.

Fourthly, the difficulty of measuring household income makes the results less accurate. Many heads of household did not give accurate figures of their total income. This is particularly true, if we know that people in this country depend on various sources of income.

## CONCLUSIONS

There are several limitations in food consumption obtained from Food Expenditure Survey. Per capita food intake in this survey was based on food availability rather than actual food consumption. Food losses prior to consumption due to processing, spoilage, trimming, waste and cooking are all not accounted for (Sabry, 1988). Despite these limitations, the Food

Expenditure Survey is still widely used for measuring trends in food consumption patterns over time and may help in studying the relationship of diet with health of people (FAO, 1986).

Although, this study indicates several social factors that affect food consumption in Bahrain, education may be the best socio-economic predictor of change in food consumption patterns. This indicator is easy to measure and can reflect the knowledge and habits of the people.

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# DIETARY HABITS OF PRESCHOOL CHILDREN IN BAHRAIN

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## INTRODUCTION

Preschool children are especially vulnerable to a number of nutritional problems (Jelliffe and Jelliffe, 1989). In Bahrain, preschool children (1-6 years) have a higher prevalence of iron-deficiency anaemia and under-nutrition characterized by wasting and underweight than school children (Amine, 1980). Dental caries as a result of excessive intakes of sweet foods and poor dental hygiene is common among these children. In fact, Mobayed, Kamal and Al-Gashy (1980) showed that 35% of Bahraini children aged 2-5 years had dental caries. Preschool children appear to be particularly vulnerable to dietary deficiencies of iron (Sawaya et al 1988; Stanek et al, 1990). However, in Saudi Arabia, Sawaya et al (1988) reported that the intake of iron, energy, vitamin A and thiamine of preschoolers were below the US Recommended Daily Allowances. It seemed that these deficiencies were mainly due to unsound food habits rather than poverty.

Information on food habits of preschool children is essential as a basis for nutrition intervention programme to improve the health status of these children. To our knowledge there is no published information on dietary habits of preschoolers in Bahrain. The present study was conducted to obtain this information for Bahraini preschool children from their meal and snack patterns.

## METHOD

Information for this study was obtained by interviewing a sample of Bahraini mothers as part of a National Nutritional Survey on mothers and preschool children which was carried out in Bahrain during 1990 (Musaiger and Al-Sayyad, 1991). The mothers were interviewed and asked about the dietary intake of their children aged between one to six years. Children were selected from households using a multistage sampling method. Bahrain was divided into 337 blocks distributed in 11 geographical areas. Fifty one blocks (15%) were selected by a systematic sampling method. Ten households having at least one child of less than 7 years were then chosen from each block to make a total of 510 households. However 29 (6%) households were dropped out due to absence of some families and non-response of others, reducing the total number of the studied households to 481.

The WHO sampling technique (WHO, 1984) for morbidity and diarrhoeal diseases was used for selection of the households. In summary, an approximate geographical center of the block was determined, and then direction for obtaining the households was randomly selected. The interviewers, then moved in a straight line in this direction and surveyed the houses in that direction until the required number of households had been covered (10 households with children less than seven years).

Only children aged between one and six years were included in the study. A total of 423 children were studied, of whom 221 were boys and 202 were girls. Children aged less than one year (58 children) were excluded because these mostly depend on breast-milk, bottle-milk and commercial weaning foods.

Mothers were interviewed in their homes by trained female workers using a pretested questionnaire. Information on the socio-demographic characteristics of the mothers and the food intake at the three meals and the snack patterns of the children were obtained. The food intake was assessed using the 24 hour recall method. This was done by asking the mothers about the type of foods consumed by their children at the main meal and between meals during the past twenty four hours (Cameron and Van-Stareren, 1988).

For the purpose of analysis, children were divided into two age groups, 1-3 years and 4-6 years. This age grouping was used because children at 4 years start enroll in kindergarten schools where they are exposed to various new foods and develop new food habits. Additionally, children after the age of 3 years can go alone to the near-by grocery stores to purchase foods which also given them access to a grater variety of foods.

The results are presented in term of food frequencies that is as percentage intake of the total of each food by sex and age. Each time a food was consumed, it was counted as a single observation.

Data were analysed using SPSS-PC<sup>+</sup> package. Statistical significant of difference between food consumption and sex and age of children was tested by Chi-Square analysis. A significant association was considered when P value was 0.05 or less.

## RESULTS AND DISCUSSION

Breakfast is considered an important meal, especially for preschool children. It was found that if a child ate a poor breakfast, he will have difficulty in obtaining its daily nutrient requirements (Morgan et al, 1986). Bread, milk, tea, cheese and eggs were the main foods consumed at breakfast among both boys and girls. Children in the younger age group were more likely to consume milk than the older children. In the younger age group rather more boys (48%) than girls (40%) drank milk at breakfast. This difference was not apparent in the older children (32% boys, 36% girls) (Table 1). There was statistically significant association between younger and older children in milk consumption ( $p = 0.04$ ). These findings are consisted with those of other investigators who showed as the child got older, there was a decrease in milk consumption (Cala et al, 1980). On the other hand the percentage of children who consumed tea was higher mong older than young children (46.3% and 38.6% among 4-6 and 1-3 years of age children, respectively). But the difference was not statistically significant. In general, there was no statistically significant association between type of food consumed and sex of preschool children in both age groups.

The relatively high percentage of preschool children who consume tea in Bahrain may be a source of worry, as it is well

Table 1

Percentage of children who consumed various foods at breakfast by age and sex.

Foods	1 - 3 years			4 - 6 years		
	Boys	Girls	Total	Boys	Girls	Total
	%	%	%	%	%	%
Bread	62.5	65.7	63.9	63.4	62.9	63.2
Tea	38.3	39.0	38.6	47.3	45.4	46.3
Cheese	35.2	42.9	38.6	37.6	40.2	38.9
Eggs	31.3	35.2	33.0	37.6	33.0	35.3
Milk	47.7	40.0	44.2	32.3	36.1	34.2
Corn flakes	4.7	5.7	5.2	6.5	5.2	5.8
Others	33.6	24.8	29.6	26.9	45.4	36.3

documented that tea inhibits the absorption of non-haem iron due to its high tannin contents (DeMayer, 1989). It would therefore seem to be essential that health education should focus on reducing the intake of tea, especially with meal, by preschool as well as school children.

In general the foods consumed at breakfast were nutritious (if taken in adequate amounts) and should be encouraged. However, one of the main barriers to improving food intake at breakfast is the widespread belief that breakfast should not include meat, chicken or fish as these foods are difficult to digest when consumed in the early morning (Musaiger and Gregory, 1992). This belief may reduce the chances to diversify the eating patterns at breakfast.

Snacks are not always bad for children and nutritious snacks can make an important contribution than their daily nutrient requirements. In Saudi Arabia it was found that the morning snack provided 9-13% of most nutrients for preschool children (Sawaya et al, 1988). In our survey canned drinks, fruits and corn-puffs were the main foods consumed by preschoolers between breakfast and lunch (Table 2). Sex of preschool children has no statistically significant association with type of foods consumed at this period. As for age, milk and bread were the only foods which have statistically significant association between the two age groups ( $p = 0.002$  for milk and  $0.001$  for bread).

About 30% of both boys and girls consumed corn-puffs. This food is low in its nutritive value, and therefore parents should be discouraged to provide it to their children. Additionally, corn-puffs have a high sodium content (Musaiger, 1986). The high intake of sodium by children have been a matter of concern in a number of studies (BSMWP, 1987; Stanek et al, 1990). High intake of salt may be a predisposing factor for hypertension and cardiovascular diseases (CVD). The precise contribution of dietary sodium to the early pathogenesis of hypertension, beginning in childhood, remains unclear. However, it may be important to decrease the intake of sodium and increases that of potassium (WHO, 1990). This is particularly desirable in view of the remarkable increases in the prevalence of CVD and hypertension in Bahrain (Musaiger, 1990). Control should start in childhood when food habits are formed as the seeds of future diseases may be shown.

Table 2

Percentage of children who consumed various foods between breakfast and lunch by age and sex.

Foods	1 - 3 years			4 - 6 years		
	Boys	Girls	Total	Boys	Girls	Total
	%	%	%	%	%	%
Corn-puffs	29.7	28.6	29.2	28.0	36.1	32.1
Canned drink	33.6	23.8	29.2	29.0	34.0	31.6
Fresh fruits	28.1	31.4	29.6	22.6	26.8	24.7
Potato-chips	8.6	10.5	9.4	17.2	8.2	12.6
Biscuits & sweets	18.0	17.1	17.6	9.7	13.4	11.6
Ice-cream	11.7	12.4	12.0	10.8	12.4	11.6
Chocolates	6.3	7.6	6.9	10.8	12.4	11.6
Bread	1.6	2.9	2.1	17.2	6.2	11.6
Carbonated - beverages	6.3	5.7	6.0	7.5	3.1	5.3
Milk	8.6	8.6	8.6	1.1	2.1	1.6
Others	13.3	15.2	14.2	25.8	16.5	21.1

Chocolates were more preferred by older than younger children at morning snack, but the reverse are true for sweets and biscuits. The consumption of carbonated beverages was low during this period (Table 2). The nutritional value of chocolates, sweets and carbonated beverages is low and they contain a large amount of refined sugar. Mothers, therefore, should be advised to reduce giving such foods to their children, especially before a main meal such as lunch, because of their effect on the children's appetite for more nutritious foods.

Lunch is the main meal in Bahrain. Sawaya, et al (1988) found that it contributed more than 29% of the recommended daily allowances of protein, energy and iron for preschoolers. The foods consumed at lunch by our preschool children were the same as those consumed by adults in Bahrain (Musaiger, 1981). The main foods were rice with meat, chicken or fish (Table 3). A statistically significant association has been found between sex of children and rice consumption at age 1-3 years ( $p = 0.04$ ). In the older children more boys than girls consumed fish whereas more girls than boys consumed chicken.

Interestingly, a relatively high percentage of preschool children consumed fresh fruits (26%) and vegetables (21%) with lunch. These foods are rich sources of vitamins and minerals, as well as dietary fiber, and their consumption is therefore very desirable. The association between fruits consumption and age of preschool children was statistically significant ( $p = 0.04$ ).

The fact that the majority of preschool children were eating the same foods as adults at lunch, leads to the conclusion that any recommendation for improving the dietary intake of preschoolers should focus on improving the food habits of the family in general.

Foods consumed between lunch and supper were not different from those consumed between breakfast and lunch and consists of corn-puffs, canned drink, fruits, sweets, chocolates and potato-chips (Table 4). Fruit juice, ice-cream and chocolates were the only foods who have statistically significant association with age of children ( $p = 0.02$ ,  $0.01$  and  $0.02$ , respectively). Again many of foods consumed during this period were high in sodium. Stanke et al (1990) reported that most of preschool children in

Table 3

Percentage of children who consumed various foods at lunch by age and sex.

Foods	1 - 3 years			4 - 6 years		
	Boys	Girls	Total	Boys	Girls	Total
	%	%	%	%	%	%
Rice	87.5	95.2	91.0	88.2	90.7	89.5
Fish	44.5	50.5	47.2	53.8	46.4	50.0
Fresh fruits	22.7	26.7	24.5	29.0	26.8	27.9
Chicken	20.3	23.8	21.9	18.3	29.9	24.2
Fresh vegetables	22.7	17.1	20.2	18.3	24.7	21.6
Meat	27.3	21.9	24.9	20.4	14.4	17.4
Others	24.2	21.0	22.7	14.0	18.6	16.3

Table 4

Percentage of children who consumed various foods between lunch and supper by age and sex.

Foods	1 - 3 years			4 - 6 years		
	Boys	Girls	Total	Boys	Girls	Total
	%	%	%	%	%	%
Corn-puffs	29.7	36.2	32.6	33.3	36.1	34.7
Fresh Fruits	22.7	25.7	24.0	25.8	24.7	25.3
Canned drink	30.5	37.1	33.5	22.6	23.7	23.2
Ice-cream	7.0	12.4	9.4	15.1	20.6	17.9
Potato-chips	14.8	14.3	14.6	17.2	16.5	16.8
Chocolates	10.2	5.7	8.2	16.1	13.4	15.3
Carbonated - beverages	5.5	8.6	6.9	14.0	10.3	12.1
Biscuits & sweets	26.6	17.1	22.3	10.8	11.3	11.1
Cheese	3.9	1.9	3.0	4.3	6.2	5.3
Milk	7.0	7.6	7.3	2.2	4.1	3.2
Others	15.6	19.0	17.2	21.5	11.3	16.3

United States consumed sodium greater than the estimated safe and adequate range.

The percentage of younger children who consumed canned drinks was higher than that of the older children, and girls in general preferred these drinks more than boys. In contrast, the percentage of older children who consumed ice-cream was higher than that of young children (17.9% and 9.4%, respectively). There were also some differences between boys and girls and between younger and older children in the intake of biscuits and sweets, chocolates, and carbonated beverages (Table 4).

Foods consumed at supper were more diverse than those eaten at breakfast or lunch. One reason for this is the habit of eating outside the home during the evening, or bringing prepared foods into the home (Musaiger and Gregory, 1992). Bread, meat, milk, cheese, vegetables and eggs were the main foods consumed by preschool children at supper (Table 5). Older children (4-6 years) were more likely to consume cheese and bread than younger ones (1-3 years). Most of the foods consumed at supper are nutritious and mothers should be encouraged to continue giving their children these foods.

There was no statistically significant association between type of foods consumed at supper and sex of children in each age group. Tea and bread have a statistically significant association with age of children ( $p = 0.02$  and  $0.01$ , respectively).

In general, the food habits of preschool children in Bahrain are acceptable. This study was limited to the quality of food consumed and not its quantity. It is difficult, therefore, to evaluate the nutrient intake based on the available data. However, the present study provides useful information which to proceed to carry out a quantitative investigation of nutrient intake in this important group of the population.

The high percentage of children who consumed sweets and carbonated beverages is a matter of concern. These foods doubtfully prevented the child from eating other more nutritious foods. The consumption of foods rich in salt such as corn-puffs, potato-chips and processed cheese is, as already mentioned, a matter of concern. We suggest that nutrition education for improving the food habits of preschool children should

**Table 5**

Percentage of children who consumed various foods at supper by age and sex.

Foods	1 - 3 years			4 - 6 years		
	Boys	Girls	Total	Boys	Girls	Total
	%	%	%	%	%	%
Bread	41.4	48.6	44.6	60.2	53.6	56.8
Cheese	14.8	14.3	14.6	20.4	19.6	20.0
Meat	20.3	24.8	22.3	22.6	10.3	16.3
Eggs	21.9	17.1	19.7	11.8	16.5	14.2
Fresh vegetables	17.2	15.2	16.3	11.8	11.3	11.6
Chicken	11.7	9.5	10.7	12.9	10.3	11.6
Milk	9.4	8.6	9.0	7.5	8.2	7.9
Tea	3.9	1.9	3.0	8.6	7.2	7.9
Carbonated - beverages	3.1	4.8	3.9	9.7	4.1	6.8
Yoghurt	9.4	8.6	9.0	4.3	8.2	6.3
Fresh fruits	4.7	5.7	5.2	7.5	5.2	6.3
Rice	9.4	6.7	8.2	6.5	4.1	5.3
Others	39.1	48.6	43.3	44.1	53.6	48.9

concentrate on reducing the intake of sweets and salty foods, and increasing the consumption of foods such as milk, fruits and vegetables which contain a greater variety of necessary nutrients. The importance of these recommendations is underlined by the increased prevalence of hypertension and CVD disease in Bahrain in recent years. Good food habits should be established during childhood if life-style factors affecting these diseases are to be controlled. Attention must also be given to the intake of foods rich in iron as iron deficiency anaemia is one of the main nutritional problems among preschool children.

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# DIETARY HABITS OF ADOLESCENT GIRLS IN BAHRAIN

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## INTRODUCTION

Many food habits of adolescent girls are formed at school. These girls have more access to money and to grocery stores, and thus to purchase various kinds of food with questionable nutritive value. At the same time, the school canteen plays a significant role in influencing the dietary habits of adolescent girls by introducing many food items. An understanding of the dietary habits of adolescent girls is therefore essential for any nutrition intervention programme in order to improve their nutritional status.

Musaiger and Gregory (1992) have carried out a study on dietary habits of 465 adolescent girls selected from 10 geographical areas in Bahrain. The ages of these adolescents ranged from 11 to 22 years and were divided into two groups 11-15 and 16+ years. The main findings of this study are summarized below.

### **Breakfast intake**

Breakfast can make a valuable contribution to the nutrient quality of the diet of adolescents. It was found that 25% and 35% of girls aged 11-15 and 16+ years skipped breakfast, respectively (Table 1). When the girls were asked about the reasons for skipping breakfast, the main reasons given were; because they woke up late, not accustomed to eating breakfast, not hungry and did not like the food served at breakfast. Cooksey and Ojeman (1983) reported that breakfast was omitted more often when family members did not eat together or when there was no one to prepare it for the girls.

Several studies (Morgan et al, 1986, Shiraki and Iwasaki, 1986) reported that skipping breakfast has a significant impact

**Table 1**

Main foods consumed by adolescent girls at breakfast according to their age.

Breakfast	Age (years)	
	11 -15 %	16+ %
None	25.4	34.6
Bread	55.0	45.4
Tea	51.1	47.0
Cheese	32.1	24.3
Eggs	18.6	17.8
Whole milk	9.3	7.0
Yogurt	4.3	0.5

Source : Musaiger & Gregory (1992).

on meeting the Recommended Daily Allowances (RDA). Morgan et al (1986) demonstrated that skipping breakfast has a negative effect on the quality of diet, particularly among girls and adolescents. The intake of vitamin A, iron, calcium, magnesium, copper and zinc was found to be less among breakfast skippers. It is important, therefore, to encourage the adolescent girls to have their breakfast at home before they go to school.

Bread, tea, cheese, eggs and whole milk were the main foods consumed at breakfast by adolescent girls. The consumption of bread, tea and cheese decreased as age of girls increased. For instance, 55% of girls aged 11-15 years consumed bread at breakfast compared with 45% of girls more than 15 years.

It can be concluded that most foods consumed at breakfast are nutritious (cheese, eggs, milk and yoghurt), but there was no intake of fruits or pure fruit juices, which are a valuable source of some minerals and vitamins. Additionally, many people in Bahrain believe that breakfast should not include meat, chicken or fish because these foods are hard to digest in the morning, when the stomach is empty. This belief prevents the children from diversifying their food intake at breakfast with the resulting dislike of foods that are usually given to them.

### **Morning Snack**

Baseline data on the kinds of foods consumed between meals (snacks) and how these foods contribute to nutrient intake in relation to the overall diet is essential for school meal programme. The findings of this study showed that about 22.3% and 17.6% of adolescent girls aged 11-15 and 16+ years, respectively did not eat any snack between breakfast and lunch. Carbonated beverages, cheese, uncarbonated drinks, meal and liver sandwiches and falafel (fried broad bean mixed with spices) were the foods commonly consumed at morning snack by adolescents girls (Table 2).

The consumption of carbonated beverages increased steeply with age. Of 11-15 year old girls, 36% consumed carbonated beverages compared to 66% among those more than 15 years old. In contrast younger girls were more likely to consume uncarbonated canned drinks than older girls.

Table 2

Main foods consumed by adolescent girls at morning snack according to their age.

Morning snack	Age (years)	
	11 -15 %	16+ %
None	22.3	17.6
Carbonated beverages	36.2	65.9
Cheese sandwich	23.4	32.2
Meat & liver sandwiches	18.1	22.0
Canned drinks	14.5	4.4
Falafel sandwich	13.9	12.7
Corn-puffs	7.8	1.0
Chocolates	3.6	4.3
Egg sandwich	1.7	3.9
Chicken sandwich	0.6	1.5
Tea	1.7	1.5

Source : Musaiger & Gregory (1992).

The relatively high percentage of adolescent girls who skipped breakfast, as well as those who ate poor breakfast suggest that the food available in school canteens should supply adequate amounts of nutrients. The school feeding programme in Bahrain depends on canteens which sell soft drinks, chocolates, sweets, corn-puffs, and various kinds of sandwiches. These foods are sold to the school teenage girls during the mid-morning break. It was found that sandwiches provided to these school girls contain an appropriate amount of nutrients if they are adequately consumed, while other foods such as corn-puffs, sweets and soft drinks are deficient in most nutrients (Musaiger, 1986).

### **Lunch intake**

Lunch, the main meal, usually consist of rice with meat, chicken or fish. Data in Table 3 confirmed that the dietary habits of adolescent girls at lunch did not differ from those of adults. Interestingly, the consumption of fresh fruits was relatively high; 29% and 34% among girls aged 11-15 and 16+ years old, respectively. Lunch was skipped less often than breakfast as only 6% reported that they omitted lunch. The main reasons for skipping lunch were : did not like the food served at lunch and not hungry.

It is worth mentioning that many adolescent Bahraini girls consumed sweets and soft drinks outside school on their way back to home. This practice reduces the appetite of these girls for lunch and thus they consumed smaller amounts of food. As lunch is the main meal, it should contribute largely to the Recommended Dietary Allowances (RDA) and in case of these girls or those who skipped lunch, the chance to get their RDA is low. Shiraki and Iwasaki (1986) showed that the nutrient intake of college students was lowered by 10-25% due to skipping breakfast, and by 35% due to skipping lunch. The irregularity in taking meals and the lack of interest in dietary habits were apparent among those who habitually skipped meals.

### **Afternoon Snack**

The most popular foods consumed between lunch and supper (afternoon snack) were corn-puffs, carbonated beverages, chocolates, uncarbonated canned drinks and fruits (Table 4). The

**Table 3**

Main foods consumed by adolescent girls at lunch according to their age.

Lunch	Age (years)	
	11 -15 %	16+ %
None	6.1	6.5
Rice	81.8	80.0
Vegetables, cooked &/ or fresh	54.7	63.2
Meat	21.1	21.1
Fish	43.3	39.4
Chicken	23.6	23.2
Fruit	29.3	33.5
Dates (dried)	1.1	2.2
Bread	7.1	9.2
Carbonated beverages	1.8	3.2

Source : Musalger & Gregory (1992).

**Table 4**

Main foods consumed by adolescent girls at afternoon snack according to their age.

Afternoon snack	Age (years)	
	11 -15 %	16+ %
None	27.9	30.3
Corn-puffs	30.4	17.8
Carbonated beverages	16.1	17.3
Fruit	13.6	12.4
Canned drinks	7.1	4.9
Chocolates	12.1	13.5
Cheese	1.2	0.5
Biscuits	3.6	7.6
Seeds	4.6	1.1
Potato chips	6.8	8.6
Tea	3.9	6.5

Source : Musaiger & Gregory (1992).

Table 5

Main foods consumed by adolescent girls at supper according to their age.

Supper	Age (years)	
	11 -15 %	16+ %
None	13.2	20.5
Bread	54.6	53.5
Meat	1.8	2.7
Cheese	22.9	33.5
Eggs	2.5	3.2
Chicken	0.4	1.6
Vegetables, cooked	1.5	1.6
French fries	5.0	15.1
Fruit	4.3	2.7
Falafel	22.1	12.4
Sambosa*	6.8	8.1
Chocolates	12.1	3.8
Corn puffs	18.2	9.2
Carbonated beverages	49.3	56.8

\* Sambosa is fried vegetable pie.

Source : Musaiger & Gregory (1992).

consumption of corn-puffs decreased with age (30% and 18% among 11-15 and 16+ year old girls, respectively). It was documented that corn-puffs is a very poor source of essential nutrients, and its intake therefore should be discouraged. Older girls were more likely to skip afternoon snacks than young girls.

### Supper intake

Foods consumed at supper were more varied than those consumed at other meals (Table 5). Bread, carbonated beverages, cheese, falafel, chocolates and corn-puffs were the preferred foods at supper by adolescent girls. Supper was less skipped than breakfast, but more often than lunch. The main reasons for skipping supper were : not hungry, sleep early and not accustomed to eating supper.

### CONCLUSION

The dietary habits of Bahraini adolescent girls were similar to those reported from Oman (Musaiger, 1994) and Western communities (Farthing, 1991) in relation to breakfast skipping, snacking patterns and some preferred foods. The change in food habits of Bahraini girls to more westernized may explain in part the increase in diet-related chronic diseases in this country. Studies in western countries have attributed the causes of many chronic diseases such as cardiovascular disease, diabetes and hypertension to the steady change in food habits and life-style (Anderson, 1991). Sound food habits during childhood and adolescence, therefore, is important for establishing good health and to prevent these chronic diseases. Promotion of healthy eating should be done through various mass media. School canteens should take an important role in providing nutritious snacks. Studies on factors determining food intake of children and adolescents are highly recommended.

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# FOOD HABITS IN KUWAIT

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### INTRODUCTION

The state of Kuwait is located in the northwest corner of the Arabian Gulf. The total area is about 7000 square miles. The weather of the country is typical of the Sahara geographic region. The total estimated population was approximately 1.5 million persons in 1993. About 43% of the inhabitants are Kuwaitis and 57% are non-Kuwaitis; mostly Arabs and others from southeast Asia, Africa and Europe.

The age structure of the Kuwaiti population is typical of a young community, about 44% of them are below 15 years of age. Education is free and compulsory from 6-14 years of age. An active adult literacy campaign has reduced illiteracy considerably. Teaching of health, hygiene and nutrition education in schools is very limited. Nutrition is included in the medical college only as a part of clinical teaching.

Kuwait has a well developed health service system. It provides primary, secondary and tertiary health care and emergency medical services. Life expectancy in Kuwait (69 years for men and 74 years for women) is among the highest in the Arab world.

### Food Consumption Patterns

Due to the oil boom the State of Kuwait has witnessed a noticeable increase in income, which has improved the standard of living in a relatively short period of time. The increase in the amount of food supplies from local production as well as food imports from all over the world have made available an abundance of diversified foods in the market. Also, staple food items are subsidized in Kuwait. Expatriates have introduced new sets of food habits and dietary practices, foods imported from many countries are available in the local market within the purchasing power of the Kuwaiti family. Travel and media have also helped in the acquisition of new food habits.

Before the discovery of oil, the food pattern was simple. Kuwaitis were dependent on a limited variety of local foods, mainly fish and other seafoods, sheep, goat and camel milk and their by-products and dates. Meat was traditionally eaten once a week or perhaps once a month by the less affluent. Arabic coffee and milk were the only beverages. Tea with sugar was served only on special occasions. At present, traditional diets have become diverse. Canned, frozen, refrigerated, dehydrated foods are imported from all over the world. Also, sweets chocolates, snacks and pastries are available in abundance. Food franchises, covering a wide range of choices, are widely spread and eating outside the home is becoming an acquired habit. Fast foods such as hamburgers, pizza, fried chicken are widely consumed especially by the younger generation (Musaiger, 1987; Kuwait Country Paper, ICN, 1992).

This change in eating habits has lead to increase the consumption of calories and protein. According to the Food and Agriculture Organization (FAO), Food Balance Sheets (FBS) for Kuwait (1977-1979) versus (1987-1989) the food availability data showed a general increase in all food groups. The nutrient availability per head per day showed an overall increase of calories by 220 kcal., protein by 5.5 gms and total fats by 18.5 gms. (Tables 1 & 2).

A closer look at food consumption patterns among specific groups of Kuwaiti reveals interesting data. Food consumption patterns for Kuwaiti housewives of different educational levels showed that cereals, beverages and eggs were consumed most. On the other hand fish and legumes were consumed the least. Housewives with the lowest educational level consumed significantly more sugar and sweets and less meat and poultry than those of higher educational levels. (Al-Shawi, 1985).

Trends observed in the daily dietary habits of housewives in Kuwait showed increased percentage of those who consumed in-between snacks (Mostafa and Nuwayhid, 1981, Al-Shawi, 1985, Al-Awadi and Amine, 1993). Tea, coffee and carbonated beverages are most frequently consumed between meals. Sugar utilization is high (Mostafa and Nuwayhid, 1981, Kamel and Martinez, 1994,b, Al-Awadi and Amine, 1987).

**Table 1**  
Food availability data for Kuwait

Food Groups	<u>Availability Kg./Head/Year</u>	
	1977-1979	1987-1989
Cereals	134.5	138.1
Sweeteners	45.9	42.3
Tubers	16.0	21.6
Animal fats	3.9	13.5
Pulses, Nuts & Seeds	12.4	14.2
Meat, Poultry & Offal	61.9	70.4
Eggs	11.2	12.1
Fish	9.1	11.0
Milk & Milk Products	182.4	186.1
Vegetables	120.7	175.5
Fruits	125.2	131.7

Source : "Agrostat/PC" F.A.O. Food Balance Sheets

**Table 2**  
Nutrient availability for Kuwait / Head / Day

	1977-1979	1987-1989	Difference
Calories	2931.0	3151.0	+ 220
Total Protein	87.9	93.4	+ 5.5
Animal Protein	45.9	49.8	+ 3.9
Vegetable Protein	42.0	43.6	+ 1.6
Total Fat	85.0	103.5	+ 18.5
Animal Fat	46.4	51.8	+ 5.4
Vegetable Fat	38.6	51.7	+ 13.1

Source : "Agrostat/PC" F.A.O. Food Balance Sheets

Nutrient intakes of University women in Kuwait showed that consumption was below U.S. Recommended Allowance for calories, calcium, iron, zinc, folic acid and vitamin D. The diets were limited in fibre, high in sugar, high in caffeine and slightly above recommendations for cholesterol (Al-Shawi, 1992).

An analysis of nutrient intake for Kuwaiti housewives and adults showed that dietary vitamin A, thiamin, riboflavin, calcium, iron and magnesium intakes are below the U.S. Recommended Dietary Allowance. (Mostafa and Nuwayhid, 1981; Al-Shawi, 1985; Al-Shawi, 1992).

### **Food habits of pregnant and lactating women**

Kuwaiti pregnant and lactating women consumed extra milk, meat products, vegetables and fruits. Special foods were consumed during post-partum such as *asida* (wheat flour, sugar and fat) and *hesso* (wheat flour, fat and eggs). Spices were avoided by pregnant women (Nutrition Unit, 1984).

Some pregnant women in Kuwait omitted important protective food groups such as vegetables and fruits from the diet while others regularly consumed empty calories in sweets and candies. Some diets were deficient in calcium and iron necessitates the supplementation of the mother's diet with iron and calcium during pregnancy (Mostafa and Nuwayhid, 1979; Nutrition Unit, 1984, Mameesh, et al, 1985, Nutrition Unit, 1990).

The daily dietary intake patterns of Kuwaiti pregnant women showed that bread, rice and sugar were most commonly consumed food items. More than half of them consumed fruits, milk products, vegetables, meat and eggs. Poultry, legumes and fish were the least consumed items (Nutrition Unit, 1990).

### **Breastfeeding habits**

It was found that 95% of mothers recognized that breast feeding is beneficial for the infants, yet the majority of them did not practice it and by the age of three months only 13% of the infants were breast fed (Al Bustan, 1986). The reasons given for stopping breast feeding were insufficient milk, pregnancy and illness of the mother (Mostafa and Nuwayhid, 1979, Al-Awadi and Amine, 1989).

A study on weaning practices showed that juices and drinks were introduced first, followed by cereals, strained fruits, vegetables, ground meat and a portion of the adult food. Commercially prepared foods were more commonly used than home prepared foods. Weaning practices were found among high socioeconomic and educated mothers than low socio-economic and illiterate mothers. (Mostafa and Nuwayhid, 1979, Al-Shawi, 1986, Al-Awadi and Amine, 1989).

### **Fast food intake**

A survey on fast food dietary patterns among Kuwaiti secondary students revealed that the main reason for visiting fast food restaurants was for recreation among males and change from home diet for females. The most common meal taken was dinner and the most common snack was that between lunch and dinner. The main factor affecting the choice of fast food items was the taste. The most preferred fast food items were found to be pizza, chicken, pies, chips and meat (Nutrition Unit, 1993).

### **Influence of income**

Studies done on food availability in Kuwait have shown an abundance among the most privileged and adequacy among the poor with respect to energy and protein. Kuwaitis spent a higher proportion of their income buying food. They purchased more cereals, sugars, sweets and fish than non Kuwaitis. With increased income, purchases of most food groups, especially of protein-rich products, increased in both groups, but in Kuwaiti households cereal purchases declined (Kamel and Martinez, 1984.a).

While some traditional food habits are adhered to, others are giving way to western influences. Increased family income has been associated with a basic change in food pattern as the consumption of soft drinks, tea, chocolates, sweets, nuts and ready made foods has increased (Al-Shawi, 1985).

### **Meal patterns**

The daily meal pattern consists of breakfast, lunch, dinner and snacks in between. The most common foods consumed for

breakfast are bread with cheese or cream and tea with milk. Meal patterns vary with family income. For breakfast cornflakes and orange juice are more popular among high income families while eggs and white cheese are more common among low income families (Al-Shawi, 1985, Al-Awadi and Amine, 1993).

The major bread types consumed are Arabic followed by Iranian. The contribution of bread to the fulfillment of daily requirements was about 29-33% of energy, iron and thiamin and 40-50 % of protein and niacin (Eid and Bourisly, 1986).

Traditional dishes are consumed by almost all Kuwaiti families for lunch which is the main meal of the day. The main course at lunch is *machbous* (composed of rice and one kind of meat or fish). Lamb and goat are consumed by more families than beef. *Marabian* (rice with shrimp) is frequently consumed at lunch time. It is made of either fresh or dried shrimps with lentil and rice. *Mashool* (boiled rice) is sometimes consumed by Kuwaiti families. It is usually eaten with *maraq* (stew) made from potatoes, egg plant, okra, zucchini and tomato paste. Salad made of lettuce, cucumber and tomatoes, parsley, green onions and radish is also commonly used. Laban (diluted yoghurt) is drunk at lunch (Mostafa and Nuwayhid, 1981, Al-Awadi and Amine, 1993).

A wide variety of foods are consumed for dinner. Hamburger, fried chicken, macaroni and falafel are the most common dishes with carbohydrate rich foods such as macaroni and fried potatoes are consumed at higher rate by low income families. (Mostafa and Nuwayhid, 1981, Al-Awadi and Amine, 1993).

The Kuwait Health Survey (1985) showed that a large percentage of Kuwaitis eat meals with the family, most of them add sugar to hot drinks, eat more sweets and discard left over food (Ministry of Health, 1985).

## CONCLUSION

Several social and economic factors have an influence on the food habits of Kuwaitis and modified their food intake patterns. Excessive or unbalanced diets with unhealthy life-styles such as inadequate physical exercise, stress and abuse of tobacco also contributes to poor health and lead to the increased

incidence of diet-related non-communicable diseases such as obesity, hypertension, diabetes, cardiovascular disease and cancer together with increased incidence of anaemia.

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# FOOD CONSUMPTION PATTERNS IN SAUDI ARABIA

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## INTRODUCTION

The Kingdom of Saudi Arabia occupies approximately four-fifths of the Arabian Peninsula, with an area of about 2,240,000 square kilometers. Its Middle East neighbours are Kuwait and Jordan in the north; Yemen, South Yemen, and Oman in the south; and the United Arab Emirates and Qatar in the east. The current estimated population of the Kingdom based on the 1992 census is 16,900,000. Non-Saudis comprise 27% of the Saudi population, males represent 50.4% while females represent 49.6%.

Development has advanced markedly in the last three decades, with major improvements in the provision of public services, particularly in health, education, and social services. The agricultural sector is flourishing, with heavy investment underway. This sector's contribution has increased from 3.4% of the total gross domestic product (GDP) for the year 1984 to 10.4 by the year 1989. Some 18% of all the Kingdom's manpower is employed in this sector (Ministry of Planning, 1991).

### Food Consumption Patterns

The per capita consumption of different nutrients has been calculated according to the total consumption of specific nutrients divided by the total population at specific times, not taking into consideration the yearly seasonal variations, age and sex differences. According to the Saudi Arabian Food Balance Sheets (Ministry of Planning, 1993), the estimation for annual or daily per capita consumption could be quantitative (grams or kilograms) or qualitative (calories, proteins or fats). These sheets, with all their limitations, are the best data available, and they give a general idea of the major features of food consumption.

The Food Balance Sheets indicate a development and increase in the per capita food consumption during the period

1974-1989, in which the daily total calories consumption has increased from 1807 to 3064 calories. Protein has increased from 51.3 to 82.4 grams, and total fat has increased from 33.6 to 90.4 grams. The increase showed an increase in the animal source of calories from 13.4% of the total calories for the period 1974-1976 to 17.2% for the period 1987-1989. The animal source of protein has increased from 31.6% to 40.7% of the total source of protein during these periods (Tables 1 and 2).

The increase in food consumption varied according to food group. The annual per capita consumption of cereals has increased from 94.4 to 133.1 kilograms, sugars from 17.6 to 32.0 kilograms, fresh vegetables from 56.9 to 112.0 kilograms, fresh fruits from 97.8 to 124.7 kilograms, red meat from 10.8 to 19.5 kilograms, poultry from 7.6 to 28.3 kilograms, fresh fish from 2.7 to 5.5 kilograms, eggs from 2.5 to 6.8 kilograms, total milk and milk products from 34.0 to 44.2 kilograms, and oil and fat from 4.0 to 16.7 kilograms.

### **Factors Affecting Food Consumption Patterns**

Many factors are known to have an influence on food consumption patterns in Saudi Arabia. Probably most important is the high per capita income which resulted from the oil boom. With the sharp elevation of purchasing power, food consumption patterns have become more varied. There are more food choices, so the quantity and quality of food eaten has improved. New foods such as beef, veal, and cold cuts, have slowly been added to the new Saudi diet, which includes lamb, chicken, and liver (Al-Shoshan, 1992). Sliced bread, and rolls are provided in addition to Arabic bread. Rice has replaced wheat. Fresh cow's milk has replaced camel's milk, goat's or sheep's milk. Butter and corn oil have replaced ghee. Canned and processed foods, more fruits and vegetables, cheeses, rich pastries, and convenience foods are now widely consumed (Al-Othiameen, 1991).

Educational level has a vital influence in changing the eating habits of the people (Musaiger, 1993). It was found that education is positively associated with the food habits of Saudi housewives. The better educated housewives consumed more fruits and high protein foods during pregnancy and lactation (Madani et al, 1994).

**Table 1**  
Per Capita Consumption of Food Stuff for the period (1974 - 1976)

Food Stuff	Per Capita Consumption				
	Fat/g/ day	Protein/ g/day	Calorie/ day	Gram/day	Kg/year
Wheat-flour	1.8	15.7	490	134.2	49.0
Wheat products	0.6	1.4	18	4.2	1.8
Rice	0.5	4.8	257	71.5	26.1
Sorghum	0.9	4.7	135	40.8	14.9
Rye	0.2	0.3	15	4.1	1.5
Maize	0.1	0.2	10	2.7	1.0
Cereal products	•	•	1	0.2	0.1
Total Cereal	4.1	27.1	926	258.4	94.4
Potatoes and tubers	0.2	0.2	9	6.1	2.2
Sugar	0.0	0.0	174	45.2	16.5
Sug. confec. & honey	1.7	•	10	3.0	1.1
Total	1.7	•	184	48.2	17.6
Pulses	0.2	1.5	18	7.4	2.7
Nuts	1.9	0.8	20	5.6	2.0
Fresh vegetables	0.2	1.9	40	155.7	56.9
Prepared veg.	•	0.2	5	7.7	2.8
Total Vegetables	0.2	2.1	45	163.4	59.7
Fresh fruits	0.7	2.9	266	268.1	97.8
Prepared fruit	•	0.1	16	19.3	7.0
Total Fruit	0.7	3.0	282	287.4	104.8
Red meat	4.8	4.9	65	29.6	10.8
Poultry	1.7	2.7	26	20.8	7.6
Meat prod. & offals	0.4	0.8	9	5.1	1.8
Total Meat	6.9	8.4	100	55.5	20.2
Fresh fish	0.2	0.8	5	7.4	2.7
Prepared fish	0.1	0.4	3	1.8	0.6
Total Fish	0.3	1.2	8	9.2	3.3
Eggs	0.7	0.6	10	6.8	2.5
Fresh milk	3.6	3.1	57	79.8	29.2
Dairy products	2.7	2.2	41	13.3	4.8
Total milk & dairy products	6.3	5.3	98	93.1	34.0
Veg. oil/fats	7.6	•	68	8.2	3.0
Animal oil/fats	2.7	•	24	2.3	1.0
Total oil & fats	10.3	•	92	11.0	4.0
Vegetable origin	16.7	35.6	1565	795.8	290.5
Animal origin	16.9	15.7	242	167.4	61.0
Grand Total	33.6	51.3	1807	963.2	351.5

(\*) Not significant

Table 2  
Per Capita Consumption of Food Stuff for the period (1987 - 1989)

Food Stuff	Per Capita Consumption				
	Fat/g/day	Protein/g/day	Calorie/day	Gram/day	Kg/year
Wheat-flour	3.6	23.1	721	197.6	72.1
Wheat products	1.8	2.5	87	23.7	8.6
Rice	0.3	7.7	416	115.5	42.2
Sorghum	0.5	2.6	76	23.1	8.4
Rye	0.1	0.1	6	1.5	0.5
Maize	0.0	0.1	6	1.6	0.6
Cereal products	0.0	0.2	8	2.0	0.7
Total Cereal	6.8	36.3	1320	365.0	133.1
Potatoes and tubers	0.2	0.4	22	24.4	8.8
Sugar	0.0	0.0	318	82.5	30.1
Sug. confec. & honey	0.4	0.1	18	5.4	1.9
Total	0.4	0.1	336	87.9	32.0
Pulses	0.2	2.5	36	15.9	5.8
Nuts	2.4	1.0	26	8.9	3.2
Fresh vegetables	0.4	3.4	74	307.0	112.0
Prepared veg.	0.0	0.5	13	15.2	5.7
Total Vegetables	0.4	3.9	87	322.2	117.7
Fresh fruits	0.9	3.1	290	342.1	124.7
Prepared fruit	0.4	0.2	25	22.3	8.1
Total Fruit	1.3	3.3	315	364.4	132.8
Red meat	11.2	7.7	133	52.8	19.5
Poultry	6.2	10.1	98	77.4	28.3
Meat prod. & offals	1.1	1.6	17	10.2	3.9
Total Meat	18.5	19.4	248	140.4	51.7
Fresh fish	0.4	1.9	12	15.1	5.5
Prepared fish	0.3	0.4	5	2.1	0.7
Total Fish	0.7	2.3	17	17.2	6.2
Eggs	1.9	2.1	27	18.5	6.8
Fresh milk	3.6	3.3	61	85.3	31.2
Dairy products	8.3	6.4	126	35.5	13.0
Total milk & dairy products	11.9	9.7	187	120.8	44.2
Veg. oil/fats	39.5	0.0	348	39.5	14.5
Animal oil/fats	5.5	0.0	49	6.2	2.2
Total oil & fats	45.0	0.0	397	45.7	16.7
Vegetable origin	51.9	48.9	2536	1258.0	459.0
Animal origin	38.5	33.5	528	303.1	111.1
Grand Total	90.4	82.4	3064	1561.1	570.1

The immigrants who came to Saudi Arabia during the oil boom have introduced many foods and dishes which have become popular with the Saudi inhabitants. It has become normal to find people of different nationalities converging on Turkish or Lebanese restaurants to try their spicy and highly palatable food, or in Thai eating places to experience their exotic and varied tastes. Other restaurants now available include Chinese and Filipino cuisine. As more new products have come in from foreigners' native countries, so methods of cooking have changed. New tastes have been acquired and an entirely new range of food habits and manner of eating have come into existence. Food consumption has become more diversified to satisfy the different ethnic origins and various tastes and preference of the immigrant labour forces.

The agro-industries development has made a significant contribution to the agricultural and investment industry contributing toward the strategy of "Food Self-Sufficiency." As a result, the Ministry of Agriculture announced that the Kingdom was producing enough eggs not only to meet its own needs, but to begin exporting to other countries in the region. By mid-eighties self-sufficiency in dairy production had been achieved, and more than twenty new dairy farms had been established, giving the country the largest number of highly efficient dairy farms in the Middle East. The most striking accomplishment in Saudi agriculture, throughout the eighties, has been the enormous production of cereal grains, particularly wheat. Wheat production is the centerpiece of the agricultural sector. Saudi Arabia has moved from being a major importer to a major exporter of wheat in only four years. Among other crops and vegetables which provide an exportable surplus are dates. These and other advances in Saudi agriculture have received international attention. This growth in agriculture could not have been achieved without substantial government support to the private sector with a wide spectrum of activities. These include the Saudi Arabian Agricultural Bank which disburses subsidies, grants, and interest free loans, and the Grain Silos and Flour Mills Organization (GSFMO), which purchases wheat from farmers at fixed support prices. The GSFMO provides grain silos for wheat storage, in addition to construction of flour mills and production of animal feed (Ministry of Agriculture and Water, 1993).

## **Effect of Change in Food Consumption on Nutritional and Health Status**

The change in food consumption patterns and in the people's lifestyle has led to a significant change in the health and nutritional status of the country. Disease trends have changed dramatically. Infectious and parasitic diseases, and severe cases of undernutrition have sharply declined. On the other hand, the affluence-related health problems like obesity, diabetes, cancer, and heart disease have increased and are now considered the main public health problems.

The available data indicates that the prevalence of adult obesity in the kingdom is high, and affects women in particular. There are several factors contributing to the high incidence of obesity amongst women. Watching television and eating snacks are the main activities during their leisure time, especially the majority of women are not employed (Musaiger, 1987). Excessive intake of food is also responsible for obesity in the region. The modernization and affluency, occurring in Saudi Arabia over the last three decades has probably surfaced the problems of obesity in vulnerable persons (Khashoggi et al, 1994). Understanding the psychodynamics of obese patients and their families is a prerequisite to successful treatment. Perhaps behaviour modification, with respect to food intake, will be effective in the treatment of obesity, especially in Saudi Arabia.

Diabetes has become one of the most challenging public health problems in Saudi Arabia. The prevalence rates ranging from 2.6% to as high as 30%, increases with age. It is believed that the rapid socio-economic changes in the country over the last twenty five years have contributed to the high prevalence rate of diabetes (Fatani et al, 1987; Sebai, 1987). All the acute and chronic complications of diabetes are prevalent in Saudi Arabia, but in particular, the pattern of chronic complications reflects the transition of Saudi Arabia from a developing to a rapidly industrialized nation.

Cancer in Saudi Arabia is an increasing problem as people change their food consumption patterns, lifestyle, and increase longevity (Sebai, 1989). Al-Akkad (1986) points out an upward trend in the incidence of lung, breast, colon, and rectal cancer; and a downward trend in oesophagus cancer. He relates these

trends to the rapid pace of economic progress, industrialization, and affluency.

The incidence of cardiovascular disease (CVD) is increasing rapidly in Saudi Arabia, judged by an increasing number of patients being admitted to coronary care units with CVD along with a major increase in the number of CVD-related surgical procedures done in all major hospitals. The contribution of hypercholesterolaemia as a risk factor for CVD is well established (Posner et al, 1993). The transition to a more westernized diet is likely to result in a high intake of animal fat and hence saturated fatty acids and dietary cholesterol. Sawaya et al. (1986) and Al-Jebrin et al. (1985) demonstrated that many Saudi Arabian dishes contained a high amount of saturated fatty acids and cholesterol, but were low in poly and monounsaturated fatty acids. Additionally, there is evidence that the serum total cholesterol concentration in the Saudi population is elevated (Khoja et al, 1993). Al-Nozha et al. (1993) reported also an excess of sodium intake resulting in elevation of blood pressure.

## CONCLUSION

The food consumption patterns in Saudi Arabia has changed dramatically and this change has affected the health and nutritional status of the community. There is an urgent need to initiate nutrition education programmes to correct the dietary habits resulting in a more physiological lifestyle. Epidemiological studies on factors associated with food habits as well as the link between dietary habits and chronic diseases are highly recommended.

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# FOOD CONSUMPTION PATTERNS IN UAE

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### INTRODUCTION

The socio-economic transition has been well identified in many developing countries including United Arab Emirates (UAE). Economic development and improved health care have played an important role in changing food consumption patterns and trends of diseases. This paper reviews the food consumption patterns in UAE based on food availability.

#### Per Capita Calorie Consumption

Data based on food availability showed that the total daily per capita calorie intake in 1988 was 3308 Kcal. The total calorie intake fluctuated from year to year, it was 3088 Kcal in 1972, increased to 3259 Kcal in 1976 and then decreased to 3194 in 1979 (Table 1). This fluctuation may be attributed to several reasons; the inaccuracy in calculation of food availability especially with lack of statistics in early 1970s, and the rapid growth of population particularly after the oil-boom period (1972-1973) (MOH, 1992 a).

The majority of calories are obtained from vegetable origins (77%), and the rest from protein foods (23%). Cereals, especially rice constitute the main source of energy in UAE. Rice, the staple food in the Emirates is usually eaten at lunch and supper. A recent nutrition survey showed that 97.5% of Emirate families consumed rice daily (MOH, 1992 b).

Based on Food Balance Sheet (FAO, 1988) data describing the availability of calories from cereals suggest that there was a continuous decline in the consumption of cereals. This was applicable to rice and wheat, the two cereals commonly consumed in the UAE. This was also accompanied by a reduction in the consumption of sweeteners which is derived mostly from sugar.

Table 1  
Per capita daily calories available from different types of food in UAE (1972-1988)

FOOD AVAILABILITY	YEAR					
	1972	1976	1979	1982	1985	1988
Total calories (Kcal/per capita/day)	3088	3259	3194	3283	3278	3308
Vegetable products	2271	2446	2364	2389	2509	2554
Animal products	817	813	830	894	769	754
% of total (AM)	26.5	24.9	26.0	27.2	23.5	22.8
Calories from cereals	1451	1273	1190	1159	1142	1139
Wheat	724	730	692	629	639	643
Rice	728	542	495	523	494	487
Maize	0	1	4	7	9	9
Sweeteners	456	441	331	304	293	277
Others	0	0	0	7	0	0
Calories from pulses	23	51	65	63	72	80
Calories from vegetables	48	89	104	151	162	157
Calories from fruits	201	249	252	258	345	356
Calories from meat	216	302	342	430	327	310
Calories from fats and oils	331	365	384	388	384	378

On the other hand Table (1) illustrates that calories available from other food groups showed an increasing pattern. per capita calories available from pulses increased from 23 calories daily in 1972 to 80 calories in 1988. A profound increase is noted in the number of calories available from vegetable and fruits, 327% and 177% over the same period respectively. The smallest increase was noted in the number of calories available from meat and fat which amounted to 143% and 114% respectively.

### **Calories available from protein rich foods**

Table (2) illustrates the daily calories available per capita from protein rich foods over the period 1972-1988. The data showed that sheep and goat meat has always been the most popular type of meat in the Emirates followed by poultry and beef. The highest increase in the number of available calories was noted in poultry meat which increased from 22 calories in 1972 to 104 calories in 1988. The corresponding figures for sheep meat were 89 and 114 calories respectively.

The data show that milk has always been an important source of calories in the Emirates, although, the number of calories derived from milk did not show a drastic increase over the study duration.

It was surprising to note that calories available from fish was limited to 32 calories in 1972 and only increased to 47 calories in 1988 despite the fact that fish dishes are very popular in the UAE.

### **Calories available from vegetables and fruits**

The daily calories available per capita from vegetables and fruits are illustrated in Table (3). The data show that tomatoes and onions were the most popular vegetables in the Emirates. However, the consumption of other vegetables showed a continuous increase over the study period. At the present time, okra, eggplant, cabbage, cucumber, beans and several other vegetables are available in the market.

A sharp increase was also noted in the number of calories available from fruits. Some fruits such as grapes and pineapples

**Table 2**  
**Per capita daily calories available from protein rich foods in UAE (1972-1988)**

FOOD AVAILABILITY	YEAR						
	1972	1976	1979	1982	1985	1988	
Calories from protein food							
Bovine meat	35	42	39	112	80	68	
Sheep and goat meat	89	119	147	178	136	114	
Poultry meat	22	95	125	115	86	104	
Meat from other sources	70	46	31	26	25	25	
Offals	15	7	7	9	10	11	
Milk	217	265	269	256	248	250	
Eggs	23	48	61	62	50	45	
Fish and seafood	32	32	43	40	35	47	

**Table 3**  
Per capita daily calories available from vegetables and fruits in UAE (1972-1988)

FOOD AVAILABILITY	YEAR						
	1972	1976	1979	1982	1985	1988	
Calories from vegetables	48	89	104	151	162	157	
Tomatoes	18	26	34	38	33	27	
Onions	13	15	14	19	29	37	
Other vegetables	17	49	56	94	100	93	
Calories from fruits	201	249	252	258	345	365	
Oranges, Mandarines	3	20	28	24	40	35	
Lemons	3	2	1	1	4	3	
Citrus, others	0	1	2	3	3	3	
Apples	2	15	12	12	17	20	
Pineapples	0	6	11	8	7	7	
Dates	149	92	95	110	137	159	
Grapes	0	6	10	5	44	42	
Banana	6	37	32	21	24	29	
Other fruits	38	70	61	75	68	66	

were not available in 1972. Others were available in limited quantities such as oranges, banana and apples. Currently, almost all types of fruits are readily available in the market throughout the year and at a price within the purchasing power of the average consumer. The data show that dates have always been a popular fruit in the Emirates and have been consumed in large quantities when compared with any other fruit.

### **Calories available from animal and vegetable fats**

A comparison between the number of calories available from vegetable oils and animal fats is presented in Table (4). The data show that vegetable oils were available in limited amount in 1972 (17 cal/day) in contrast with animal fats which represented the most important source of lipids in the diet (314 cal/day).

This trend did not last long and after 1976, the trend was reversed as vegetable oils became the dominant source of dietary lipids. The latest available figures available per capita from vegetable oils amounted to 292 calories as compared with 86 calories derived from animal fat.

### **Types of oils available**

As the consumption of vegetable oils has increased, it is of interest to compare the change in the number of calories available from different types of oils as shown in Table (5). The data shows that corn oil, which was not available in 1972 has become the most popular oils since 1979. Soybean oil was also introduced to the market in 1976 and is currently the second important source of calories of vegetable oils. Although the number of calories available from olive oil more than doubled during the period 1972 - 1988, it did not contribute more than 6% of the calories available from vegetable oils.

### **Food frequency intake**

Data on food frequency intake was obtained from the recent National Nutrition Survey (1991). Mothers were interviewed and asked about frequency intake of some common foods (Table 6). It was found that rice, fresh vegetables, fruits, milk and tea were consumed daily by more than 85% of mothers in UAE. Meat and chicken were consumed twice to three times a week by 75% of the

**Table 4**  
Per capita daily calories available from vegetable oils & animal fats  
in UAE (1972-1988)

FOOD AVAILABILITY	YEAR						
	1972	1976	1979	1982	1985	1988	
Vegetable oils							
Kilograms/year	0	9	11.9	12.5	12.3	12.3	
Calories/day	17	210	279	295	291	292	
Gram fat/day	1.9	23.7	31.5	33.3	32.9	33	
Animal fats							
Kilogram/year	15.7	7.8	5.3	4.6	4.6	4.3	
Calories/day	314	155	105	93	93	86	
Gram fat/day	35.4	17.4	11.9	10.5	10.5	9.7	

**Table 5**  
**Per capita daily calories available from oils in UAE (1972-1988)**

FOOD AVAILABILITY	YEAR					
	1972	1976	1979	1982	1985	1988
Calories from oils	17	210	279	295	291	292
Soybean oil	0	5	27	34	42	55
Ground nut oil	0	3	2	1	1	1
Olive oil	8	25	20	21	20	19
Corn oil	0	56	113	141	136	129
Oil crop oil & others	9	121	117	98	92	91

Table 6  
Frequency intake of foods by Emirate mothers (N = 978)

Food	No intake %	Once/day %	More than Once/day %	2-3 week %	Weekly %	Monthly %	Occasionally %
Rice	0.1	15.7	81.8	2.1	0.1	0.1	0.0
Fresh - vegetables	0.4	30.5	59.8	.4	1.5	0.3	0.1
Fruits	0.3	50.7	37.2	7.8	3.3	0.5	0.2
Milk	1.0	47.4	48.9	1.9	0.5	0.1	0.1
Dairy products	0.7	29.4	53.6	10.9	4.4	0.8	0.1
Cooked - vegetables	2.1	7.2	28.9	43.9	15.2	2.6	0.1
Meat	0.4	1.1	7.1	75.4	14.0	1.7	0.3
Fish	0.8	0.9	22.8	63.0	11.2	1.2	0.0
Eggs	1.0	12.3	51.9	27.8	5.7	1.2	0.0
Chicken	0.3	1.1	12.0	74.3	12.0	0.2	0.1
Legumes	8.1	0.9	7.0	26.1	36.4	19.3	2.2
Nuts & seeds	11.5	4.4	10.5	12.1	20.6	16.6	24.4
Fruit juice	6.5	15.8	39.1	20.2	11.7	4.4	2.2
Tea	2.6	67.9	25.9	1.9	0.4	0.7	0.6

mothers. About 64% of mothers consuming eggs daily (MOH, 1992).

Fish was more frequently consumed than meat and chicken as 24% of mothers consumed fish daily, and 63% consumed it 2-3 times a week. This is not surprising as the per capita consumption of fish in UAE is among the highest in the Arab World. The recent statistics of Infosamak (1992) showed that the annual per capita fish consumption in UAE is 26.3 Kg, and this figure ranks UAE second after Oman in the Arabian Gulf countries (29.4 Kg).

## **CONCLUSION**

In general it can be concluded that the food consumption patterns in UAE have become more varied. The high intake of fresh fruits and vegetables should be encouraged among the Emirati population. However, more investigations are needed in the quantity intake of foods and the actual nutrient intake to determine the deficiency or the excess of essential nutrients.

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# FOOD FREQUENCY INTAKE OF UNIVERSITY FEMALE STUDENTS IN UNITED ARAB EMIRATES

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## INTRODUCTION

The United Arab Emirates has faced a rapid transition in its socio-economic status during the past 3 decades, which resulted in great changes both in life-style and food consumption patterns. The traditional diet which consisted of dates, buttermilk, rice, high fibre bread, fresh vegetables and fish has become more diversified. Red meats, eggs, fast foods and various processed foods have become an important items in the diet (Musaiger, 1987).

Studies on food habits in United Arab Emirates are scanty. The National Nutrition Survey (1992) showed that 70% of Emirate families purchased fast foods and the most foods commonly consumed by the families were rice with meat or chicken or fish, grilled meat and vegetables (Musaiger, 1992). A recent study by Musbah and Musaiger (1992) on food habits of adolescent girls in Sharjah Emirate reported a wide range of foods consumed by those girls. The most foods preferred were chicken, pizza, sweets, hamburgers, macaroni, meat, rice, fish, chocolates and carbonated beverages.

The present paper aims to study the food frequency and meal intake of university female students in the United Arab Emirates (UAE).

## METHOD

The target group in this study was university female students who attended the course " Food and Man" in the UAE University in 1993. There was no significant difference in age and nationality between females included in this study and total females registered in UAE University.

The total number of female students studied were 215, with their age ranging from 18 to 30 years. The mean age was  $19.7 \pm 1.3$  years. Females were assembled into a class and asked to fill specially designed questionnaire which contained information on meal patterns and frequency of intake of foods commonly consumed in the country.

Data were stored in Dbase files and analysed using EPI-INFO Programme (WHO/CDC, 1990). Chi-square was used to test the statistical association between food intake and age of female students.

## RESULTS AND DISCUSSION

The percentage of females who skipped breakfast (15.8%) was higher than that for skipping lunch (11%) and supper (7%). Most of females skipped morning snack (66%), and about one third (38%) skipped afternoon snack. There was no significant difference between females aged less than 20 years and those 20 years and above in meal and snacking patterns. However, younger females (<20 years) were more likely to skip breakfast and supper than older females (20 + years). In contrast, morning snack and supper were more often skipped by older than younger girls (Table 1).

The dietary habits of university female students are different than that of secondary school females. This is because of different time-table as well as the living of most university females in UAE in hostels. The time-table of university females start from 8 a.m. and may end at 8 p.m., with several breaks in between. This certainly affects the time of consuming meals and snacks. Also living in the university hostels limit the type and choice of foods eaten. In general, university females were less likely to skip breakfast compared to secondary school females in UAE, but were more likely to skip lunch, morning and afternoon snacks (Musbah and Musaiger, 1994).

A relatively high percentage of girls rarely or not consumed some nutritious foods such as milk (58%), cooked vegetables (53%), legumes (45%), fish (44%) and eggs (37%) (Table 2). The low intake of milk and other dairy products such as cheese and buttermilk is a source of concern as these foods are the richest sources of calcium. Increased consumption of foods high in

**Table 1**  
Meal and snack intake by age of university female students in UAE

Meal & Snack	Age (years)				Total	
	< 20		20+		No.	%
	No.	%	No.	%	No.	%
<b>Breakfast</b>						
Intake	101	86.3	80	81.6	181	84.2
Non-intake	16	13.7	18	18.4	34	15.8
<b>Morning Snack</b>						
Intake	36	30.8	36	37.7	72	33.5
Non-intake	81	69.2	62	63.3	143	66.5
<b>Lunch</b>						
Intake	104	88.9	87	88.8	191	88.8
Non-intake	13	11.1	11	11.2	24	11.2
<b>Afternoon Snack</b>						
Intake	71	60.7	62	63.3	133	61.9
Non-intake	46	39.3	36	36.7	82	38.1
<b>Supper</b>						
Intake	110	94.0	90	91.8	200	93.0
Non-intake	7	6.0	8	8.2	15	7.0

Table 2

Frequency intake of some common foods by university females in UAE

Foods	Frequency Intake (%)			
	Daily	1-3/Week	4-6/Week	None or rarely
Rice	67.0	6.5	15.8	10.7
Bread	86.5	1.9	6.5	5.1
Fish	2.3	1.9	51.6	44.2
Meat	7.4	7.0	55.8	29.8
Chicken	28.0	14.0	45.6	11.6
Eggs	8.4	1.9	52.6	37.2
Legumes	5.1	2.3	47.4	45.1
Milk	20.0	2.8	18.6	58.6
Buttermilk	42.8	8.8	24.2	24.2
Cheese	50.2	10.7	24.7	14.4
Fresh vegetables	59.1	7.9	20.0	13.0
Fresh fruits	40.9	9.3	32.1	17.7
Cooked vegetables	8.4	4.7	33.5	53.5
Dates	22.3	3.3	24.7	49.8
Canned drinks	50.7	4.2	23.7	21.4
Tea, black	23.3	1.4	17.7	57.7
Tea, with milk	33.5	4.2	17.7	44.7
Coffee	5.1	1.4	13.0	80.5
Carbonated beverages	53.0	7.4	14.9	24.7
Chocolates	38.1	6.0	28.4	27.4
Potato-chips	24.2	7.4	44.7	23.7
Biscuits	11.6	3.7	35.3	49.3
Corn-puffs	20.0	6.5	27.9	45.6

calcium is recommended for all but especially for adolescent girls and adult females.

Bread and rice, the staple foods, were consumed daily by 86% and 67%, respectively. However, more girls did not eat rice (11%) compared to bread (5%). Chicken was preferred more than fish and meat. Dates, the traditional fruit, were less consumed by girls. It is well documented that the food habits in Arabian Gulf countries have become more westernized and the intake of traditional foods such as dates and buttermilk has decreased dramatically, especially among new generation (Musaiger, 1987).

Frequency of intake of animal protein foods according to age of female students is given in Table 3. In general, chicken, cheese, milk and eggs were more daily consumed by older than younger girls, but the difference was not statistically significant. About 50% of girls consumed meat, chicken and fish between one to three times a week. This is because these foods are the main items at lunch in UAE and other Arabian Gulf countries. Milk and cheese are mostly consumed at breakfast and supper.

Interestingly a relatively high proportion of young and older girls did not intake meat (28% and 32%, respectively) and fish (46% and 42%, respectively). We have no explanation for this practice. It may be due to methods of cooking the foods in the hostels or the food habits of the girls. The low preference of fish by girls was also reported in other Arab Gulf States (Musaiger and Gregory, 1991).

There was no significant differences in the intake of cereal-based foods, fruits, vegetables, sweets, beverages and legumes between older and younger girls (Table 4). Older girls were more often daily consumed tea (either black or with milk) and carbonated beverages. More than 50% of both groups of girls did not drink black tea. About 49% and 40% of younger and older girls respectively did not consume tea with milk. The intake of tea especially with meal have a negative effect in the absorption of iron (DeMayer, 1990). Iron deficiency anaemia is highly prevalent among adolescent girls in the Arab Gulf countries, including United Arab Emirates. It is widely accepted that the high intake of tea by the people in the Arab Gulf has an important role in the occurrence of iron deficiency anaemia (Musaiger, 1990).

Table 3

Frequency intake of animal protein foods according to age of university female students in UAE

Foods	Age (years)	Frequency Intake (%)			
		Daily	1-3/Week	4-6/Week	None or rarely
Meat	< 20	6.8	57.3	7.7	28.2
	20 +	8.2	54.1	6.1	31.6
Chicken	< 20	26.5	48.7	17.1	7.7
	20 +	31.6	41.8	10.2	16.3
Fish	< 20	1.7	49.6	2.6	46.2
	20 +	3.1	54.1	1.0	41.8
Cheese	< 20	45.3	28.2	12.0	14.5
	20 +	56.1	20.4	9.2	14.3
Buttermilk	< 20	41.9	26.5	8.5	23.1
	20 +	43.9	21.4	9.2	25.5
Milk	< 20	17.9	17.1	5.1	59.8
	20 +	22.4	20.4	0.0	57.1
Eggs	< 20	4.3	56.4	3.4	35.9
	20 +	13.3	48.0	0.0	38.8

Table 4

Frequency intake of cereal-based foods, fruits, vegetables, sweets, beverages and legumes according to age of university female students in UAE

Foods	Age (years)	Frequency Intake (%)			
		Daily	1-3/Week	4-6/Week	None or rarely
Rice	< 20	68.4	13.7	7.7	10.3
	20 +	65.3	18.4	5.1	11.2
Bread	< 20	87.2	6.8	1.7	4.3
	20 +	85.7	6.1	2.0	6.1
Fresh fruits	< 20	40.2	29.1	12.8	17.9
	20 +	41.8	35.7	5.1	17.3
Dates	< 20	22.2	28.2	5.1	44.4
	20 +	22.4	20.4	1.0	56.1
Fresh vegetables	< 20	60.7	18.8	9.4	11.1
	20 +	57.1	21.4	6.1	15.3
Cooked vegetables	< 20	6.0	41.0	6.0	47.0
	20 +	11.2	24.5	11.2	61.2
Chocolates	< 20	39.3	29.1	8.5	23.1
	20 +	36.7	27.6	3.1	32.7
Biscuits	< 20	11.1	38.5	5.1	45.3
	20	12.2	31.6	2.0	54.1
Tea, black	< 20	17.1	17.9	1.7	63.2
	20	30.6	17.3	1.0	51.0
Tea with milk	< 20	28.2	17.1	6.0	48.7
	20 +	39.8	18.4	2.0	39.8
Carbonated beverages	< 20	48.7	18.8	11.1	21.4
	20 +	58.2	10.2	3.1	28.6
Canned drinks	< 20	51.3	24.8	4.3	19.7
	20 +	50.0	22.4	4.1	23.5
Coffee	< 20	4.3	10.3	1.7	83.8
	20 +	6.1	16.3	1.0	76.5
Potato-chips	< 20	23.1	45.3	6.8	24.8
	20 +	25.5	43.9	8.2	22.4
Corn-puffs	< 20	18.8	30.8	6.8	43.6
	20 +	21.4	24.5	6.1	48.0
Legumes	< 20	4.3	53.0	3.4	39.3
	20 +	6.1	40.8	1.0	52.0

Two main issues in the dietary habits of university girls were noticed. Firstly, the high proportion of girls who skipped morning and afternoon snacks, and secondly the low intake of fresh vegetables and fruits. The nutritional quality of snacks has a significant impact on the total nutrient intake. Individuals who skipped morning and afternoon snacks may find difficulties to obtain their daily nutrient requirements (Farthing, 1991). This is particularly true if the foods consumed at meals are poor in its nutritional value.

The low intake of fresh vegetables and fruits by girls may contribute in part to some chronic diseases at adulthood. A high intake of vegetables, fruits and high fiber foods is thought to reduce the risk of coronary heart diseases through several mechanisms, including lowering serum cholesterol and blood pressure levels (Shrapnel et al, 1992). A recent study in Bahrain (Al-Roomi et al, 1994) showed that patients with myocardial infarction tended to consume fresh vegetables and fruits less frequently per week than community controls.

In conclusion, the dietary patterns of university female students in this country need to be improved and guided towards more good eating habits. Nutrition education programme both in mass media or university curricula should focus on healthy lifestyle and sound food habits, with more emphasis on nutritious snacks and increase intake of fresh vegetables and fruits.

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# FOOD HABITS IN SOUTHERN REGION OF OMAN

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## INTRODUCTION

Published reports on food habits in Oman are limited. An earlier study by UNICEF (1973) showed that Omani diet was more homogenous and traditional foods such as fish, dates, rice and bread were the main items in the diet. Recently, Musaiger (1992) reported that the diet of Omani women is more diversified. Meat and chicken were more frequently consumed than fish, while processed and fast foods have become popular items in Omani meals.

Meal patterns in Oman differ somewhat by geographical area, with each area having its own particular habits based on available food resources. The desert area have the most limited and least diversified diet. Rice, camel or goat milk, bread and dates are the main foods consumed in these areas. The foods consumed in mountains are mainly consisted of goat milk, rice, vegetables and goat meat. The diet in coastal areas are more diversified and consist of a wide range of foods (Musaiger, 1988).

The present paper describes the food habits of preschool children, adolescent girls and women in the southern region of Oman. This region accounts for a third of the country's total area and is inhabited by more than 150,000 people. It has three main geographical areas; coastal, mountain and desert. It is estimated that about half of the population live in Salalah city (the capital of the region), and the rest in many villages in the mountain and desert areas. Inhabitants of coastal areas are involved in agriculture, fishing and trade whilst those in the mountains are mostly engaged in cattle-breeding, especially cows and camels. People living in the desert (the Bedouins) are mainly involved in raising goats and camels (Ministry of Commerce and Industry, 1989).

## METHOD

The data of this paper were based on several rapid assessment surveys and field observation by the author. Information on food habits of mothers, pregnant mothers, preschool children and adolescent girls were obtained using pretested questionnaire. Mothers were interviewed by female social workers at households and health centers, while adolescent girls were interviewed at schools. The total number of mothers included in the study was 117 for food frequency intake, 39 for pregnant mothers, and 42 for mothers with preschool children.

Adolescent girls were selected using a multi-stage stratified sampling technique. The schools were divided into two educational levels, intermediate and secondary. Two schools were then selected randomly, one for each educational level. The girls were selected from school records by a systematic sampling technique. The girls were interviewed by female social workers and asked about their meal patterns. The total sample included in the study was 139 girls.

## RESULTS AND DISCUSSION

### Preparation of Foods

Based on interview with the women in the southern region, certain unsound food practices in food preparation were found. The most important is the wide use of animal fat (ghee) and coconut oil in the preparation of local dishes. Ghee is sometimes mixed with honey and consumed with bread as a dish. In other cases it is used for frying the foods instead of vegetable oil. Ghee is also the main item in many dishes given to lactating mothers such as *Joulah* (wheat flour, ghee, sugar and spices) *Skhanah* (fenugreek, wheat flour, sugar, ghee and milk). *Khabisa* (wheat flour, ghee, sugar, and spices) and *Assidah* (wheat flour, ghee and honey).

Coconut oil is widely used for cooking. Two types of vegetable oils are available in markets in the southern region, pure coconut oil and a mixture of coconut, palm and corn oils. Both types contain a high concentration of saturated fatty acids. Health education should focus on reducing use of coconut oil

and animal fat. This is an important measure to prevent diet-related chronic diseases in Oman.

### **Meal Patterns of Mothers**

Bread, tea and milk were the main foods consumed by mothers at breakfast. When compared to other regions of Oman, mothers in Salalah city are more likely to drink milk at breakfast and supper. About 17% of the mothers consumed butter-milk (laban) at breakfast but no mothers in other regions drink such beverages at this meal (Musaiger, 1991).

As in other regions in Oman, rice with meat, chicken or fish constituted the lunch in the southern region. In general, fish and chicken were more commonly consumed in Salalah city than in the mountains and desert, where meat was the main animal food consumed at lunch. At supper wheat bread (80%), chicken (42.9%) and milk (31.4%) were commonly consumed. This meal pattern shows that vegetables and fruits were less consumed, particularly in the mountain and desert areas.

### **Food Frequency Intake by Mothers**

As reported in a previous study (Musaiger, 1991), mothers in the southern region were more likely to consume milk than their counterparts in other regions. Three quarters of the mothers (74%) consumed milk daily. Rice, bread and tea were the common foods consumed daily by more than 85% of the mothers studied. About 57% of mothers consumed citrus fruits daily, and 26.5% consumed them 1 to 3 times a week. Yellow fruits (mostly papaya and mango) were consumed less frequently than citrus fruits. Although, the southern region has good resources of fish, the frequency of intake of fish was slightly more than that of meat and chicken. Shrimp were rarely consumed as only 1% of mothers ate them daily and 85% of mothers rarely or never ate shrimp (Table 1).

In general the food consumption patterns of southern mothers were more varied when compared with the patterns 20 years ago (UNICEF, 1973). Milk products such as cheese and yoghurt have become an essential part of the diet of southern Omani families. Fish has been replaced by chicken and meat as these have come within the purchasing power of the family. The

intakes of fresh fruit and vegetables have declined, while the intakes of sweets, chocolates and carbonated beverages have increased. This trend in food consumption may be responsible in part for the change in patterns of morbidity, as chronic diseases such as diabetes, hypertension and heart disease have become a major cause of death in Oman (Ministry of Health, 1991).

### Food Habits During Pregnancy and Lactation

About 30% of pregnant mothers in the region reduced their food intake during pregnancy; 8.8% increased it and 62% did not change it. Mothers who reduce their food intake during pregnancy are at greater risk to nutrient deficiency and insufficient weight gain and this may affect the health of both mother and fetus. Insufficient weight gain during pregnancy is associated with small for gestational age infants. These infants are at greater risk of neonatal death and various defects and disabilities (King and Weininger, 1990).

Many mothers avoided spicy foods (20.2%), tea (8.8%) and citrus fruits (5.9%) during pregnancy, believing that such foods are harmful to the mother and her fetus. The avoidance of spices and tea during pregnancy is recommended, but citrus fruits should not be avoided as these are good sources of vitamin C and other minerals.

*Assida*, *laham ma'aaheen* (meat cooked with ghee), ghee mixed with honey and milk were the main foods consumed during the puerperium. Mothers believed that such foods give more energy (38%), improve the health (14.7%), increase milk secretion (11.8%) and clean the uterus from blood (8.9%). Some of these foods (*Assida* and ghee with honey) are very rich in energy but low in protein and in some essential minerals such as iron and zinc (Musaiger, 1988).

Several other foods were commonly consumed during the puerperium such as tea with brown sugar, which were thought to clean the uterus. *Ma'joon altamer* (dates mixed with wheat flour and black pepper) and ginger tea were consumed to warm the abdomen, and coffee with brown sugar to reduce back-pain. Some mothers avoided eating fish during the first 40 days after delivery, because they believed that fish reduces the time needed for healing the wound.

Table 1  
 Frequency intake of some common foods by mothers in the southern region (N=117)

Food	Daily	1-3/week	4-6/week	1-3/month	Rarely or none
	%	%	%	%	%
Meat	7.1	72.3	6.3	13.4	0.9
Chicken	3.6	77.7	8.0	3.6	7.1
Fish	8.0	67.0	9.8	9.8	5.4
Milk	73.9	9.9	0.0	2.7	13.5
Eggs	14.5	40.9	6.4	8.2	30.0
Cheese, cheddar	25.9	41.1	2.7	7.1	23.2
Yoghurt	21.6	25.2	3.6	18.9	30.6
Rice	89.4	7.1	3.5	0.0	0.0
Bread	87.5	10.7	1.8	0.0	0.0
Legumes	6.5	27.8	1.9	22.2	41.7
Green leafy vegetables	19.8	39.6	1.8	14.4	24.3
Yellow fruits	12.7	40.9	3.6	24.5	18.2
Citrus fruits	56.6	26.5	0.9	11.5	4.4
Dates	38.7	25.2	2.7	13.5	19.8
Tea, black	76.8	7.1	1.8	0.9	13.4
Tea with milk	87.6	2.7	0.9	0.9	8.0
Coffee	18.9	8.5	0.0	6.6	66.0
Carbonated beverages	26.1	31.5	6.3	8.1	27.9
Sweets & Chocolates	10.3	15.9	0.9	8.4	64.5
Cakes & Biscuits	10.4	30.2	0.9	17.9	40.6

## Food Habits of Preschool Children

Preschool children are especially vulnerable to a number of nutritional problems (Jelliffe and Jelliffe, 1989). In Oman preschool children (1-6 years) have a high prevalence of wasting and stunting, and this is largely due to their food habits (Musaiger, 1992). An attempt was made in this study to describe the dietary habits of preschoolers, as baseline data for a nutritional education programmes to improve the food habits of this age group.

The meal patterns of preschool children did not differ from those of adults. Bread, milk, tea and eggs were commonly consumed at breakfast. Rice with meat, chicken or fish were the main foods consumed at lunch. About 24% of mothers stated that their preschoolers ate fresh vegetables and 16.7% consumed fruits at lunch. These percentages are relatively higher than those reported by Musaiger (1989) in other regions in Oman. Preschool children in Salalah city were more likely to consume carbonated beverages, milk and tea as snacks between lunch and supper, when compared to other regions in Oman. Although Salalah city is well known for fruits production, the intake of fruits between meals by preschoolers was relatively low.

The high percentage of preschool children who consumed chocolates, sweets, biscuits and canned drinks as snacks between meals is a source of concern, for their ability to reduce the appetite for nutritious foods in the main meals.

At supper, milk (31%), meat (23.8%), eggs (11.9%) and chicken (11.9%) were the main foods consumed by preschoolers. The intakes of milk and meat at supper was high in Salalah city when compared to other regions. A high percentage of mothers (52.4%) believed that milk is beneficial to preschool children. However, the way of preparing the milk makes it harmful for the children, as many mothers, especially in the mountains, do not boil the milk before serving to kill the pathogenic microorganisms that may cause sickness to the children (Musaiger, 1990 a).

Adolescence is a period of rapid physical growth and the increased nutritional requirements to support increase in body mass (ADA, 1989). Teenage girls are vulnerable to nutritional problems because of several physiological and social factors. One of the important factors affecting health and nutritional status of adolescent girls in Oman is early marriage. Studies demonstrate that a high percentage of Omani women get married in adolescence (13-18 years) (Musaiger, 1990 b, 1992). Teenage girls who become pregnant early (before 18 years) are at high nutritional risk since they must meet their own needs for growth as well as the energy and other nutrient demands of pregnancy and lactation (ADA, 1989). Understanding the dietary habits of adolescent girls is essential for any intervention programme to improve the nutritional status of teenage girls in Oman.

Breakfast was not consumed by 18% of the adolescent Omani girls. It has been shown that the nutrient intakes of college students were lowered 10-25% due to skipping breakfast (Shiraki and Iwasaki, 1986). The proportion of adolescent girls in Salalah city who skipped breakfast, however, is relatively low when compared to other regions in Oman. The percentage of breakfast skipping by adolescent Omani girls ranged from 12.8% to 28.4% (Musaiger, 1989). A recent study among school children in Bahrain (Musaiger and Gregory, 1992) showed that the main reasons for skipping breakfast were : waking late, not accustomed to eating breakfast, not hungry and not liking the foods served at breakfast. Most of these reasons may apply also in Oman.

Bread (48.2%), milk (36.7%) and eggs (25.9%) were the main foods consumed at breakfast. As in other age groups, adolescent girls in Salalah city were more likely to consume milk than their counterparts in other regions of Oman (Musaiger, 1989).

Morning snacks were not consumed by 10% of the girls but canned drinks (79.1%), *falafel* sandwich (mixture of broad beans, onions, parsley and spices) (34.5%) and cheese sandwich (22.3%) were most commonly consumed. Other foods offered in the school canteens were chocolates, corn-puffs, potato-chips and sweets. Some of these foods, such as corn-puffs and sweets, are poor in nutritive value. The nutritious ones (various kinds of sandwiches), need to be prepared hygienically. In some Arabian

Gulf countries sandwiches prepared in unhygienic way and stored at a warm temperature in the school canteens, thus leading to spoilage. Food poisoning in schools has been reported in this region (Musaiger, 1987).

For lunch adolescent girls tended to eat more fresh vegetables and fruits than preschool children. The foods mostly eaten at lunch were : rice (87.8%), fish (41%), meat (33.8%), vegetables (33.8%), chicken (17.3%) and fruits (10.8%). Few girls (4.3%) skipped their lunch; indicating that lunch is the least skipped meal by adolescent girls.

A high percentage of adolescent girls (22.3%) did not take snacks between lunch and supper. The most common foods consumed at afternoon snack were sweets and chocolates (19.4%), black tea (18.7%), and fruits (15.8%).

About 7% of the girls did not eat supper. Generally, the foods consumed at supper were more varied than those at other meals. Bread (65.5%), meat (19.4%), milk (18.7%) and eggs (14.4%) were the main foods consumed at supper. The trend of food consumption of these girls is close to that reported for Omani mothers in Salalah city (Musaiger, 1991). However, the mothers were more likely to consume milk, chicken, and tea at supper than their adolescent girls.

The relatively high consumption of tea by adolescent girls at breakfast, evening snack and supper is a matter of concern, as tea negatively affects absorption of non-haem iron (DeMayer, 1986). Iron deficiency anaemia is highly prevalent among teenage girls in Oman. It is important therefore to educate the public in general and adolescent girls in particular to reduce intake of tea, especially with the meal.

## CONCLUSION

This investigation revealed many unsound food beliefs and practices in the southern region of Oman which may negatively affect the nutritional status of mothers and their children. One of the most important measures to improve the food habits of the children is to improve the knowledge of parents on nutritional needs and proper food habits for children. This can be done by health education through various media. Information provided in

health education should be related to sound dietary habits to prevent and control local nutritional problems in this region.

Nutrition training courses should be conducted for those directly in contact with mothers and children such as social workers, nurses and teachers. The training courses should focus on dietary management of nutritional problems in the southern region and sound food habits during adolescence, pregnancy, puerperium and infancy.

The quality of food provided to school children should be improved. Cornpuffs, canned drinks, potato chips, sweets and chocolates can be excluded from the school canteen, and replaced by other nutritious foods such as milk, *laban* (butter milk), fruit juice, fruits and various kinds of sandwiches. The school curriculum should also be improved to contain more information on good food habits especially during adolescence, pregnancy, lactation and infancy.

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## APPENDIX A

### SUMMARY OF FOOD AND NUTRITION SITUATION IN THE ARAB COUNTRIES OF THE GULF

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Source : FAO/RNEA (1993) Summary of the  
International Conference on Nutrition (ICN)  
Country Papers, Cairo, Egypt.



## BAHRAIN

### INTRODUCTION

Bahrain consists of 33 islands with a total of about 661<sup>2</sup> km. The country lies halfway down the Arabian Gulf and is linked to Saudi Arabia through a causeway. The main island of Bahrain is Manama, the capital city of the State where about half of the population live.

The population was estimated at 516,444 in 1991 (67.2 of Bahrainis and 32.8 of non-Bahrainis). The population is increasing at a high rate mainly due to the influx of expatriates who came for work. According to the 1981 census, 68% of the population were Bahrainis, the rest were expatriates mainly from India, Iran and the Far East.

Before the discovery of oil, Bahrain was known for its pearls. It was also an important agricultural and trade centre. The discovery of oil in 1932, although of limited amount, led the country to develop and diversified economic base. Consequently Bahrain's economy was not seriously affected by the regional recession until late 1984. Although oil contributes only about 1/6th of the GCP, oil sales provide over 50% of government revenues. Banking is an important sector in the economy. The causeway connecting Bahrain to Saudi Arabia opened in December 1986, had a profound economic and political impact on Bahrain. Local industries benefitted from export opportunities to Saudi Arabia and other GCC States. The tourism sector has also benefitted as a result of the causeway.

### I. THE NATURE AND DIMENSION OF NUTRITION AND DIET-RELATED PROBLEMS:

1. Assessment of Nutritional Problems: Few nutritional surveys were carried out during the last decade. Most of these suffered from methodological problems and lacked information on dietary intake and clinical data.

#### a. Undernutrition:

Several studies reported on the prevalence of underweight indicated that among pre-school children (using Harvard Standard), stunting was 14.3% while wasting of muscle was 67.6%. Among school children, aged 6-18 years, 0.7% had weights less than 60% of the Harvard Standard and 6.9% had heights less than 90% of the Standard. Another study showed that 76% of the male pre-school children and 71.2% of the females in rural areas had low weight for age according to Harvard Standard compared to 52.6% and 70.4% respectively in urban areas. In children aged 6-11 years, it was found that 72% of males and 58% of females had low weight for age in rural areas. The percentages were 65.5% for males and 70.5% for females in urban areas.

b. Low Birth Weight (LBW):

A study in 1985 reported that of 8793 infants (3495 males and 3298 females) born in 1980, the mean birth weight of all infants studied was 3170 g. The mean birth weight for males was 3223 g. while that for females was 3140 g. The sex ratio was 1.1 to 1.0. Another study in 1985 found that there was a higher incidence of low birth weight among females (7.9%) compared to males (6.9%). The study indicated that geographical location, mothers' age and interval between births contributed significantly to birth weight of the newborn in Bahrain.

c. Micronutrient Deficiencies:

i. Iron-deficiency anaemia: Iron deficiency anaemia is one of the public health problems in Bahrain. A study in 1980 reported that 34% of pre-school children were anaemic (Hb < 11 g/100 ml) and 32% among school children (Hb < 12 g/100 ml). The prevalence among females (42.8%) was almost double that of males (21.0%). Another study showed that the prevalence of anaemia among pre-school children was 39.5% in rural area and 19.7% in urban areas. The percentages were 40% and 23% respectively for children aged 6-11 years. A later study in 1985 showed that the prevalence has declines and showed that only 24% of school girls aged 6-18 years were anaemic. A study in 1980 found that parasitic infections were the main cause of anaemia among school children. A later study showed that the prevalence of intestinal parasitic infections has decreased during the period 1980-1987 mainly due to improvement in health services and sanitation conditions.

ii. Vitamin D deficiency: The incidence of Vitamin D deficiency has been reported in Bahrain and has been associated with wrapping of infants for long periods. It has been observed that 79% of Bahraini mothers wrapped their infants for periods varying from one week to more than 6 months. The deficiency may also be due to dietary factors since it has been observed that apart from fish most commonly used dishes were very low in vitamin D.

d. Diet-related Non-communicable Diseases:

i. Cardio-vascular Diseases: Cardio-vascular diseases are the first cause of death in Bahrain. The death rate from these diseases among persons 50 years of age and above has increased from 77 in 1976 to 120/10,000 in 1986 according to the Public Health Directorate report in 1987. Deaths due to diseases of the circulatory system occur early in life (26-34 years) and increase thereafter. Hypertension occurs mostly at 45-54 years and continue to increase thereafter. In general, males are more susceptible to cardio-vascular diseases than females. A case control study in Bahrain showed that the prevalence of diabetes, hypertension, drinking alcohol, smoking and overweight are higher among patients with CHD than the control.

The high intake of saturated fatty acids, dietary cholesterol and sodium are important contributory factors in the incidence of heart diseases in Bahrain. Transition from traditional diets to modern western diets that include more animal foods and hence more saturated fatty acids and dietary cholesterol may be another contributory factor.

ii. Obesity: Obesity is one of the public health problems in Bahrain specially among adult females. A recent study (1990) showed that 64% of mothers aged 18 years and above were obese (based on BMI over 25). Possible factors leading to such a high rate of obesity include lack of physical exercise, high intake of energy foods, sedentary life styles, multi-pregnancies and other socio-cultural factors. Another study (1991) indicated that educational level, type of employment, family history of obesity and exercise contributed significantly to obesity among adult females in Bahrain.

Food habits and taboos were found to be more prevalent among these families suggesting lack of sound nutrition knowledge.

With regard to childhood obesity a study in 1985 found that 12% of preschool children aged 1-5 years were overweight (100% of Harvard Standard). The highest percentage (30%) occurred in the first six months of life. Another study found that 19% of Bahraini school girls aged 7-18 years were obese.

iii. Diabetes Mellitus: Diabetes is another public health problem in Bahrain specially among urban societies. In 1987, it was estimated that 4% of the total deaths in Bahrain were due to diabetes mellitus. It occurred at the age of 45 and over. At the age of 45-54, the death rate was 4 times higher among males than females. However, at 55 years and over, the death rate was higher among females than males.

The disposing factors for the prevalence of diabetes include obesity, higher life expectancy and increase in survival rate of young diabetic children. Most of the diabetic patients in hospitals came from urban areas (80%). Most of these patients were female, over-weight and elderly people. The reason for the higher occurrence of diabetes among females compared to males in Bahrain may be attributed to multiple pregnancies, obesity, lack of exercise and food habits.

iv. Cancers: Cancers of various types are the third cause of death in Bahrain. The percentage of deaths due to cancer increased from 2.5% in 1976 to 12% in 1985 and the incidence was generally higher among males than females. Death statistics in Bahrain indicated that the main types of cancer were: lung cancer (33.3%), gastro-intestinal (22.0%), liver (7.3%) and breast (5.7%). High intake of animal fat, low intake of dietary fiber and the high incidence of obesity may be responsible in part for the increasing incidence of some types of cancer in Bahrain. The majority of Bahraini dishes are low in fiber. Polished rice and wheat bread made from flour of low extraction rate constitute the staple foods. The intake of fresh fruits and vegetables is low. Therefore, there is a need for more investigations on the food habits and the incidence of cancers.

v. **Dental Caries:** Dental caries is considered a nutritional disorder because of its association with carbohydrate intake particularly sweets and sugars and because the intake of some nutrients help in its prevention. A study in 1980 found that 46.8% of children aged 6-11 years suffered from tooth decay. The prevalence of dental caries and fluorosis among school children in Bahrain is very high (68.1% of children 6 years old, 45.9% children 12 years old and 54.3% of children 15 years old).

The frequency of consumption of sweets, cakes and other high sugar foods is an important factor in the occurrence of dental caries. The high consumption of bottled drinks low in fluorine is another contributing factor.

Preventive measures should therefore focus on improvement of food habits and oral hygiene, particularly among school children.

## II. DESCRIPTION AND ANALYSIS OF FACTORS AFFECTING NUTRITIONAL STATUS OF THE POPULATION:

1. Macro-Economic Environment and Nutrition: Bahrain like other Gulf countries, has experienced rapid social and economic changes. These changes started earlier than the other countries after the discovery of the oil in 1932. Thus Bahrain is the first country in the Gulf to benefit from oil revenues. During the oil boom (1973-1980) which led to a sharp increase in oil prices, the country experienced a dramatic change in life styles including changes in food consumption patterns and health status. As mentioned earlier, the country is now benefitting from the developed infrastructures and is now acting as a regional banking, trade and tourism centre.

### 2. Food Security:

#### a. Food Availability:

Agricultural production in Bahrain has declined sharply during the last 30 years as a result of the oil industry that attracted many workers from agriculture by offering better pay. In addition, the unfavourable climate, soil salinity and shortage of ground water, contributed to the decline of domestic food production. Arable land is consistently used for housing and industrial uses. It was reported that the cultivable land decreased by 4.5% during 1974-1980. Thus the country has become increasing dependent upon food imports which represent about 90% of the total food consumption.

In view of the limited water supply and poor soils, hydroponic and greenhouse cultivation are developed. Saline water is used to irrigate traditional Bahraini crops such as fodder (alfalfa), dates and vegetables. Improving the quantity and quality of water for agriculture and other uses is an important government priority. The government is encouraging farmers by providing 40% subsidy. Bahrain's main crops are dates, fruits, vegetables and alfalfa. Local production of vegetables covers about 30% of total vegetable consumption, while the percentages were 65% for fish, 75% for milk and 80% for eggs. To promote local livestock production, the government offers 40% subsidy for imported animal feeds.

b. Fish Production:

Fish production, which was one of the main traditional occupation of Bahrainis, has declines sharply as a result of the new job opportunities in the oil industry, and the rapid urbanization that took place. Thus contribution of agriculture to the GDP in Bahrain does not exceed 1%. However, since 1970 serious efforts have been directed to the development of the fishery sector. Constraints facing these efforts include, inadequate landing facilities, decline in the Bahraini labour force engaged in fishing, poor handling and processing facilities, marketing and distribution problems and insufficient investment in the fishing industry. Pollution of the sea, either by oil spills or by industrial waste and untreated sewage, also contributed to the problem.

c. Food Imports:

Food importation has increased sharply due to the lack of a developed agricultural base and the increasing demand for food commodities. Imports of livestock increased from 27,000 animals in 1975 to 260,000 animals in 1983. Meat and meat products rose from 13,103 tons in 1980 to 17,116 tons in 1986. poultry imports increased from 4,343 tons to 11,564 tons during the period 1978-1986 (an increase of 166%).

d. Household-level Access to Food:

Food Consumption Patterns: In early 1960, Bahrainis were dependent on rice and fish as main items of the diet. Dates were used as sweets. Some fresh fruits and vegetables were also consumed.

According to a report from the Bahraini Ministry of Commerce and Agriculture (1982), food consumption patters are changing and the annual per capita consumption of all food items was expected to increase by 50% by the year 2000. The increases will be greatest for poultry and fish (72.2% and 73% respectively).

Rice which is the dietary staple showed a decrease in the daily per capita consumption of 12.4% between 1970-1984, while vegetable oils registered an increase of 1081% for the same period. Red meat, poultry and fish consumption have increased by 76%, 282% and 469% respectively. The average calorie and protein intake has increased probably due to the sharp per capita income due to of the oil boom at the end of 1973. During the period 1970-1980, the daily per capita consumption of energy has increased from 2080 Kcal to 2829 Kcal, while animal protein per capita intake has doubled during the same period. Animal fat represented 53.4% of the total fat and oil intake. Such changes in consumption patterns are brought about by many factors including the high per capita income, the increasing consumption of processed and convenience foods. Food prices have their influence on food consumption. For example poultry and meat consumption has increased because of their more stable prices for the last ten years as a result of government subsidies. Other factors influencing consumption patterns include level of education, family size, influence of mass media, the influence of expatriate communities, and government food subsidy policy. For example, the current food subsidy policy encouraged people to increase their intake of fat and oil and sugar which would adversely affect the health status of the population.

e. Food Quality and Safety:

Bahrain imports 90% of its food needs from numerous countries from all over the world. According to a report from the Public Health Directorate in the Ministry of Health in Bahrain (1988), 12% of the food imports were unfit for human consumption or of lesser quality than specified. Food poisoning is on the increase (from six cases reported in 1983 to 122 cases in 1987). Generally, cases of food poisoning are under reported. Reasons for the increased occurrence of food poisoning cases in Bahrain may be summarized as follows:

- i. More and more families are now eating out in restaurants instead of eating at home. many of those restaurants have low hygienic standards.
- ii. Since more and more Bahrain women are working, the time available for meal preparation at home has diminished.
- iii. The increasing employment of housemaids to help in home management and cooking of meals. Many of those housemaids are poorly educated and have limited knowledge of food hygiene.
- iv. Most of the food handlers are foreigners who do not speak Arabic or English and hence make it difficult for the food inspectors to communicate with them.
- v. Improper use of methods of food preservation in the shops and in the kitchen.

Other problems of food safety include aflatoxin in imported foods and poor quality of drinking water.

Food legislation and food control measures including food labelling were developed in 1985 and enforced in 1986.

3. Living Conditions, Health Status and Health and Social Services:

Health Status and Health Services:

In view of the wider coverage of primary and secondary health care and the free health services, the infant mortality rate has fallen dramatically since 1970. IMR has decreased from an estimated 77 to 45 per 1000 during 1971-1981.

Communicable diseases such as Typhoid and Paratyphoid fevers, Salmonellosis, Shigellosis and Viral Hepatitis, are of common occurrence among Bahrainis and foreigners.

4. Lifestyles and Behaviour:

a. Public Awareness, Food, Nutrition and Health Education:

Nutrition education for the public is carried out by various agencies using various approaches which may be summarized as follows:

i. Almost all health centres in Bahrain provide the attendants with some information on health and nutrition using video types followed by discussion.

ii. Booklets, pamphlets and posters are produced and distributed in health centres, clubs and women associations.

iii. Radio and T.V. messages are given mostly by medical and nutrition professionals.

iv. Public lectures in food, nutrition and health are offered to men and women in public clubs and sports clubs.

v. Mobile nutrition education units are used to reach rural communities to show video types and slides as well as demonstrations on how to prepare sound weaning diets for children.

Generally, most of the nutrition programmes mentioned earlier cover topics related to nutrition of vulnerable groups and some common nutritional disorders such as obesity, diabetes and heart diseases. Nutrition of adolescents, adults and elderly people are inadequately covered.

Evaluation of the impact of the programmes is not regular. Problems facing nutrition education programmes in Bahrain include the negative influence of commercial advertising which in many cases is in direct conflict with sound nutrition practices. Another problem is illiteracy and ignorance about proper nutrition. The percentage of illiteracy among Bahrainis is still high (31%). The percentage is higher among females (41%) than males (21%). These people do not benefit from the printed materials and even among those who are able to read, many of them do not read the publications prepared by the Ministry of Health. Ignorance about sound nutrition is the most important factor causing improper nutritional status in Bahrain rather than scarcity of food. Poor food habits and practices including those introduced by foreign house-maids, are the main causes of malnutrition in Bahrain. Even health practitioners are deficient in nutrition knowledge.

Another problem facing public education in food, nutrition and health is the lack of proper planning and lack of coordination among the various agencies involved.

#### b. Nutrition Education in Schools and Universities:

Generally, nutrition receives low priority in schools and colleges including medical colleges in Bahrain. Nutrition is not offered as a separate subject and where it is offered it does not contain information on local nutrition problems and how to prevent and control those problems. Introduction of nutrition and health education in schools, colleges and universities faces several difficulties including lack of qualified personnel, training facilities of teachers in the different levels, lack of relevant textbooks and the lack of appreciation by the policy makers responsible for the education system in the country.

### III. ANALYSIS OF CURRENT POLICIES, PROGRAMMES, INTERVENTIONS AFFECTING NUTRITIONAL STATUS:

There is no specific food and nutrition policy in Bahrain. Several projects and programmes in the fields of health, agriculture, social and educational sectors. These programmes are often developed in isolation from each other.

#### 1. Programmes in the Health Sector:

i. Anthropometric measurements (height, weight and head circumference) are regularly collected from pre-school children (first year of life) attending MCH clinics and health centres. EPI is also carried out as part of this programme.

ii. Promotion of breast-feeding and supplementary feeding for pregnant mothers are also carried out in those centres.

iii. Nutrition education through various mass media covering promotion of sound food habits, breast-feeding, management of diarrhoeal diseases, sound weaning practices and dietary management of obesity, and hypertension.

2. Food Quality and Safety: The health sector has a major responsibility for developing and implementing food laws and regulations. Several nutrition research, education and training programmes are carried out by the Nutrition Unit of the Ministry of Health and the various educational institutions in the country.

3. The Agricultural and Industrial Sectors: Several projects and programmes aimed at improving local food production, particularly in fish, poultry products and vegetables, were implemented.

Food subsidies are practiced since 1974 with the aim of stabilizing the price of some foods (rice, wheat, sugar, ghee, mutton, beef and chicken).

The government expenditure on food subsidies has increased from 15 million to 25 million US dollars during the period 1975-1983.

The government encourages local food industries, particularly dairy products, snacks, dates, pickles and soft drinks.

4. Social Sector: The Ministry of Labour and Social Affairs runs a family education programme which includes family planning and nutrition and health aspects. Emphasis is given to breast-feeding, weaning practices and food preparation particularly among rural women.

5. Education Sector: Nutrition is included in the school curriculum, through other subjects such as science, home economics, public health and agriculture.

As previously mentioned, most of the material is basic and does not include local food, nutrition and health problems and how to overcome them.

An adult literacy programme has been recently launched. It aims at improving knowledge and skills of mothers in home management, health and nutrition.

#### IV. RECOMMENDATIONS FOR FUTURE ACTIONS:

Formulation of a national food and nutrition board to undertake the responsibilities of inter-sectoral collaboration and coordination. The board should preferably be attached to the Ministry of Planning. A national food and nutrition policy for Bahrain should include three main measures:

i. Food availability.

ii. Measures affecting food demand such as per capita income, food subsidies, consumer preferences, population policies and nutrition education.

iii. Food utilization, i.e. control of parasitic and infectious diseases, food safety and health care of vulnerable groups.

Other measures should include strengthening of nutrition research, particularly the control of communicable diseases, with emphasis on social and environmental factors.

## KUWAIT

### INTRODUCTION

The State of Kuwait occupies the north-western corner of the Arabian Gulf. The total area is about 7,000<sup>2</sup> miles. It has a typical desert climate.

The total population in 1990 was 2,142,6000 (38.6% of them Kuwaiti and 61.4% non-Kuwaiti). The average growth rate was 4.6%. About 90% of the population live in urban areas and about 58.3% are under 25 years of age. Kuwait is one of the major oil producing countries in the world. Eighty five percent of the revenues come from oil export.

Due to the adverse climatic conditions, agricultural production is very limited and the country depends heavily on food imports.

### I. THE NATURE AND DIMENSION OF NUTRITION AND DIET-RELATED PROBLEMS:

In Kuwait, undernutrition does not constitute a public health problem. However, nutrition problems associated with affluence such as obesity, diabetes, hypertension and heart disease and those associated with iron deficiency such as anaemia, have emerged. Nutritional problems are mainly due to changes in food habits and lack of awareness rather than shortage of food supply or low income.

As mentioned earlier, most of the foodstuffs in Kuwait are imported as the local production is very limited.

Food availability and the high level of income, resulted in modified food consumption behaviour at all levels of the population which was reflected in their nutritional and health status.

The newly acquired habits of higher consumption of fats and sugars coupled with decreased physical activity due to modern life style, lead to the emergence of cardio-vascular diseases, cancers and dental caries, and interestingly the prevalence of iron-deficiency anaemia as well.

1. Assessment of Nutritional Problems:

a. Low birth Weight:

Acute undernutrition among Kuwaiti children is rare. Few cases of underweight and "stunted" children under five years of age were located in Jahra and Ahmadi Governorates. On the other hand, there is an increasing prevalence of health problems associated with over-nutrition, such as obesity, diabetes, hypertension and heart disease.

A marked sex difference in underweight was reported among school children (26% in girls and 11% in boys) and in adults (18% in women and 9% in men).

b. Vitamin A Deficiency:

Vitamin A deficiency is rare and in a random of 2,069 adult Kuwaitis in Jahra Governorate, it was found that only 15% of males and 19% of females showed signs of vitamin A deficiency.

c. Obesity:

The Kuwaiti Health Survey in 1985 indicated that 49% of adult males and 59% of adult females suffered from obesity.

d. Diabetes Mellitus:

The prevalence of diabetes mellitus was found to be higher in Kuwaiti (17.8/1000) than in non-Kuwaiti (13.3/1000) and more in females (18.7/1000) than in males (17/1000) the highest prevalence being in the age groups 50-59 years. Incidences of cancer were reported to be higher among non-Kuwaiti than Kuwaitis.

e. Iron Deficiency Anaemia:

Prevalence of anaemia has been attributed to the changing food habits, low intake of iron and the high levels of parasitic infestation.

2. Analysis of Population Groups: Infant mortality rate in 1989 was 14.8/100,000. According to a report by the nutrition unit, Ministry of Public Health (1990), the average birth weight of Kuwaiti infants was 3.35 kg. which is rather high.

## II. DESCRIPTION AND ANALYSIS OF FACTORS AFFECTING NUTRITIONAL STATUS OF POPULATION:

1. Macro-Economic Environment and Nutrition: The Kuwaiti economy depends heavily on oil exports. In 1985, mining, quarrying and the fuel sector accounted for about 50% of the country's GDP. Agricultural and manufacturing sectors accounted for only 7% of the GDP. However, by the end of 1980's, the share of agriculture and manufacturing sectors in the GDP has increased to over 15%, while that of the mining, quarrying and fuel sectors has decreased to 41%. Kuwait enjoyed a positive trade balance in the 1930's. Kuwait exports are dominated by the oil trade with which accounts for 91% of the total exports in 1989. On the other hand, Kuwait imports almost everything.

Kuwait exhibits a negative growth rate for food exports and a positive growth rate for food imports. The deficit in food trade balance increased from about 774 million US Dollars in 1985 to 893 million in 1989. While share of food exports did not exceed 1%, the share of food imports in relation to total imports has increased from 13.6% in 1985 to 16.4% in 1989. This trend is likely to continue in the future.

2. Food Security: According to the FBS for Kuwait (1977-1979 and 1987-1989), the nutrient intake per head per day showed an overall increase in calories, protein and fat.

Food availability in Kuwait is adequate and most food items are offered at relatively low prices in the local markets. Basic foods such as rice, sugar, dried milk, vegetable oils, lentils and tomato paste are subsidized and distributed through a system of ration cards issued to both Kuwaitis and non-Kuwaitis. However, subsidy of infant diets has indirectly encouraged Kuwaiti mothers to use them and thus led to early stoppage of breast-feeding. The government policy encourages expansion of local food production through producers subsidies.

### Food Quality and Safety:

Since Kuwait depends heavily on food imports from all over the world, the country recognizes the needs for an effective and efficient food control administration in order to protect the nutrition and health of its population and to avoid deception in the food trade.

Formulation and implementation of food laws, regulations, standards, inspection and analysis are carried out by several governmental agencies and may be summarized as follows:

The Ministry of Commerce and Industry is concerned with the protection of the consumer through issuing of standards for handling of food products (both locally produced and imported). The standards are enforced by the Kuwaiti Municipality.

Chemical and bacteriological tests are conducted in the Ministry of Public Health laboratories. The Nutrition Unit of the Preventive Health Division supervises the marketing of food for special dietary purposes. Kuwait Municipality is responsible for controlling markets, food inspection and has the authority to issue and withdraw licenses.

The Public Authority for Agricultural Affairs and Fish Resources supervises local agricultural production. It is also responsible for ensuring that all imported plants and animals are free from pests and diseases and in collaboration with the Ministry of Public Health (Preventive Health Division) develop laws to monitor the import of pesticides and some veterinary drugs.

The Kuwait Institute for Scientific Research (KISR) gives the research support to the above activities.

### 3. Living Conditions, Health Status and Health and Social Services:

#### a. Water Supply:

Kuwait is a desert country with no rivers. The supply of potable water is provided by the desalination of sea-water blended with 10% of underground brackish water.

Another main source of fresh water is the natural underground water at Rawdhatain and Umm al Aish.

#### b. Agriculture:

In spite of the arid soil, harsh climate and insufficient irrigation water, Kuwait still manages to achieve good yields of some crops and animal products. The agricultural section of the Ministry of Public Works is conducting research on various plants and animals in order to select those best suited to Kuwaiti natural environment. The Government is encouraging local food production through provision of improved vegetable seeds, fertilizers, and facilities for construction of greenhouses at low costs. The Government is also offering interest free loans and bears 50% of the drilling costs of underground wells for agricultural purposes.

#### c. Health and Social Services:

Kuwait has a well developed and comprehensive health delivery system. Although the curative services are of a high standard, the preventive activities did not receive adequate support except for EPI. Therefore some non-communicable diseases related to diet began to spread in the community. Gastroenteritis and diarrhoeal diseases are prevalent among infants who are bottle-fed.

#### d. Education Levels and Trends:

In a span of 10 years, illiteracy rate among adults was reduced by half. The education of Kuwaiti females has progressively increased over the year.

4. Life Styles and Behaviour: Increased prevalence of diet-related non-communicable diseases among Kuwaitis may be attributed to excessive or unbalanced diets, inadequate physical exercise, stresses and abuse of tobacco. The importance of exercise and a balanced diet is being recently realized.

Increased income and food availability were not associated with nutrition education programmes and as a result excessive consumption became a common habit which led to the emergence of the nutritional disorders induced by overnutrition. It has also been observed that breast-feeding was less common than bottle feeding. Weaning diets were constituted mainly from cereals among low socio-economic groups. Most mothers introduced solid foods relatively early. Weaning practices were found to vary according to the mother's education and employment status.

#### a. Public Awareness, Food and Health Education:

Food, nutrition and health education in Kuwait need to be strengthened in coverage and quality in both formal and non-formal educational systems. Special emphasis should be given to prevent the spread of diet related non-communicable diseases. Food and nutrition programmes should stress the importance of a balanced diet, the need of physical exercise, how to reduce stress and to avoid the abuse of tobacco.

### III. ANALYSIS OF CURRENT POLICIES, PROGRAMMES, INTERVENTIONS AFFECTING NUTRITIONAL STATUS:

The policy of the government of Kuwait is to secure adequate food supplies for its people through encouragement of local food production and food imports. This is coupled with strengthening the food quality control system to protect consumers from health hazards. The Government has also established very comprehensive medical services which include dietary and nutrition counselling clinics, health clinics in hospitals and provision of nutrient supplements to pregnant women.

A national nutrition programme is being developed and led by KISR in cooperation with relevant government agencies. The purpose of this programme is to initiate and implement a comprehensive Food and Nutrition Plan for Kuwait which will generate accurate up-to-date information on the nutrition and health status of the population and increases the awareness about the relationship between the diet and health and widen the choice of safe foods of good quality.

IV. RECOMMENDATIONS FOR FUTURE ACTIONS:

1. Strengthening of the Food and Nutrition Affairs Council which was established in 1986.
2. Development and implementation of the national nutrition plan.
3. Support of the country's capabilities to produce local food crops, animal products and marine foods to substitute some of the food imports.

## OMAN

### INTRODUCTION

Oman with 300,000<sup>2</sup> km. occupies the south-eastern part of the Arabian peninsula with a coast line of 1700 km. The country is characterized by ranges from Musandam Peninsula that plunges into the strait of Hormuz in the north to the fertile Betinah plain and from the vast sandy edge of Rubel Khali desert to the tropical Salalah plain in the south. The population of Oman in 1990 was estimated at 1.5 million with a growth rate of 3.0%. More and more of the population are concentrating in the urban areas. In 1990 about 35% of the population were living in the capital Muscat.

Oman's economy prior to the discovery of oil in 1967 was a subsistence economy based on limited agriculture and fishing. Now Oman is an oil producing and exporting country and 83% of the total revenues in 1990 came from oil and petroleum exports.

Oman has limited food production capabilities and it therefore depends on food imports to fulfil its requirements of food (Food and beverages constituted 17% of the total imports in 1989).

### I. THE NATURE AND DIMENSION OF NUTRITION AND DIET-RELATED PROBLEMS:

#### a. PEM:

According to hospital based data, a considerable number of children attending hospitals suffered from different degrees of PEM. Prevalence of PEM was higher in certain regions (Dhakhilia, South Betinah and Sharqia). In 1991, it was reported that 69% of Omani children attending hospitals were malnourished. A survey data in the same year showed that underweight and stunting were very high among preschool children (using -2 SD of the mean according to WHO criteria). In the first year of life, 28.0% of females were stunted and underweight, while 6.3% of males were underweight and 10.4% of them were stunted.

#### b. Micronutrient Deficiencies:

i. Anaemia: Based on two national surveys in 1991, confirmed previous findings that anaemia is very common among children and adults. In 1992 it was found out 58.9% of male children under five years of age and 61.5% of female children of the same age were anaemic. Prevalence of anaemia in school children was found to have doubled in the last 10 years (male school children in 1980 had a prevalence rate of 21.3% compared to 79.5% in 1992, whereas for females the rate rose from 46.2% in 1980 to 77.1% in 1992). In 1986, 54.0% of pregnant mothers were reported to be anaemic.

ii. **Vitamin A Deficiency:** Vitamin A deficiency was known to exist particularly among preschool and school children in Oman, but the magnitude of the problem was not fully illustrated.

c. Diet-related Non-communicable Diseases:

i. **Obesity:** As a consequence of the quick socio-economic development of the country during the 1980's, obesity and other diseases of affluence emerged and their prevalence among the Omani population is on the increase. In 1980, it was reported that 17.4% of female adults were obese and in 1991 the prevalence increased to 27.6%. The problem has special magnitude in the southern part of the country. In that region in 1980, it was found that 45% of adult females were obese, while in 1991 the figure rose to 57.3%.

ii. **Diabetes:** As a result of the high prevalence of obesity and other factors, it was observed that 10% of the patients admitted to hospitals were diabetic. In 1991, a survey on the prevalence of diabetes showed that 9.8% of the Omani population were diabetic according to WHO criteria, while 11.1% suffered from impaired glucose tolerance. Women were found to be more susceptible to this problem than men.

iii. **Hypertension:** In the same survey mentioned earlier (1991), it was found that the prevalence of hypertension varied from 5% to 17% in the different regions of Oman. It increased markedly with age specially among females.

II. DESCRIPTION AND ANALYSIS OF FACTORS AFFECTING NUTRITIONAL STATUS OF THE POPULATION:

1. Macro-Economic Environment and Nutrition: As mentioned previously, Oman's economy prior to the discovery of oil in 1967 was a subsistence economy which depended on limited agriculture and fishing. Since 1980, the revenues from the export of oil and petroleum were increasing rapidly reaching 83% of total revenues in 1990. This transformation in the economy coupled with a high rate of urbanization and a high rate of population growth led to drastic changes in food consumption patterns and an ever increasing gap between local food production and the national food needs covered by food imports. As a consequence of food availability and higher income level higher intake of nutrients particularly sugars and animal fats, diseases of affluence such as obesity, cardio-vascular diseases have emerged and their prevalence is increasing.

2. Food Security:

a. Food Production:

The cultivated land constitutes about 46% of the cultivable land which has an area of 11,300<sup>2</sup> km. mostly in the Batinah coast and the capital Muscat. Agricultural production depend on low and unpredictable rainfall and hence very limited. Other sources are underground water which is gradually becoming salty.

In spite of these limitations, the agricultural sector achieved continuous development. In 1989, 50% of the local food production were tubers and grains, 25% fruits (mainly dates) and 17% vegetables.

Animal production (cattle, sheep and goats) is practiced in the Northern Coast of Batinah and the Southern Mountains using traditional methods that depended on natural pasture. One of the main problems facing animal production is the prevalence of animal diseases which would require more time and efforts to overcome and control.

Fish production is practiced along the coast of the Sultanate along in the Arabian Gulf which extends 1700 km. Fish production is increasing progressively. However, most of the fish catch is still practiced by traditional fishermen. An ambitious plan to increase fish production using modern methods is being implemented.

b. The food gap:

Although local food producers managed to increase the rate of self-sufficiency in many items, grains, sugar and vegetable oil are imported. In 1988, only 22.6% of red mutton meat, 46.1% of beef and 90% of milk consumed were locally produced.

Living Conditions, Health Status, Health and Social Services:

a. Health Status and Health Services:

According to hospital data in 1990, the most common diseases were respiratory system diseases followed by communicable and parasitic diseases. Child (under 5 years of age) mortality rate declined in the last decade (from 90/1000 in 1980 to 36/1000 in 1990).

b. Low Birth Weight (LBW):

Low birth weight is common in Oman as a consequence of malnutrition among pregnant mothers in addition to other social factors such as early marriage. According to hospital data, 7% of total births were below 2.5 kg. However, infant mortality rate showed a marked decline through the last decade (it decreased from 72/1000 in 1980 to 29/1000 in 1990 with no significant difference between regions).

EPI national coverage was 84.0%. Diarrhoeal diseases were common due to many hygienic, environmental and cultural factors. According to the Ministry of Health annual report in 1990, 130/1000 among children of all age groups suffered from diarrhoea. According to a report in 1991, 23.9% of children aged 0-6 years of age were infected with intestinal parasites.

c. Infant Feeding Practices:

Hospital data indicated that 98% of mothers breast-fed their babies for the first 3 months and 73% of them introduced sugar and water to the infant during the first 3 days after delivery.

Weaning foods were introduced at an early age by a large number of mothers. About 50% of mothers continued breast-feeding up to six months or more.

d. Education Levels and Trends:

Continuous efforts were exerted to expand the educational sector in both quantity and quality all over the Sultanate, university education as well as professional education through Sultan Qabus University and colleges for Banking, Health Sciences, etc.

As a result of all these efforts, adult literacy rate increased from 25% in 1980 to 50% in 1990. Literacy rate among females was 41% compared to 60% among males.

III. RECOMMENDATIONS FOR FUTURE ACTIONS:

1. More inputs should be directed towards local food production and processing to reduce the food gap.
2. Efforts should be made to assess the nutritional situation at the national level with a special emphasis on the vulnerable groups.
3. Evaluation of existing nutrition programmes in the health and agriculture sectors in order to make them more effective.
4. Establishment of a multi-sectoral committee to coordinate food and nutrition activities.
5. More studies are needed on the socio-cultural aspects and their effect on the nutritional well-being of the community.
6. Design and implement nutrition education programmes to improve public awareness in the field of food and nutrition.

## QATAR

### INTRODUCTION

Qatar is a peninsula in the middle of the western coast of the Arabian Gulf. It occupies an area of 11,437<sup>2</sup> km. with a total population of about 600,000.

The State has witnessed tremendous economic and social changes in the last few decades as a result of the revenues from the exports of oil and gas. All these changes were reflected on the mode of living and the population structure of the State.

1. Food Availability: Provision of enough food in both quality and quantity receives a high priority by the Government. Since Qatar depends largely on food imports, enough food commodities are imported from different parts of the world.

In spite of the continuous changes in the international food prices, the State is exerting all efforts to stabilize local food prices through subsidies of imported items such as wheat, sugar, rice, vegetable oil, milk and animal feeds. The State also encourages the local food industries.

2. Food Consumption: As a consequence of the changes in living conditions and the increase in incomes coupled with the diversity in available food items and the influence of new feeding patterns of expatriates, the food consumption pattern in Qatar has changed from the traditional diet of rice, fish and dates to the new processed foods and frozen foods which became major items in the food trade.

3. Food Quality and Safety: In view of the wide range of food imports, the need to protect the people of Qatar from possibilities of fraud and health hazards, the State introduced laws and regulations to exercise food control at all levels since 1967.

The food laws and regulations aim to ensure the following:

- i. Ensure food safety.
- ii. Expose food adulteration.
- iii. Follow-up of food laws, standards and specification of all food commodities produced locally or imported.

All these functions are done in close collaboration with local and international agencies dealing with this matter.

These responsibilities are carried out by the Ministry of Public Health (administration of preventive medicine).

Food inspection is exercised at the points of entry (sea ports, air ports or road transport checks). Inspection is carried out in stores, trading centres, etc.

Food quality control agencies in Qatar carry out their responsibilities in three directions:

- i. Food legislation.
- ii. Food inspection in sites.
- iii. Food laboratories for identification of contamination or spoilage.

Qualified personnel are carefully chosen to undertake these responsibilities.

4. Nutrition Activities: The Ministry of Public Health of the State of Qatar established a National Nutrition Committee (Administrations of preventive medicine, primary health care and curative services are represented), to monitor the nutrition situation in the State. The committee is expected to carry out its responsibilities through design and implementation of nutrition surveys to generate the necessary information that will enable the various administrations to take appropriate actions and to formulate comprehensive nutrition programmes. The National Nutrition Committee is also expected to cooperate closely with the international agencies working in the field of food and nutrition.

The State of Qatar is anxiously awaiting the outcome of the ICN and looking forward to implement its recommendations.

## SAUDI ARABIA

### INTRODUCTION

The Kingdom of Saudi Arabia occupies approximately four-fifths of the Arabian Peninsula, an area of about 2,250,500<sup>3</sup> km. The country is made up of three geographical zones: the narrow coastal plain running along the Red Sea; the mountain range which is parallel to the coastal plain and has an average elevation of over 1200 meters; and the great sandy plateau, which is divided into the Great Nafud, the Dahna and El Rubal-Khali, the world's largest continuous sandy body.

Much of the country is arid desert and about 1% of the total area (134 million hectares) is cultivable confined to oases and irrigated regions. Most of the cultivable land is used for the production of field crops, dates and vegetables.

Saudi Arabia has the world's largest proven oil reserves and the largest oil export capacity and its GDP is one of the highest in the world.

### I. THE NATURE AND DIMENSION OF NUTRITION AND DIET-RELATED PROBLEMS:

#### 1. The Assessment of Nutritional Problems:

##### a. Protein-Energy Malnutrition (PEM):

A National Nutrition Survey has recently been completed (July 1991) and the results are still being compiled and analyzed.

Earlier studies on nutrition and health of Saudi people focused on various aspects of nutritional disorders and related problems and conducted mostly on infants, pre-school children and hospital patients and hence were not representative of a region or the nation. Most of these studies revealed problems of anaemia, mild to moderate degree of PEM resulting in stunting and wasting of pre-school children. In 1980, a study on 337 pre-school children (0-5 years) in two rural villages in central Saudi Arabia found that 76% of the children were normal, 20% were mildly wasted, 1.3% were moderately wasted and only 0.6% were severely wasted according to Harvard Standard. Most other studies gave similar results indicating that the prevalence of severe PEM was rare.

##### b. Micronutrient Deficiencies:

i. Nutritional Anaemia: All studies to date indicated the prevalence of anaemia in children and adults. A study in 1988 on 500 children found that 198 of them (39.6%) were anaemic due to dietary iron deficiency. Hospital data showed that iron deficiency anaemia was common among females of child-bearing age.

ii. **Vitamin D Deficiency:** Several reports indicated the prevalence of Vitamin D in Saudi Arabia. In 1980, cases of Rickets were identified in children admitted to the Maternity and Children's Hospital of Riyadh. The occurrence was related to overdressing of babies with limited exposure to sunlight. Subsequent reports confirmed those findings and urged mothers to avoid excessive wrapping of children and recommended better solar illuminated housing and educating mothers about the importance and benefits of sunshine.

iii. **Vitamin A Deficiency:** The National Nutrition Survey of Saudi Arabia (July 1991) revealed the prevalence of isolated cases of vitamin A deficiency in certain regions.

c. **Diet-related Non-communicable Diseases:**

i. **Obesity:** Available data indicated clearly the prevalence of adult obesity in the country affecting women in particular. However, the data is insufficient to quantify, the trend for the entire adult population. The risk of childhood obesity and its continuation to adulthood was well established. A study on 467 married non-pregnant female patients showed an overall prevalence of 27% obesity. A significantly higher proportion of women at the age of 25 years and above were found to be obese compared to those under 25 years of age. It was concluded that the prevalence of obesity among adult females was correlated to age, level of income, marital status, education, type of job, age of husband, and number of housemaids.

ii. **Diabetes Mellitus:** Most studies on the prevalence of this disease were carried out in local communities and mostly among hospital patients. Data confirmed the emergence of this problem particularly in urban communities (13% in subjects over 55 years). It was suggested that the rapid socio-economic changes in the country over the last 20 years must have contributed to the high prevalence rate. It was found that the prevalence of diabetes differed among both sexes rose according to income. The need for nutrition and health education as well as the establishment of specialized centres for better management of the disease were emphasized. It was also concluded that most cases of diabetes in Saudi Arabia were non-insulin dependent with onset in middle age and most patients were characteristically obese at the time of diagnosis.

iii. **Cardio-vascular Disease and Hypertension:** The prevalence of cardio-vascular diseases is increasing in the Kingdom and the countries of the region. Concrete data is not yet available, awaiting the analysis of the results from the National Nutrition Survey (July 1991).

iv. Cancer: Reports indicated that cancer in Saudi Arabia was an ever increasing problem as people change their lifestyles. The incidence of cancer was estimated to be around 800 per million population per year. Contributing factors to this high prevalence include social and possibly genetic. Dietary factors and consumption patterns are also involved and need to be closely investigated.

v. Oral Health and Cario-genesis: The prevalence of cario-genesis and periodontal diseases as a public health problem in the Gulf area is well established. A major part of the National Nutrition Survey was devoted to the status of oral health, hygiene and cario-genesis. The data on these aspects is not yet available.

2. Analysis Population Groups: The data from the National Nutrition Survey (July 1991) covering four major geographic areas: East, Central, North-Central and North-West is not yet fully analyzed. However, preliminary information indicated that in the Eastern Region, the most common clinical signs of malnutrition were those due to micro-nutrient deficiencies (vitamin B complex, vitamin A and iron). Females suffered more than males. Most of the deficiency signs were manifested in the age group 5-15 years. A positive correlation between the literacy level and the signs of malnutrition was noted. The higher the literacy level, the lower the prevalence of malnutrition.

55.8% of the population examined in the Eastern Region were found to have a mean haemoglobin level below the lower acceptable limits for the different age groups:

a. Al-Qasseem and Hail Regions:

These regions showed similar results as above. In the North-Central Region, both Hail and Al-Qasseem areas showed prevalence of malnutrition in its various forms. Again females manifested the burden of malnutrition more than the males.

b. The North-Western Region (Tabouk):

The manifestation of clinical signs of malnutrition and the prevalence rates were also similar to the above regions. Rickets was found to be predominant. As in the other regions, the female segment of the population manifested the burden of malnutrition more than the males. The same pattern was observed with regard to age and level of education. The data on clinical signs of malnutrition for the West, South and Central Regions are not yet available.

3. Age-sex Mortality Trends: A study conducted recently showed that both Infant Mortality Rate (IMR) and Child Mortality Rate (CMR) showed a reduction during the period 1976-1989 although they were still high. The IMR decreased from 81/1000 live births in 1976 to 30/1000 in 1989. The CNR showed a similar decline during the same period.

It was observed that the rates for females were lower than for male children. That impressive decline has been attributed to the rapid socio-economic development including an effective health care delivery system, environmental sanitation, improved infant weaning practices and compulsory immunization.

The IMR was 27/1000 for the urban population compared to 40/1000 for rural population. The CMR was also higher in rural than in urban populations. The higher rates in rural areas was attributed to: (a) relatively higher proportions of illiteracy among mothers, (b) short birth intervals, (c) number of children in the family, (d) availability of health services and their utilization by rural communities, and (e) the lower maternal care and nutritional status in rural areas.

The IMR and CMR varied according to geographical location. The Eastern Region had the lowest rates, while the Southern Region had the highest. (In 1976, the IMR was 102/1000 in the south compared to 69/1000 in the east). The reasons given for the high IMR in the southern region were; (a) the relatively low socio-economic growth, (b) the relatively low level of immunization and nutritional status together with the unfavourable environmental factors, and (c) the presence of endemic diseases such as schistosomiasis and malaria.

Mortality rates were generally influenced by education level of the parents. Infants of educated parents were found to have better chances for survival compared to those of illiterate parents.

## II. DESCRIPTION AND ANALYSIS OF FACTORS AFFECTING NUTRITIONAL STATUS OF THE POPULATION:

1. Macro-economic Environment and Nutrition: Although oil export constitutes the main source of revenues, other sectors that contribute to the general economic growth include agriculture, petrochemicals and other manufacturing industries.

Agricultural production expanded rapidly throughout the last four development periods (last 20 years). The government is encouraging a gradual shift in the structure of production away from crops which require excessive inputs of scarce water resources, towards more high-value added products.

In the health sector, priority is given to the development of primary health care strategies and services particularly in rural areas.

### 2. Food Security:

#### a. Food Production, Imports and Availability:

In order to achieve the objectives of "Food self-sufficiency", reduce the volume of food imports and increase domestic agricultural production, the Ministry of Agriculture and Water through the channel of the Saudi Arabian Agricultural Bank (SAAB) and other agencies, has embarked on ambitious agricultural investment programmes in the late seventies.

Food self-sufficiency was given high priority by the government which resulted in an impressive increases in local food production and the contribution of the agricultural sector to the GDP was on the rise since the early eighties.

Egg production reached self-sufficiency and is now being exported to neighbouring countries. Self-sufficiency has also been reached in dairy products. Record production levels have also been achieved in fisheries. Livestock production for meat and meat products is expected to meet the rising demand during the nineties. The most striking accomplishment throughout the eighties has been the enormous production of cereal grains particularly wheat. Wheat production has increased from 26,000 tons in the late sixties to 2.6 million tons per year. That achievement moved Saudi Arabia from being a major importer to a net exporter of wheat. However, about 75% of the food needs of the country are still imported. A major portion of the national requirements for cooking oil, fruits and vegetables, rice and sugar are imported. Food imports averaged 5 billion US Dollars annually during the mid eighties.

#### b. Household-level Access to Food:

The tremendous social and economic progress during the last decade had their impact on consumption patterns, dietary habits and the associated lifestyles. The report of the Multi-Purpose Household Survey (MPHS) in 1982 indicated that dietary habits and consumption patterns of the Saudi people have shown a considerable change and diversification. The survey showed that 96% of the population ate three meals per day, and in most cases supplemented them with drinks and snacks. 64% of children under one year of age were breast-fed and 51% of those under 4 years of age were fed formula foods. The National Nutrition Survey (1991) showed some differences in consumption patterns between the regions. The survey also indicated that the Saudis had a more diverse daily diet than the non-Saudis. It was also observed that the levels of food intake were higher in urban areas than in rural areas.

The increase in domestic food production coupled with the worldwide supply of imported foods had their impact on food consumption patterns and nutrient availability throughout the Kingdom. The high purchasing power and the availability of ample sources of raw and processed meat, fish and poultry contributed to a steady increase in the per capita consumption of those items. Per capita consumption of fats and oils as well as pulses had also shown steady increase throughout the eighties. A similar trend was noted with regard to the consumption of fruits and vegetables. However, the high consumption of cereals (wheat, rice and sorghum) was the main feature of the Saudi diet.

A WHO report indicated that during the last twenty years, there was a trend for increased fat consumption and decreased carbohydrate in Saudi diet.

c. Food Subsidies:

The government food subsidies included payments to farmers, social security payments, social care, etc. In general, basic food commodities, health and social services are heavily subsidized and are provided free of charge where necessary.

d. Food Quality and Safety:

Several food-borne illnesses (bacterial, viral, parasitic, poisonous plants and animals) have been identified in Saudi Arabia and reported by the Ministry of Health, Riyadh, annual reports 1987-1989. The Department of Preventive Medicine of the Ministry of Health (MOH) is providing the procedures and guidelines for the proper investigation, control and monitoring of food borne illnesses in the Kingdom. Constraints facing these responsibilities include:

i. Shortage of sufficient trained personnel.

ii. Insufficient coordination and communication for the proper collection of data, recording, reporting and monitoring.

It is, thus, necessary to upgrade the present set-up and to create a central food poisoning control system under the supervision of the department of preventive medicine, MOH.

3. Living Conditions, Health Status, Health and Social Services:

a. Population Growth and Distribution Trends:

According to the widely disputed 1974 census, the population in Saudi Arabia ranged from 12.5 to 14.5 million with about 25% classified as migratory.

The annual growth rate was estimated at 4-5%. However, according to a new census in 1992, the population was estimated at 17-18 million. About 45% of them were under the age 14, and 17% were under the age of 5. There is a considerable expatriate population attracted by job opportunities. As a result of the economic boom and settlement of the migratory groups, the urban growth has been extremely fast since the mid-sixties. A few smaller towns (Taif, Madinah and Hofuf) have more than doubled in size over the last decade, and satellite towns have sprung up around the major cities. About 50-75% of the total population live in urban areas.

The illiteracy rate is higher in females (72.18%) than males which may be attributed to the tribal habits and traditions which are now gradually changing as a result of expansion in education facilities. The Kingdom has given high priority to education particularly female education in order to alleviate female illiteracy.

b. Social Services:

Social services such as provision of potable water, sanitation of public utilities, social security, housing, etc. have been given great attention through the four development plans.

c. Health Status and Health Services:

Both public and private health care is available in the country. The Ministry of Health is responsible for about 70% of all health facilities in the Kingdom. Health and social services are given increasing attention and budget allocations. The Ministry of Health and UNICEF have been actively involved in the expansion and strengthening of the MCH services in the Kingdom. According to the NCHS findings in 1987, about 95% of all children were immunized. Urban immunization levels were higher than rural levels (97% and 90% respectively for children under six years of age).

d. Diarrhoeal Diseases and ORT:

The control of diarrhoeal diseases is a major part of the "Child Health and Survival" programmes. The objectives were to reduce morbidity and mortality rates due to dehydration and the use of ORT. Diarrhoeal diseases were most common among children aged 6-17 months.

4. Lifestyles and Behaviour: The Kingdom of Saudi Arabia now faces a new challenge: how to combat the emerging diet-related non-communicable diseases resulting from high standard of living, prosperity, high purchasing power and sedentary lifestyle. There has been drastic changes in food consumption patterns and dietary habits that resulted in overnutrition with more consumption of fats and sugars. The magnitude of these problems have been reviewed earlier.

a. Infant Feeding:

Prolonged breast-feeding is widely practiced in Saudi Arabia. In general, babies are not breast-fed at birth and instead given water and ghee (Samna) which is thought to lubricate the infant's gastro-intestinal tract and provide initial nourishment. Thus breast-feeding starts on the second or third day. The practice of prolonged breast-feeding is lower in urban compared to rural settings. In a study on infant feeding (both breast and bottle) and weaning practices of children 0-72 months, showed that the rapid economic progress and modernization did not have any significant effects on the pattern of breast-feeding. Most babies were given powdered milk formula and weaning foods were introduced after six months and bottle feeding stopped after twenty months. Energy intakes were found to be below requirements, while iron and niacin were grossly deficient despite the high values for protein intake.

b. Public Awareness, Food and Health Education:

Thus far, no large scale efforts have been undertaken for mass education of the public in regard to food, nutrition and health. The current activities are limited to basic health education in the school curricula. New comprehensive academic curricula addressing all aspects of food, nutrition and health sciences are now given in colleges and universities in the Kingdom. The division of Nutrition Education and Extension in the Department of Nutrition MOH has recently initiated a quarterly newsletter entitled "Nutrition and Health", but so far has very limited distribution.

III. ANALYSIS OF CURRENT POLICIES, PROGRAMMES, INTERVENTIONS AFFECTING NUTRITIONAL STATUS:

As mentioned earlier, the Kingdom witnessed a high rate of economic growth and social welfare during the last two decades. Considerable progress has been achieved in diversification of the national economy. The contribution of the agricultural sector in the GDP increased significantly from 5.9% in 1969 to 7.3% in 1989. The government expenditures for the improvement of health, education and other social services are high. Development of the agricultural and industrial sectors is also consistent.

Government subsidies were directed to support the economically underprivileged segment of the population. In 1988-1989, the total government subsidies amounted to SR 2.6 billion. Food subsidies rose from SR 300 million in 1973/74 to a peak of SR 5 billion in 1981/82. The government subsidizes many sectoral activities, e.g. health and social services, in order to improve the quality of life for all people.

a. The Agricultural Sector:

The development of agriculture was given high priority by the government during the last Four Development Periods (1970-1989) and will continue to receive attention in order to diversify the economic base and minimize the food gap. The increases in food production and purchasing power of the Saudi citizens aim at improving food availability and nutritional status.

b. Human Resource Development:

The government commitment to increase educational and training facilities at all levels received the utmost priority during the last four development plans in order to provide the required manpower to develop and manage the expanding national institutions in both the public and private sectors.

c. Social Development Sector:

i. Health Services: Great efforts have been made to improve the network of health services for all citizens. Infant and child mortality rates have been drastically reduced and life expectancy at birth among males increased from 47 to 60 years and among females from 50 to 64 years over the period 1965-1985.

ii. Social Services: The development plans during the last two decades aimed at raising the standard of living of deprived citizens through the provision of the necessary social services. Rehabilitation and care facilities were provided for those in need through a network of facilities and subsidies.

d. Development of the Private Sector:

One of the major policies of the Fifth Development Plan is "Privatization" which is expected to play a key role in the diversification and expansion of the economy. The private sector investment resulted in increased economic efficiency, healthy competitive environment, reduced subsidies, industrial expansion, increased employment opportunities, higher purchasing power, better health and social services.

IV. RECOMMENDATIONS FOR FUTURE ACTIONS:

1. Transformation of the Department of Nutrition MOH into a National Nutrition Centre (NNC) in order to deal more effectively with the increasing and diverse responsibilities and to cooperate and coordinate with the proposed "Inter-sectoral Food and Nutrition Committee".

2. Nutrition education programmes should be expanded to deal with problems of inadequate knowledge and lack of awareness about food, nutrition and health and the relationships between them. They should be carefully targeted to deal with problems facing different age groups particularly the vulnerable groups and the emerging diet-related non-communicable diseases.

3. Establishment of "Nutrition Support Units" in hospitals to offer nutritional counselling and promote preventive measures against the prevalence and treatment of malnutrition to hospital patients.

4. Development of National Dietary Guidelines based on local and regional traditions, food preferences, consumption habits and lifestyles.

5. Establishment of a National Surveillance System and Data Bank to monitor trends in nutritional status, dietary patterns, morbidity and mortality and other nutrition and health indicators.

6. Development of Saudi health and nutrition manpower in preventive health care services within the concepts of the primary health care strategies and the guidelines of preventive medicine and the promotion of health care services.

## APPENDIX B

### AN ANNOTATED BIBLIOGRAPHY ON FOOD CONSUMPTION PATTERNS IN THE ARAB COUNTRIES OF THE GULF (1975-1989)

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Source : Musaiger, A.O. (1990). An Annotated Bibliography on Food and Nutrition in the Arabian Gulf Countries. Ministry of Health/Bahrain and FAO/Rome.



*Al-Shawi, A. The dietary patterns and food habits of Kuwaiti housewives of three educational levels. Ed. J. Kuwait. 2:9-19. (1985)*

Dietary habits of 225 Kuwaiti housewives of different educational levels were studied. Cereals and beverages were the main foods frequently consumed, while eggs, fish and legumes were the least consumed. Low educational housewives were more likely to consume sugar and sweets than higher educational housewives. The great majority of housewives ate their meals at home (82.7%, 98.7% and 96.0% for breakfast, lunch and dinner, respectively). As education increased the role of housewife in meal planning increased (49.3%, 56.0% and 64.0% for low, middle and high educational levels, respectively). It was found that housewives lacked knowledge of the relationship between foods and diseases.

*Dawood, J.S., Prakash, P. & Ali, K.M.R. Nutritional Survey for Elderly People in Kuwait. Nutrition Unit, Preventive Medicine Section, Ministry of Public Health, Kuwait, 13 p. (1982)*

The purpose of this study was to assess nutritional status of elderly people (over 59 years old) in Kuwait. A sample of 83 males and 81 females were selected from various polyclinics. Anthropometric measurements included were; height, weight, arm circumference and skinfold thickness. Haemoglobin, hematocrit, glucose, protein, serum albumin, cholesterol, vitamin C and vitamin A in blood were determined. Based on weight for height 25% of males and 53% of females were found obese. There percentages were 15.7% and 28.4%, respectively when based on skin fold thickness. Hypertension was more common among males (35%) than females (22%). Of the sample studied 13.4% were diabetic, and there was no significant differences between males and females. Iron deficiency anaemia was higher among females (18.5%) than among males (3.6%). The proportion of hypercholesteremia was 23.5%, of which 27% were among males and 18.9% among females. The mean level of cholesterol was 230 mg% in males and 208 mg% in females. The mean level of vitamin A and Beta carotene were respectively: 33.13 and 37.8 mg% for males, and 37.1 and 33 mg% for females.

*Eid, N. & Bourisly, N. Bread consumption in Kuwait. Nut. Rep. Int. 33(6): 967-971. (1986)*

This study looked into the consumption and composition of two types of bread in Kuwait. The study was based on a field survey of 1420 subjects from various age groups and nationalities. The results revealed that the average per capita daily consumption of bread was 277 grams. Sex, age, nationality and work activity significantly

affected bread consumption. The major types of bread consumed were Arabic and Iranian. The contribution of bread to the fulfillment of daily requirements was about 29-33% of energy, iron and thiamin, and 40-50% of protein and niacin.

*Ghulam, L.J. Nutritional taboos and traditional practices in pregnancy and lactation including breast feeding. In Traditional Practices Affecting the Health of Women and Children. WHO/EMRO Technical Publication No.2, volume 2. WHO Regional Office of the Eastern Mediterranean, Alexandria, 67-74.(1978)*

This paper study the beliefs and practices related to health and nutrition in two communities in Oman, namely Nizwa and Sohar. The sample consisted of 153 women in Nizwa and 219 women in Sohar. The results showed that 55% and 76% of women studied changed their meal patterns during pregnancy, in Nizwa and Sohar, respectively. The main change in the meal patterns was eating less (94% in both communities). The most important reason given for eating less was to make more room for the foetus, as many women believe that the foetus grows in the stomach. Some women ate less fish as they believe that the bones and scales of fish would harden the bones of the foetus and lead to complicated delivery. Some women avoided eating rice during lactation, as they believe that it discontinues the formation of mother's milk. The main food consumed during lactation was meat in Nizwa (82%), and chicken in Sohar (64%). Mothers started breast-feeding 3 to 7 days after delivery. In Sohar, 90% of mothers continued breast-feeding for two years. In Nizwa, 16% reported to stop breast-feeding between six months to one year of infant life, while the others continued breast-feeding for two years.

*Kamel, B.S. and Martinez, O.B. Food availability for Kuwaiti and non-Kuwaiti households. Ecol.Food.Nutr. 15:191-201. (1984)*

A sample of 1,134 Kuwaiti (K) and 1,444 non-Kuwaiti (NK) households in Kuwait was chosen at random to obtain information on food and nutrient availability in the household deduced from food purchase during one week. The data were studied according to income and taking into account households composition. Food availability among NK was found higher than in K households. However food was, on the average, abundant among the most privileged and adequate among the poor in both groups with respect to energy and protein. Nevertheless, K larger households spent, on the average, a higher proportion of their income to buy food than NK families. Kuwaiti households purchased more cereals, sugars and sweets and fish than NK households. With increased income, purchases of most food groups, especially protein-rich products, increased in both groups, but in K households cereal purchases declined. In spite of adequate dietary availability, low income families in both groups had poor diets, especially with respect of the provision of thiamin, riboflavin, vitamin A and calcium.

Kamel, B.S. & Martinez, O.B. *Food habits and nutrient intake of Kuwaiti males and females. Ecol.Food Nutr. 15: 261-272. (1984)*

Dietary habits and foods consumed by Kuwaiti citizens were described based on data collected from 5000 adults of different educational and income levels. The data showed that while some traditional food habits were still adhered to, others were giving way to western type of foods. Wheat is the main staple, followed by rice; mutton and lamb are preferred over beef; but chicken and fish are also consumed. Diluted yogurt (roob) was traditionally taken during lunch, which is the main meal. Fresh fruits and vegetables were readily available, but their consumption was limited by purchasing power. Carbonated beverages, coffee and tea were consumed frequently with high sugar added. Some food preparation practices had different implications on nutrient values of food. In cooking, rice was soaked in warm water for a few hours and then the water was discarded; meat and vegetable mixtures might be boiled for a long time. Such food preparation methods tended to destroy valuable nutrients; but partially boiled vegetable, or not well cooked meat, were not popular. Although abundant food was available and considerable amounts were wasted, an analysis of nutrient intakes showed that dietary vitamin A, thiamin, riboflavin and calcium intakes were below that of the U.S. RDA for adult men and women. Iron and magnesium intakes of women were also unsatisfactory.

Musaiger, A.O. *Food habits in Bahrain, dietary practices and social occasions. Ministry of Health, Bahrain, 62p (A). (1981)*

This study is a survey of dietary practices and food habits of Bahraini families during social occasions. A random sample of 310 households was taken from the 8 geographical regions of Bahrain, representing 1% of the households. Al-harees (composed of wheat and meat) and Al-threed (composed of bread, meat and vegetables) were the main dishes consumed during the fasting month (Ramadan), while the Gadoo, composed of sweets, nuts and fruits, and rice with meat were the main dishes presented to the visitors during wedding and after pilgrimage, respectively. Tea or coffee with sweets were the main foods (63%) given to the visitors during grieis. Most of the families (61%) did not give their male children any food after circumcision. Others gave milk (10.6%), eggs (9%) and sweets (5.8%). About 25% of the housewives believed that nuts increase the sexual ability of the males. Relatives and friends (32%) were the main source of these beliefs, followed by the grandmother (23%). Most of the families (71.6%) ate together from the same dish, while 13.2% segregate the sexes. The majority of the housewives (92%) used canned foods in their diets. Almost 36% of the housewives agreed that the price of food affects the quality and quantity consumed.

Musaiger, A.O. *Factors influencing food consumption in Bahrain. Ecol Food.Nutr. 12:39-48. (1982)*

This paper reviews the social and economic factors affecting food consumption in Bahrain. Industrialization led to a decline in the agricultural and fishing products with the result of more dependence on imported foods. Income and prices of foods limited the purchasing power of the households, particularly low social classes. The high fertility and family size affected the quantity of food consumed by different household members. Educational level of housewife and husband had also a potent effect on the food consumption pattern. Immigrants had their influence too. They introduced many dishes which have become popular in the Bahraini community. Television advertising of food products and utensils also played an important role in modifying the food consumption of Bahraini households.

*Musaiger, A.O. Dietary habits of Bahraini housewives during pregnancy and lactation. J.Kwt.Med.Assoc. 16: 203-209. (1982)*

This study reports the food habits of Bahraini housewives during pregnancy and lactation. A random sample of 310 households was taken from urban and rural areas of Bahrain. The housewives were interviewed in their homes and asked about their food habits during pregnancy, puerperium and lactation. The findings indicated that 45.5% of the housewives preferred fruit, milk, rice and high protein foods during pregnancy. About 14.5% of the housewives avoided spicy foods during this period. The main reason given for avoiding certain foods during pregnancy was that they were thought to be harmful to the mother (10%). Hesso (composed of eggs, watercress seed, animal fat, sugar and spices) and chicken were the main foods consumed during puerperium (41.9% and 13.2%, respectively). About half of housewives (52.6%) had no preference for any special food during lactation. About 18% preferred protein rich foods. Spicy foods were the main foods avoided (15.2%) during lactation, as they are believed to cause diarrhea to the infant (9%).

*Musaiger, A.O. Bread in Bahrain, Consumption, Processing and Its Nutritive Value. Bahrain Centre for Studies and Research, Bahrain, 58p(A). (1988)*

The paper discusses the consumption patterns, processing and nutritive value of the main types of bread consumed in Bahrain. A sample of 305 households were selected using stratified clustering random technique. About 16 bakeries were selected to study the processing and composition of different breads namely, tanoor, Labanese, French and chapati breads. The findings showed that tanoor bread is the preferable bread in Bahraini households. The average daily household consumption of bread was 8.5, 3.7 and 10 breads for tanoor, Labanese and chapati respectively. An average of 16 slices of French breads was consumed daily by household. Detailed information on processing of tanoor breads were also provided. Proximate composition of breads consumed showed similarity in protein, fiber and energy contents. Recommendations to improve the quality of tanoor bread were given.

*Musaiger, A.O. Food-shopping behaviour in countries that are becoming industrialized. J.Cons. Stud. Hom. Econ. 13:53-60. (1989)*

The paper gives the results of a study conducted to determine the food-shopping behaviour in Bahrain, and its association with nationality. A sample of 207 adults was interviewed on the spot in 18 major supermarkets. The findings revealed that the main reason for purchasing from a supermarket was the location (27%). Bahraini consumers were less likely than non-Bahraini to purchase meat products, fruit and vegetables from a supermarket. Production and expiry dates were the most important information read on the label of food products (40.3%). Wives made the major food-shopping decision in 64% of non-Bahraini consumers compared to 37% of Bahrainis. The study suggested that investigations on food-shopping behaviour in this region should be carried out in order to understand the current situation of food marketing.

*Musaiger, A.O. Food Habits of Preschool Children in Oman. UNICEF/ Muscat Office. Oman. 27p. (1989)*

The paper presents the results of a survey of food habits of preschool children (2-5 years) in Oman. The survey was carried out in five geographical regions, Muscat, Samail, Sur, Sohar, and Salalah. Mothers of children aged 2 to 5 years were interviewed in hospitals and health complexes. The total number of mothers interviewed was 255. The results showed that foods consumed at breakfast were similar to that of an adult, and consisted of bread (73%), tea (50%), eggs (41%), milk (33%) and cheese (15%). Canned drinks (23%), cornpuffs (19%), fruits (19%), and bread (15%) were the main foods consumed by preschool children between breakfast and lunch. Rice with meat, chicken or fish were the main foods consumed at lunch by preschool children. The same foods were also consumed by other members of the family. Foods items consumed between lunch and supper were similar to those consumed between breakfast and lunch. Preschool children's supper consisted mainly of bread (64%), milk (21%), meat (17%), eggs (10%) and chicken (9%). The main foods preferred by preschool children were fruits (16%), milk (14%), eggs (13%), canned drinks (11%), fish (11%), and meat (10%). Whereas the main foods disliked were rice (19%), fish (11%) and meat (9%). Fruits(30%), milk(30%), eggs(20%) and vegetables(18%) were among the main foods believed to be beneficial to preschool children. On the other hand, chocolates and sweets(10%), spicy foods(4%), contaminated foods(3%), cornpuffs (3%) and carbonated beverages (3%) were the main foods believed to be harmful to these children.

*Musaiger, A.O. Food Habits of Teen-age Girls in Oman. UNICEF/ Muscat Office. Oman. 34p. (1989)*

The paper gives the results of a survey carried out to find out the prevalence of underweight and obesity and to understand some of the food habits and beliefs of

adolescent girls in Oman. The survey was based on interviewing the adolescent girls aged 11 to 19 years in five geographical regions in Oman; Muscat, Samail, Sur, Sohar, and Salalah. The girls were selected from intermediate and secondary schools, and measured for weight and height. The survey included 708 girls. The findings showed that the prevalence of underweight among adolescent girls in Oman was very high (63%). The over-all percentage of obesity was 11.5%. The composition of breakfast of adolescent girls did not differ from that of the common breakfast in Oman. Breakfast was skipped by 21% of the girls. The main foods consumed between breakfast and lunch were canned drinks(58%), cheese sandwiches(26%), potato chips (20%), falafel sandwiches (16%), bread (14%) and chocolate and sweets (12%). Rice (87%), fish (52%), vegetables (31%), meat (20%) and chicken (18%) were the main food items consumed at lunch. Only 6% of girls skipped their lunch indicating that lunch is the least skipped meal by adolescent girls. A high percentage of adolescent girls (31%) skipped snacks between lunch and supper. Bread (68%), tea (21%), meat (15%), cheese (14%), and chicken (13%) were the main foods consumed at supper by adolescent girls. About 10% of girls skipped supper. About 20% of girls believed that some foods should be avoided during onset of puberty. Of adolescent girls, 83% agreed that pregnant mother should consume special foods. A high percentage of girls (40%) depended on television as main source of nutrition information. School curriculum came second in order (34%). About 74% of girls believed that mothers during puerperium should consume special foods. Honey (22%), milk (21%), ghee or saman (17%), assida (17%), meat (16%) and chicken (15%) were the main foods recommended during puerperium. Fruits (35%), chicken (34%), rice (28%), meat (25%) and fish (24%) were among the main foods liked by girls. On the other hand, fish (28%), fruits (17%), meat (15%) and vegetables were among the main foods disliked.

*Musaiger, A.O. Food Habits During Pregnancy in Oman. UNICEF/Muscat Office. Oman. 27p. (1989)*

The paper discusses the results of a survey carried out to determine the main food habits of pregnant mothers in Oman. The survey was carried out in five geographical areas in Oman; Muscat, Samail, Sur, Sohar, and Salalah. A total number of 298 mothers were interviewed in hospitals in these areas. Findings showed that mothers got married at a very early age. The mean age at marriage in the five geographical areas ranged from 15.0 to 16.6 years. The overall mean age at marriage was 15.6 years. The great majority (92%) of mothers had their deliveries at hospitals. About 27% of pregnant mothers ate less during pregnancy. On the other hand 18% of mothers ate more during pregnancy. Meat, vegetables, milk, fruits, and fish were the common foods preferred by pregnant mothers. The main reasons given for such preference were; benefit to mother (18.8%), for growth of the foetus (18.5%), and liked the taste of these foods (10.7%). Fish (19.8%), spicy foods (12.8%) and meat (7.4%) were the main food avoided during pregnancy. Of the mothers, 14.8% stated

that they did not like these foods during this period. Other reasons given were: harmful to mothers (6.7%) and because of nausea (5%). A high percentage (64%) of pregnant mothers reported that they had morning sickness. Lemon juice, citrus fruits and milk were the main food consumed to overcome morning sickness. Ghee (44%), chicken (39%), honey (39%), meat (27%) and fenugreek (19%) were the foods mostly consumed during puerperium. About 25% of mothers believed that these foods give more energy, 21% believed that these foods improve the health of mothers and 16% believed that such foods help to clean the uterus from blood. Milk (33%), fish (21%) and meat (20%) were the main foods believed to increase milk secretion.

*Musaiger, A.O. El-Sherbini, A.F. & Amine, E.K. Education and food habits of Bahraini housewives. J.Royal Soc. Hlth. 106(3): 85-86,89. (1986)*

The meal patterns and food habits of Bahraini mothers during pregnancy, puerperium and lactation, as well as supplementary foods given to infants were studied and associated with educational level of mothers. A random sample of 310 of households, representing 1% of the total households was taken. Education was found to be positively associated with the food habits of Bahraini mothers. Only 6% of low educated mothers ate fruits with lunch, whereas the proportions were 10.5% and 24.1% for middle and highly educated groups, respectively. The consumption of fruits during pregnancy was also found to be greater in the highly educated mothers. However, there was no clear association between educational level and types of food consumed during puerperium. Most of the mothers preferred to eat the traditional dishes which are commonly consumed after delivery (Hesso and Gellab). Sixty percent of low educated mothers and 50% of middle educated continued to take their normal daily diet during lactation period, as against 25.9% in highly educated mothers. The highly educated mothers were more likely to consume protein rich foods, fruits and vegetables during lactation period. Commercial baby foods were widely used as a supplement to infant diet by middle (89.5%) and highly (91.3%) educated mothers, compared to low educated mother (66.8%).

*Prakash, P., Shubber, K.M. & Abdul-Ghani, Z.A., Food habits during pregnancy and lactation in Kuwait. Nutrition Unit, Preventive Health Section, Ministry of Public Health, Kuwait, 13 pp. (1984)*

A total sample of 500 mothers were interviewed to obtain their food habits during pregnancy and lactation. Of mothers, 51% took extra milk, meat, vegetables and fruits during pregnancy, compared to 40% took these extra of foods during lactations. The main reason given for intake such foods was good for mother's and foetus' health (26% and 11% for pregnant and lactating mothers, respectively). Special foods consumed during post-partum were Asida, Hesso, Helba and Lohoom. Spices (19.2%) and meat, fish and poultry (8.4%) were the main foods avoided during pregnancy and lactation periods. Dislike, and bad for mother's and foetus' health were

the main reasons given for avoiding these foods. Based on 24 hour dietary recall, calcium, iron, vitamin A and vitamin C were below 75% of US RDA for pregnant mothers. Except for protein, all other nutrients intake of lactating mothers were found below 75% of the RDA.

*Salji, J.P. Contribution of dairy products to nutrient intake in Saudi Arabia. Nut. Rep. Int. 34(4):673-676. (1986)*

The paper discusses the role of dairy products in nutrient intake in Saudi Arabia. Data were derived from local dairy production as well as imported dairy products for the year 1985. Findings indicated higher annual per capita consumption of milk (72.2 kg) and fermented dairy products (26.7 kg) when compared to other dairy products (1.4-6.6 kg). The contribution of nutrients derived from dairy products to the Recommended Daily Allowance was most significant for Ca(64%), P(49%), riboflavin(49%), vitamin B12(42%), protein (30%), and energy(19%). This contribution was greatest among younger population aged 1-10 years. Dairy products consumed in Saudi Arabia provided 100 mg of cholesterol and 18.5g of saturated fatty acids per capita per day. The ways and means of limiting the contribution to cholesterol, fatty acids and salt were discussed.

*Sawaya, W.N., Tannous, R.I. & Othaimen, A.I. Dietary Survey on Infants and Preschool Children in Saudi Arabia. Ministry of Health/Ministry of Agriculture and Water, Saudi Arabia, 269 pp. (1985)*

This report gives and discusses the results of a survey carried out to determine dietary intake, infant feeding habits, anthropometric measurements and nutritional deficiencies among preschool children (0-6 years) in Saudi Arabia. A total sample of 849 children from four geographical areas was randomly selected. The survey showed that most of the children were below the 90% median for weight and height. For both means weight and height of children, the majority fall below the NCHS standard. A common clinical sign was dental caries (11.2%). Bleeding gums was also very common (12.4%), particularly in older children. Goiter or thyroid enlargement was only reported in one area. Rickets was also observed in two areas. Breast-feeding was still the main method of feeding babies, however, 50% of the children supplemented breast-feeding with bottle-feeding. The age at which breast-feeding was stopped was high (upto 20 months), the major reason being new pregnancy. Age at introduction of weaning foods ranged from 6 to 15 months. Dietary information showed that the intake of protein and vitamin C exceeded the US Recommended Dietary Allowances, while iron was the most deficient nutrient. For infants calcium and phosphorus intake was adequate, while niacin was low. For all ages, most nutrients were below the RDA.

*Sawaya, W.N., Tannous, R.I. & Othaimen, A.I. Nutrients intake of Saudi infants and preschool children by meal of the day. Nut.Rep.Int. 35(2):233-250. (1987)*

This paper studies the nutrient intake of children aged 0 to 72 months through meals consumed during the day. Data were collected from 849 children from four different regions in Saudi Arabia. The mothers were interviewed and asked to recall the food intake of her child during 24 hours. For infants and children still on breast milk, the number of breast feedings per 24 hr were recorded. The results revealed that lunch contributed the highest percentage of the average total daily intake for all age groups with respect to protein (30%) and energy (35%), followed by supper (protein 26% and energy 23%). Breakfast's contribution of Ca, P and Fe was substantially high and accounted for 30, 36 and 30%, respectively, of the total daily intake of all age groups. The highest daily intake of vitamin C was mainly from lunch and morning snack (28% of the total). Differences in nutrients intake from different regions of the country and for different age groups investigated and were discussed.

*Sawaya, W.N., Tannous, R.I., & Othaimen, A.I. Dietary intake of Saudi infants and preschool children. Ecol. Food. Nutr. 20:171-184. (1988)*

Nutrients intake of 849 Saudi children aged 0-6 years was investigated by 24-hour dietary recall method. Findings showed that the intake of protein and vitamin C was adequate using US Recommended Daily Allowances, while that of iron was the least plentiful supply. For infants, calcium and phosphorus intakes were adequate because of the prolonged breast-feeding, but that of niacin was relatively low. For all age groups, the intake of energy, vitamin A and thiamin were below the standard. Regional variation in nutrient intake was observed particularly in energy and calcium.

*Wirhth, W. et al. Nutritional status, food intake and nutrient supply of schoolchildren in Saudi Arabia. 2. Food intake and nutrient supply. Zeitschrift für Ernährungswissenschaft. 16(3): 184-197 (G). (1977)*

Information on dietary intake and food consumption patterns during one week period were collected and analysed on 306 students aged 6 to 18 years old in 13 schools in various regions in Saudi Arabia. Cereal products were the main foods consumed. Of the children 70% did not reach the German Recommended Dietary Allowances for animal protein. Intake of carbohydrates was too high, while intake of linoleic acid, minerals, and vitamins was too low. A school lunch programme for Saudi students was recommended.

*Zaghloul, N.E., El-Sherbini, A.F. & Al-Shayeb, F.A. Dietary factors and physical activity of obese and nonobese adolescent girls. Bull.High.Inst.Publ.Hlth. Alexandria XIV(3):31-49. (1984)*

Two groups of High Nursing School girls in Bahrain, 40 obese and 34 non-obese,

were compared with regard to dietary intake and physical activity. Anthropometrics measurements taken were height, weight, biceps, triceps, subscapular and abdominal skinfold thickness. The obese group was found to consume significant more calories, protein, fat and carbohydrates than their non-obese peers. The majority of obese girls (72%) were categorized as less active compared to non-obese girls (27.8%). The anthropometric measurements showed a significantly high mean body weight, body mass index (BMI) and relative body weight. The skinfold thickness of obese group were significantly higher than that of non-obese group. The study suggested that overeating and physical inactivity are important factors in the occurrence of obesity among girls in Bahrain.

*Zaghloul, N.E. & El-Shayeb, F.A. Dietary intake of college students in Bahrain. Bah. Med. Bull. 7(1):30-32. (1985)*

Dietary intake of 66 students (31 males and 35 females) for 3 consecutive days was studied. The mean age of students was  $19.69 \pm 1.85$  years. The findings revealed that male students consumed more calories and nutrients than females. In general the students had an adequate intake of most nutrients when compared with the US Recommended Dietary Allowances. The intake of protein, niacin, thiamin and vitamin C exceeded the RDA, while the intake of riboflavin and vitamin A was slightly lower. The consumption of iron was found to be low (73% of RDA) among females, and high (130% of RDA) among males. Comparison in nutrient intake between Bahraini students and others was also provided.

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