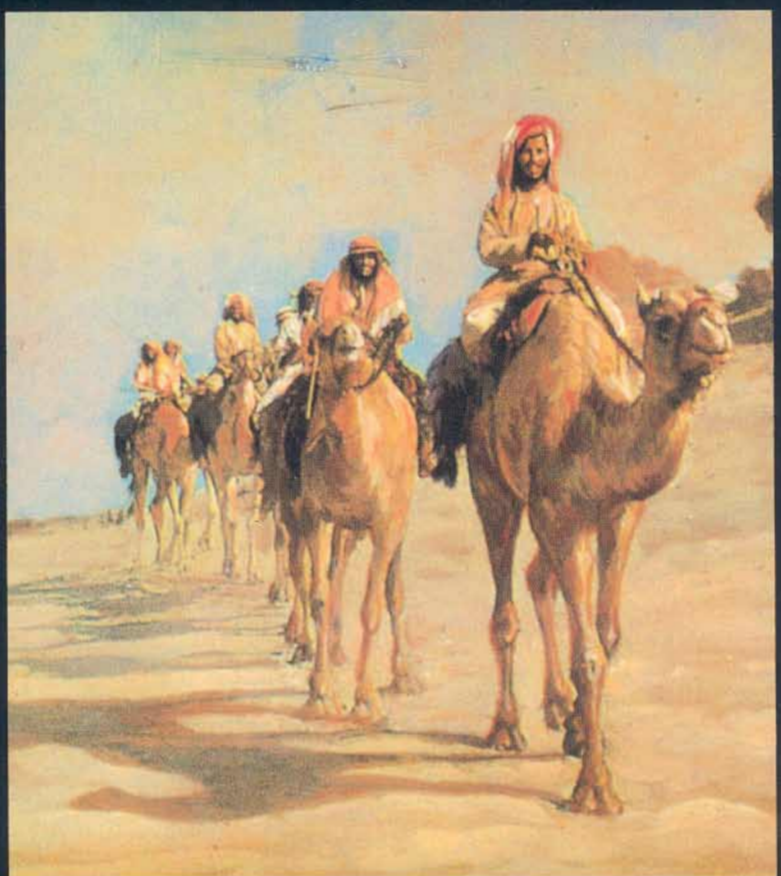
# DIET-RELATED NON-COMMUNICABLE DISEASES IN THE ARAB COUNTRIES OF THE GULF





# DIET-RELATED NON-COMMUNICABLE DISEASES IN THE ARAB COUNTRIES OF THE GULF

Edited by

**Dr. Abdulrahman Obaid Musaiger**
Associate Professor of Human Nutrition
Department of Food Sciences and Nutrition
Faculty of Agricultural Sciences
U.A.E. University, Al-Ain.

**Dr. Samir Salem Miladi**
Regional Food and Nutrition Officer
FAO/RNEA
Cairo, Egypt.

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The FAO/RNEA
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or

Faculty of Agric. Sciences
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P.O. Box : 17555
Fax : 009713-632384

or

Arab Nutrition Society
P.O.Box : 18062
Al Ain, UAE

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## FOREWORD

During the last two decades, the Arab countries of the Gulf have experienced rapid social and economic changes, mainly due to increase in income. These changes led to a drastic change in the trends of food consumption and lifestyles in these countries. Nutritional problems, which were not known to this part of the world, became very prevailing due to excessive intakes of food, particularly of dietary components related to chronic non-communicable diseases. With higher income and urbanization, diet became higher in energy and fat, especially saturated fat, have less fibre and complex carbohydrates. Exercise and energy expenditure decreased, while levels of smoking and stress increased. These and other risk factors, as well as increased life expectancy, are leading to the prevalence of obesity, hypertension, cardiovascular diseases, and cancers with immense social and health care costs.

It is particularly timely to disseminate the knowledge accumulated in the Arab countries of the Gulf, concerning the relation between the new dietary habits and the spread of non-communicable diseases. It is also necessary to provide a bibliographic guide for the application of present knowledge, and for identifying needed action for achieving nutritional well-being of the population.

The FAO Regional Office for the Near East is 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 with the United Arab Emirates University and the Arab Nutrition Society.

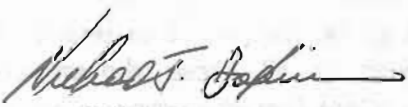
**A.Y. Bukhari**
**ADG/Regional Representative**
**for the Near East**

## PREFACE

The transition in food habits, lifestyle and trends in diseases during the past two decades in the Arab Countries of the Gulf has been well documented. This transition has led to dramatic changes in causes of death. The incidence of infectious diseases has declined steeply, while that of diet-related non-communicable diseases has gradually increased. Health statistics from the Arab Countries of the Gulf showed that cardiovascular disease, injuries and accidents and cancer are the major causes of death.

Intervention programmes to prevent and control diet-related non-communicable diseases in this part of the world should be given high priority in any health and social plan. However, baseline data about prevalence and factors associated with these diseases are essential for these programmes. The objective of this publication, therefore, is to provide reliable up-to-date information on diet-related non-communicable diseases in the Arab Countries of the Gulf.

This publication is an effort of three organizations; UAE University, FAO/Regional Office in Cairo and Arab Nutrition Society. Scientists from five Arab Gulf Countries in addition to experts from FAO/RNEA/Cairo and WHO/EMRO/Alexandria have participated in producing this work. We hope that information provided in this publication is beneficial for nutritionists, health specialists and all others interested in this topic.



Nuhad J. Daghir, Ph.D.
Dean, Faculty of Agricultural Sciences

## CONTRIBUTORS

**Ala- Aldeen Alwan**
Non-Communicable Disease Adviser
WHO Regional Office for the Eastern Mediterranean (EMRO)
Alexandria - Egypt

**Abdelmonem S. Hassan**
Former, Head Diabetics and Nutrition Section
Hamad Medical Corporation
Doha - Qatar

**Abdulrahman A. Al-Nuaim**
Associate Professor of Medicine
Consultant Endocrinologist and Diabetologist
King Khalid University Hospital
Riyadh - Saudi Arabia

**Abdulrahman O. Musaiger**
Associate Professor of Human Nutrition
Department of Food Sciences and Nutrition
United Arab Emirates University
Al-Ain - United Arab Emirates

**Khalid Al-Rubean**
Assistant Professor of Medicine
Consultant Endocrinologist and Diabetologist
King Khalid University Hospital
Riyadh - Saudi Arabia

**Khalid A. Madani**
Nutrition Consultant
Ministry of Health
Jeddah - Saudi Arabia

**Nasser Al-Daghari**
Research Fellow
Department of Biochemistry
College of Science
King Saud University
Riyadh - Saudi Arabia

**Omer Al-Attas**
Associate Professor of Biochemistry
College of Science
King Saudi University
Riyadh - Saudi Arabia

**Rufaida H. Khashoggi**
Vice Dean of Home Economics
King Abdulaziz University
Jeddah - Saudi Arabia

**Samir S. Miladi**
Regional Food and Nutrition Officer
FAO Regional Office for Near East (RNEA)
Cairo - Egypt

**Tawfik Khoja**
Director General
Health Centers
Ministry of Health
Riyadh - Saudi Arabia

**Yagob Al-Mazrou**
Assistant Deputy Minister for Preventive Medicine
Ministry of Health
Riyadh - Saudi Arabia

**Zam-Zam Al-Moussa**
Head, Nutrition Unit
Preventive Health Division
Ministry of Public Health
Kuwait - State of Kuwait

# CONTENTS

# CHRONIC DISEASES IN THE EASTERN MEDITERRANEAN REGION : AN OVERVIEW

AL'A-ALDEEN ALWAN

Noncommunicable Diseases, WHO Regional Office for the Eastern Mediterranean, Alexandria, Egypt.

## INTRODUCTION

A multitude of factors influence health. They include genetic predisposition, environmental factors as well as demographic and socioeconomic variables. Behavioural risk factors in the form of life-style characteristics of modernization have become increasingly visible as underlying causes of preventable morbidity and premature death. Alcohol, tobacco, overnutrition, high serum cholesterol levels, mental stress and injuries are the major precursors of the leading causes of morbidity and mortality namely, cardiovascular diseases, neoplasms, diabetes and accidents (Last and Wallace, 1992).

It has been shown that modern "disturbances of human culture" operating from early childhood onwards, are responsible for the epidemic of noncommunicable diseases and their complications. These disturbances include :

- Overnutrition associated with elevated levels of blood pressure, serum cholesterol and body weight, as well as high prevalence of diabetes;
- The twentieth century mass habit of cigarette smoking; and
- A sedentary life-style (WHO, 1990).

With modernization and urbanization of developing populations, new eating trends have emerged. These include habitual high intakes of :

- Total food energy in relation to energy expenditure (physical activity);
- Total fats, saturated fats and cholesterol;
- Refined sugar and other processed foodstuffs low in fibre;

Salt and other high sodium compounds and
In some populations, alcohol.

High intakes of saturated fat and cholesterol, together with low fibre intake, lead to high levels of serum cholesterol which is one of the major aetiological factors for cardiovascular diseases. Obesity, high dietary intake of sodium and heavy alcohol consumption lead to higher level of blood pressure and increased prevalence of hypertension from youth onwards. High blood pressure is also a major risk factor for other cardiovascular diseases such as coronary heart disease and strokes. In addition, obesity and physical inactivity are closely linked to the aetiology of non-insulin dependent diabetes which is also a significant risk factor for cardiovascular diseases.

Worldwide, smoking is responsible for an estimated 30% of all cancer deaths, 21% of deaths from coronary heart disease, 18% of stroke deaths and 82% of deaths from chronic obstructive pulmonary disease. Globally, tobacco is estimated to cause at least three million deaths a year, about one million of which occur in developing countries (WHO/PAHO, 1992).

A recent analysis of studies of exercise and heart disease concludes that lack of exercise is causally related to increased risks of heart disease, and that the relative risk of this factor is in the order of magnitude as those of moderate smoking and elevated cholesterol Powell et al. (1987). Analysis of studies on the role of behavioural factors in disease suggests that approximately two thirds of deaths in the United States are attributable to preventable precursors. Tobacco and three other precursors strongly related to personal health behaviour, namely high blood pressure, overnutrition and alcohol, account for the majority of preventable deaths, life-years lost and hospital days (Emler and Eddins, 1987).

Coronary heart disease (CHD), diabetes and hypertension are now considered examples of multifactorial disorders which result from the interaction of environmental factors with genetic predisposition. Although individuals differ in the nature of their responses to the environmental "disturbances of human culture", these differences in genetic predisposition appear to play a smaller part in accounting for the interpopulation differences in the

incidence of, and mortality from, these diseases (WHO, 1990). Thus, by controlling environmental factors, which exert an overwhelming influence on the occurence of the noncommunicable diseases, the potential for the prevention of this epidemic is indeed great, as the recent marked declines in CHD mortality in several developed countries indicate (WHO/EURO, 1988).

The so called "diseases of modern lifestyles" are now the major causes of morbidity and mortality. Cardiovascular diseases (CVD) taken together account for a major proportion of all deaths during adulthood in both developed and developing countries. It is estimated, that around the year 1980, almost 50% of all deaths in developed countries were caused by CVD and about 20% by cancer (WHO, 1990).

Like CVD, cancer is forcing itself into every country's health agenda. Each year it affects at least nine million people and kills five million. Its economic, as well as health consequences, are considerable. More than one half of all cancers occur among the three quarters of the world's population residing in developing nations (WHO, 1992).

The prevalence of diabetes shows considerable variations between various poulation groups. Up to 35% of adults have been reported to have diabetes in certain predisposed communities. While available data confirm the global nature of the problem, there is evidence to indicate that the disease reaches its greatest frequency in developing countries and among minority groups and the disadvantaged in the industrialized world (King et al. 1991).

This paper attempts to review available data on the epidemiological aspects of the most common chronic health problems associated with modern lifestyles in the Eastern Mediterranean Region (EMR), and to discuss the potentials for their prevention and control.

## DEMOGRAPHIC TRENDS

During the last two decades, significant demographic changes took place. The total population in the region has almost doubled in 20 years. The population has grown from 209 millions in 1970

to 376 in 1990 and is estimated to be 513 in the year 2000. Children under 15 years constitute about 44% (range : 26-48%). The percentage of persons aged 65 years and over has been maintained at a low proportion, 3% in 1990. However, because of the favourable trend in infant and under 15 years mortality, life expectancy at birth has increased from 56 years in 1985 to 62 years in 1990 (WHO/EMRO, 1991).

The population density is 28 inhabitants per sq. km with a range of 3-746 inhabitants per sq. km highlighting the differences among countries in their space distribution. Urbanization continues to increase. The proportion of the urban population has changed from 39% in 1985 to 44% in 1990. In some countries, up to 100% of the population is urbanized.

There is a wide variation in demographic trends among countries. At one end of the spectrum are countries with a life expectancy as high as 76 years and on the other extreme are those with life expectancies as low as 42 years. A more striking pattern exists concerning socioeconomic indicators where extreme variations are seen. The per capita income ranges between US $ 190 in one country to $ 15 700 in another (average of $ 1130). Adult literacy rate ranges from 11% to 95% (average 43.5%).

Despite this heterogeneity, follow up of the demographic and socioeconomic indicators generally demonstrates a steady shift from traditional and rural lifestyles to more urbanized and modernized patterns.

## NUTRITIONAL TRENDS

In the EMR, the significant transition to economic affluence has been associated with changes in dietary pattern and nutritional status. Analysis of the data collected from some countries of the region on dietary consumption trends demonstrates a rapid rise in food energy availability and consumption beyond requirement. It is predicted that if the increase continues at the present rate, the food energy availability in the Region as a whole will exceed that in developed countries in less than a decade (WHO/EMRO, 1989). In a significant number of countries, consumption of animal fat and sugar shows a steep upward trend. Adverse consequences on health are anticipated if this trend continues.

Information on adult obesity is only available from a few countries. Nevertheless, it is clear that it represents a significant problem in the region. The rates of obesity reported from some member countries are remarkably high. In one country, up to 53% of males and 63% of females are obese. Among Saudi Arabian adults aged 18 to 74 years attending a primary health care centre, 51.5% of the men and 63% of females were considered obese. Overall marked obesity, defined as a body mass index of 30 $Kg/m^2$ was seen in 25% of people (Benhemd et al. 1991).

Studies on total serum cholesterol levels are scarce in the Region. However, available data from one country indicate that a substantial proportion of the population have levels above what is considered as the upper permissible limit (Inam et al, 1991).

## CARDIOVASCULAR DISEASES

Precise data on the magnitude of CVD as a public health problem in the EMR are generally scarce. Despite the general impressions held by the medical profession and the general public of the increasing occurence of CVD, the extent of the problem has not been adequately examined in most Member States. Reliable mortality data are hard to obtain. However, data reported to the WHO Regional office from several member countries over the last 5 years provide valuable indicators on mortality trends. In most of these countries, CVD is the leading identifiable cause of death. The proportion of cardiovascular deaths ranged from 25% in one country to over 45% in another.

Analysis of mortality data from selected populations of the region reveals interesting results. Data from Kuwait indicate increasing deaths from coronary heart disease and hypertension (Nissinen et al., 1988; Uemura et al., 1988). The mortality rates for cardiovascular diseases, accidents and malignant neoplasms represented almost half of the general mortality rate in 1984. Review of the data available on the main causes of death registered in Jordan in 1985 show that CVD is clearly the leading cause of death. It is responsible for 39.1% of all male deaths in 1985. The same data indicate a steadily rising rate of mortality from CVD over the period 1961-1985. In males, CVD was

responsible for 5% of all deaths in 1961, rising to 12.6% in 1970, 18.9% in 1975, 22.2% in 1979 and 39.1% in 1985. Corresponding figures for females are 2.9%, 11.7%, 13%, 18.5%, and 27.2% respectively. The same data show concomitant reductions in mortality due to communicable diseases over the same period (MOH, 1989).

The frequency of CVD morbidity in the general population of EMR countries is not known. No nationwide morbidity statistics are generally available; however, a limited number of prevalence studies has been carried out and other descriptive epidemiological data are available in some countries. As countries are realizing the increasing importance of these diseases and the need for action at the national level, the importance of reliable epidemiological data is becoming more recognized.

## CORONARY HEART DISEASE

CHD seems to be the predominant type of heart disease now encountered in many countries of the Region. Hospital data indicate rising trends. In Jordan, analysis of data on patients managed by the National Cardiovascular Centre between 1973 and 1987 revealed an interesting pattern that provides confirmatory evidence on the changing pattern of cardiovascular diseases in the country. A progressive increase in CHD is associated with a decline in the number of cases of rheumatic heart diseases. Almost half of all patients with angiographically confirmed CHD were below the age of 50 years and only 17% were above the age of 60 years (Doghmi et al., 1989).

Studies conducted on the risk factor profile and related lifestyle patterns reveal levels generally similar to those in industrialized communities. Although the evidence based on a few isolated observations does not provide firm conclusions on the exact role of the individual coronary risk factors in the region, a high prevalence of smoking (over 70%) has been consistently reported among sufferers of acute myocardial infarction. Hypertension is found in 22-47% of cases and diabetes in over 30%. Most patients had at least one coronary risk factor.

## HYPERTENSION

Hypertension has long been recognized as a risk factor of CVD. Several studies have examined blood pressure levels in EMR populations. Using the WHO criteria of 160/95, the prevalence rates have been reported to range between 10% to over 17% of the adult population (Alwan et al., 1982; Faruqui, 1983). Although these surveys have generally used the same standardized methodology, the age groups studied varied from one place to another. This factor is at least partly responsible for the variation in prevalence rates. For example, although hypertension (160/95) was detected in 12% of the Iraqi sample studied and over 17% in one of the Pakistani surveys, the age groups studied were 15 years and over in the first and 30 years and over in the second.

Based on these figures, there are over 7 million hypertensives in Pakistan alone (Pakistan Medical Research Council, 1980). Moreover, the prevalence of hypertension appears to increase in the EMR, parallel to affluence. Studies carried out in Egypt since 1959 confirm this rising trend (Badawi, 1987). A national hypertension project has recently been initiated in Egypt to study the prevalence of hypertension in samples of the Egyptian adult population; preliminary results reported indicate that about 30% of the subjects examined have a blood pressure of over 140/90 (Ibrahim, unpublished).

As indicated above, urbanization is a progressive trend in the region. Data from studies conducted on both urban and rural population groups confirm higher prevalence in the urban populations. It is also reported that the rise of blood pressure with age is more marked for the urban compared with the rural population in Pakistan (Alwan et al., 1982 and Faruqui, 1983).

Detection rate and the level of awareness among hypertensive persons are generally low. In the report from Iraq, only 19% of hypertensives were aware of their high blood pressure prior to the survey. Similarly, in Pakistan, for every known case of hypertension, there are three undetected cases. Hypertension, like diabetes, may remain asymptomatic for years and is only detected when one of its devastating consequences occurs.

In conclusion, from the data available, evidence suggests that in many countries of the region, the present epidemiological and clinical patterns of hypertension do not appear to differ markedly from those in developed countries. While studies to provide further knowledge on the role of ethnic, geographic and socioeconomic factors are needed, countries of the region should, at present, acknowledge the emergence of hypertensive disease and its consequences like CHD and cerebrovascular disease and initiate action for their control.

**DIABETES MELLITUS**

During the last decade, data on the epidemiology and clinical characteristics of the two types diabetes have been reported from several countries of the region. Using varying diagnostic criteria, non-insulin dependent diabetes has been detected in 5%, 4.8% and 4.3% of Saudi Arabian, Iraqi and Egyptian population samples respectively (Al-Kasab et al., 1979; Fatani et al., 1987; and Arab, 1992). Ten percent of Tunisians and 14% of Omanis in the age range 30-64 years have been estimated to have diabetes. As with hypertension, the Egyptian data demonstrate distinct geographical differences with the highest prevalence in urban areas and the lowest among rural and desert populations.

The survey from Oman, which used the WHO diagnostic criteria, revealed the highest prevalence documented in the region; 9.8% of the population sample, 20 years and over, was found to have glucose values consistent with the diagnosis of diabetes (Asfour, unpublished). The intermediate category of impaired glucose tolerance (IGT), which may be associated with increased susceptibility to macrovascular complications, affects an additional proportion. In the Omani survey, IGT was found to affect 10.9% of the sample studied, thus the overall prevalence of glucose tolerance abnormalities (Diabetes and IGT) exceeds 20%.

The first report on the epidemiology of insulin dependent diabetes came from Kuwait and showed an incidence in the 0-14 and 0-19 years age groups of 3.96 and 5.6 per 100 000 respectively (Taha et al., 1983). Higher incidence rates have been subsequently reported elsewhere (El-Amin, 1989 and Salman et al., 1991). A report on childhood diabetes in Saudi Arabia, based on hospital records, suggests incidence peaks around 4-6 years and 11-14

years of age. In Sudan, the prevalence of this type of diabetes was determined in 43,000 school children 7-14 years of age. The overall crude prevalence rate was 0.95 per 1000. The incidence of diabetic children 0-14 years of age was reported to be 5.9 per 100,000 in 1987 increasing to 10.1 per 100,000 in 1990 (El-Amin, 1989).

Thus, available data indicate differences in the frequency of insulin dependent diabetes and may also suggest an increasing trend in recent years. More extensive investigation of the epidemiology of this disease in the EMR is clearly needed.

Clinical aspects of diabetes were reported from several member states in the region. In a study involving a sample of 1,175 Iraqi diabetics, the majority were in the age group 40-59 years. Those presenting with the classical symptoms of diabetes accounted for less than 50% of patients. The rest were diagnosed because of atypical symptoms or complaints related to the development of complications. More than 20% were totally asymptomatic and were detected through routine examination conducted for unrelated reasons (Alwan and Shamdeen, 1989).

The proportion of non-insulin dependent diabetics who suffer from obesity range between 75% in Iraq (Alwan and Shamdeen,1989) to 46% in Sudan (Elmahdi et al., 1991). A substantial proportion of insulin dependent diabetes presents with ketoacidosis. This serious and potentially fatal condition has been reported to be present in 82% and 67% of diabetic children at the time of diagnosis in Sudan (El-Amin, 1989) and Saudi Arabia (Salman et al., 1991) respectively and is the presenting manifestation in about 30% of Iraqi diabetics.

While these data demonstrate the high susceptibility of EMR populations to diabetes, reports have also shown that diabetics develop long term complications such as CHD at a rate similar to that seem in Western countries. This means that up to 20% of non-insulin dependent diabetics have been found to have retinal complications at the time of first diagnosis and that most would develop them over subsequent decades. A substantial proportion of people with IDDM eventually develop end stage renal failure and the majority of the diabetic population will eventually develop a potentially lethal cardiovascular complication.

While diabetes and its complications are major causes of morbidity, disability and premature death, the essential health care requirements for these patients are generally inadequate in the region. Facilities for self care are scarce and there is, at present, a serious lack of initiatives for organized programmes to remedy the situation. In some countries, very alarming facts have been reported on the health care status of people with diabetes. People may have no easy access to even life-saving drugs like insulin. Mortality appears to be disturbingly high among children with diabetes. Available data suggest that maternal complications and perinatal complications in infants of diabetic mothers are remarkably high. Facilities and experience required for the management of long-term complications such as vision-threatening retinopathy and end-stage renal failure are simply not available in many places and grossly inadequate in others. Health care institutions are often overwhelmed by the increasing demands related to the diagnosis and treatment of the various disorders associated with diabetes.

## POTENTIALS FOR PREVENTION AND CONTROL

Profound demographic, socioeconomic and behavioural transformations have taken place in the EMR over the last two decades and further changes are projected in coming years. The impact of these changes on health is considerable and the implications for the epidemiological profile of member countries have been dramatic. While infections and parasitic diseases remain a priority in many countries, new sets of health problems related to urbanization, emergence of westernized life-styles and progressive aging of populations are also being faced.

Action is urgently needed at the national level. Health policymakers must engage in undertaking an epidemiological and socioeconomic analysis of the major disease problems and consider cost-effective intervention strategies. The traditional deeply rooted commitment to protect children and young people from infections and nutritional deficiencies by providing timely immunization and promoting optimal feeding must be continued.

Prevention of hypertension and cardiovascular diseases can be remarkably successful. Success has been demonstrated by

several programmes in developed countries; significant reductions occurred for all the risk factors and substantial declines in CVD mortality have been recorded. Most of this improvement appears to be due to primary prevention of the disease (WHO/EURO, 1988 a, b).

Several recent WHO reports deal extensively with the strategies and practical approaches in the prevention of the epidemic of CHD and other atherosclerotic diseases. Top priorities with proven success in several developed countries include control of smoking and formulation of national food and nutrition policies. To prevent adult CVD, intervention should be based on preventive efforts in childhood and youth and focus on controlling the unhealthy behavioural risks and lifestyle characteristics such as smoking, eating patterns, lack of physical activity, and the like. Since attitudes and behaviours that influence future health are established during childhood and adolescent life, schools have a great potential to promote health.

Exercise has been shown to have a protective effect against diabetes as well. There is evidence to indicate a substantially higher diabetes prevalence among the least active, versus the most active. Intervention studies have demonstrated a beneficial effect of physical activity in improving insulin sensitivity and glucose tolerance.

An atherogenic and thrombogenic diet is an underlying cause of CVD. Obesity is associated with increased risk of diabetes in both sexes and in many ethnic groups. Evidence has accumulated to suggest that increased dietary intake of saturated fats and decreased intake of dietary fibre does, not only contribute to atherosclerosis, but can also result in abnormal glucose tolerance. Westernization of the diet appears to worsen glucose tolerance and there is evidence to suggest that return to a traditional diet is associated with a dramatic improvement of glucose tolerance.

Smoking predisposes to CVD, chronic lung disease and cancer. At least 30% of the estimated future cancer burden is potentially preventable by tobacco control.

In view of the above, intervention against non-communicable diseases in the region is not only needed but is also feasible. The main approach of such intervention is through health promotion, disease prevention and risk reduction. An integrated programme for the prevention of chronic noncommunicable diseases should be established. This programme can be built to prevent and correct behavioural risk factors associated with socioeconomic development and modernization. It will focus on three major elements; these are :

- Exercise promotion;
- Dietary modification; and
- Smoking prevention.

A variety of intervention approaches will be used ranging from health education to regulations, taxation, subsidies, and information programmes. Efforts to implement this programme and to promote healthy lifestyles should be encouraged. Prevention of noncommunicable diseases such as CVD, cancer and diabetes is more cost-effective when it can be incorporated into personal lifestyles rather than added on as a clinical intervention (Weinstein, 1990).

**REFERENCES**

Al-Kasab, F.M. et al. (1979). Prevalence of Diabetes Mellitus in a Rural Community in Iraq. International Journal of Epidemiology, 8,1.

Alwan, A.A.S. and L. Shamdeen. (1989). Clinical Presentation of Diabetes mellitus in Iraq, Proceedings of the Second Scientific Research Exhibition, Ministry of Scientifc Research, Baghdad.

Alwan, A.A.S. et al. (1982). Studies on the Prevalence of Hypertension in Iraqi Rural and Urban Communities. Iraqi Medical Journal.

Arab, M. (1992). Diabetes Mellitus in Egypt. International Diabetes Digest, 3 : 86-88.

Badawi, H. (1987). Hypertension in Egypt. In : Amery, A. & Strasser, T. (eds). Control of Hypertension in Developing Countries. Cardiology Tropical, 9.

Benhemd, T. et al. (1991). Obesity in a Primary Health Care Centre : A Retrospective Study. Ann. Saudi Med. 11:2-

Doghmi, F. et al. (1989). 14 Years Experience with Cardiac Catheterization and Angiography in Jordan. Jordan Medical Journal, 23,1.

El-Amin, A. (1989). Prevalence of IDDM in Khartoum, Sudan, Diabetes Care, 12, 6 :430-432.

Elmahdi, E.M. et al. (1991). Features of Non Insulin dependent Diabetes in Sudan, Diabetes Research and Clinical Practice, 11:59-63.

Emler, R.W. and D.L. Eddins. (1987). Cross-sectional Analysis : Precursors of premature death in the United States. In Amler RW, Closing the Gap : The Burden of Unnecessary Illness. Am. J. Prev. Med. 3 (suppl. 5) : 181-187.

Faruqui, A.M.A. (1983). Heart Disease in South Asia : Experiences in Pakistan, In : Hurst, J.W. (ed). Clinical Essays on the Heart Vol. 1, McGraw Hill Book Co.

Fatani, H. et al. (1987). Prevalence of Diabetes Mellitus in Rural Saudi Arabia. Diabetes Care, 10 (2) : 180-183.

Ibrahim, M.M. (1993). The Egyptian National Hypertension Project : Preliminary Results From Phase I, Unpublished data.

Inam, S. et al. (1991). Importance of Cholesterol Screening in Saudi Arabia. Saudi Medical Journal, 12:

King, H. et al. (1991). Diabetes in Adults is Now A Third World Problem, WHO Bulletin, 69 : 643-648.

Last, J.M. and R.B. Wallace. (Eds) (1992). Public Health & Preventive Medicine, Appleton & Lange, 701-711.

Ministry of Health (1989) Annual Statistical Report (1988). Amman, Jordan.

Nissinen, A. et al. (1988). Hypertension in developing countries, World Health Statistics Quarterly, 41:

Pakistan Medical Research Council. (1980). Monograph No.3, Multicentre Study of Risk Factors for Coronary Heart Disease, Islamabad.

Powell, K.E. et al. (1987). Physical Activity and the Incidence of Coronary Heart Disease. Ann. Rev. Public Health, 8 : 253-287.

Salman, H. et al. (1991). Childhood Diabetes in Saudi Arabia, Diabetic Medicine, 8 : 176-178.

Taha, T.H. et al. (1983). Diabetes Mellitus in Kuwait : Incidence in the first 29 Years of Life, Diabetologia, 25 : 306-308.

Uemura, K. et al. (1988). Cardiovascular Diesease Mortality in Industrialized Countries. World Health Statistics Quarterly, 41.

Weinstein, M. (1990). Economics of Prevention, Journal of General Internal medicine, 5 (September/October Supplement).

WHO (1990). Prevention in Childhood and Youth of Adult Cardiovascular Diseases : Time For Action. Technical Report Series 792, Geneva.

WHO/EMRO. (1989). Clinical Disorders Arising from Dietary Affluence in the Eastern Mediterranean Region. Technical Publication No. 14, Egypt.

WHO/EMRO. (1991). Second Report on Regional Evaluation of Health For All Strategies, EM/RC38/12, Egypt.

WHO/EURO. (1988b). Primary Prevention of Coronary Heart Disease, EURO Report 98, Denmark.

WHO/EURO. (1988). Comprehensive Cardio-vascular Community Control Programmes in Europe. EURO Reports and Studies 106, Denmark.

WHO/EURO. (1988a). Comprehensive Cardio-vascular Community Control Programmes in Europe, EURO Report 106, Denmark.

WHO (1992). Global programme for Cancer Control. National Cancer Control Programmes, Policies and Managerial Guidelines, Geneva.

WHO/PAHO. (1992). Smoking and Health in the Americas. A 1992 Report of the Surgeon General, in Collaboration with the Pan American Health Organization, Geneva.

# CHANGES IN FOOD CONSUMPTION IN THE ARAB COUNTRIES

SAMIR S. MILADI

FAO Regional Office for the Near East, Cairo, Egypt

## INTRODUCTION

The Arab countries included for discussion in this paper comprise the twenty Arab countries who are members of the Arab League. The region under consideration sits astride the lines of communication with Europe, Africa and East Asia, and it has been, as a result, subjected to influences, in terms of their food consumption patterns, from the East as well as the West (Patwardhan and Darby, 1972).

The total land area covered by the twenty Arab countries is 13.67 million $Km^2$. Only about one quarter of this area is under agriculture, in which 85% is pasture land with remaining 15% being devoted to arable land and permanent crops. The latter area of permanent crops represents only 3.9% (53.5 million hectares) of the total area of the region. Only 18.7% of the arable land is irrigated and the remaining 81.3% is rain fed. The erratic rainfall in the region contributes to the instability of food production. Thus, the fluctuation and uneven distribution of rainfall in the region affect food production, food availability and consumption in several countries. The two major constraints affecting the expansion of food production in the Arab countries are : first, about 75% of the total area is desert and second, the scarcity of water resources in the remaining 25% of agricultural land. In the limited irrigated areas, water resources are to some extent under control, while the other areas, depending on rainfall, suffer from erratic and unpredictable amounts of water. Some countries in the region are thus affected from time to time by severe droughts such as Somalia, Sudan and Mauritania, while other countries may also suffer occasionally from droughts, such as Tunisia, Morocco and Jordan leading to acute food shortages in these countries.

The total population of the Arab Region was about 220 million in 1990/91 with an annual average growth rate (3.1%) which is considered to be among the highest in the world (FAO

1993). This means that the population in the Region will be doubled within the next 23 years, whereas the population of Europe, in contrast, would expect to be doubled in about 235 years. Consequently, food security, availability and consumption in this region will be affected by the high population pressures on the limited arable land as well as scarce water resources coupled with the increased food demand.

The Region is also characterized by a high increase in urbanization which ranges from 4 to 6% per year. As a result, more and more food producers are becoming food consumers, and, the expansion of the cities is mostly at the expense of the limited agriculture land. During the last two decades the region has additionally witnessed massive population movements both within as well as from outside the region. The latter have been mainly from the East Asian countries and have led to changes in food consumption patterns, especially in the labour importing countries (Miladi and Farrag, 1993).

During the last three decades, a very rapid change in food consumption patterns has occurred greater than in all its history and greater than in many other region of the world. This paper will deal with the changes in these patterns.

## MAGNITUDE OF THE FOOD PROBLEMS IN THE NEAR EAST REGION

Available data on the food gap in the FAO Near East Region, which consists of all Arab countries with the addition of Turkey, Pakistan and Iran, show that, during the last three decades, the average annual growth rate of food production increased by only 2.2% compared to an increase in food demand which exceeds 5%. This led to an increase in the dependence on costly food imports from outside the Region, which amounted to 44.3 million MT in 1988/90 in comparison to 8.1 million MT in 1969/71. The self-sufficiency ratio (SSR) for major food commodities in turn decreased remarkably during these decades. For example the SSR for cereals declined from 98 to 70%, for wheat from 80 to 68%, for rice from 108 to 86%, for sugar from 75 to 62% and for meat from 99 to 85%. This widening food gap, especially in the Arab Region, is expected to further increase, particularly, if appropriate

measures are not taken at both national and regional levels to meet the rapid growth of food demand (FAO. 1993).

Trends in agricultural trade balance in the Near East Region are shown in Table 1, and trends in food imports in the Near East Region (Million US dollars) are shown in Table 2. The large difference between Arab countries and non-Arab countries in terms of trade balances in food and agricultural commodities should be noted.

In addition to the above mentioned constraints, the other factors that affect food production are : (1) The problem of land fragmentation, which hinders the application of modern technology in food production, e.g. Tunisia, Jordan and Egypt. (2) The land tenure system, which is a special problem affecting food production as in Egypt. (3) Inadequate water control and management combined with inefficient drainage systems which has led to progressive loss of cultivated land in many countries. (4) Insufficient use of agricultural inputs such as improved seeds, fertilizers and insecticides, e.g. Sudan and Yemen. (5) Continuous and high rates of urbanization, more and more of the good agricultural land being lost, e.g. Egypt, Syria and Jordan. (6) Desertification and deforestation are becoming real threats to the life of rural populations and food production capacities, e.g. Somalia and Sudan. (7) Agricultural credit facilities have not been always used in favour of small farmers. (8) The marketing system of basic foods from producers to consumers has always been to the disadvantage of producers. (9) The wide gap between agricultural research and agricultural extension services, has had a negative effect on the transfer of modern technology in several countries of the Region (FAO/RNEA, 1992).

As a consequence of these effects the income gap between rural and urban communities has encouraged rural migration to the cities, which has resulted in new food consumption patterns for those migrants. Problems of the gap between food production and food consumption in the Arab Region will be further elaborated upon in later sections.

Table 1
Trends in Agricultural Trade Balances in the Near East Region* ($ million)

| COUNTRY | 1976 | 1977 | 1986 | 1987 | 1988 |
|---|---|---|---|---|---|
| Afghanistan | + 161 | - 153 | - 81 | + 52 | + 39 |
| Algeria | - 826 | - 1 115 | - 2 052 | - 1 952 | - 2 302 |
| Bahrain | - 97 | - 134 | - 245 | - 256 | - 260 |
| Cyprus | + 24 | + 44 | - 5 | + 12 | + 1 |
| Djibouti | - 26 | - 35 | - 80 | - 86 | - 92 |
| Egypt | - 643 | - 724 | - 2 954 | - 2 883 | - 4 421 |
| Iran | - 1 209 | - 1 616 | - 1 059 | - 1 622 | - 1 544 |
| Iraq | - 529 | - 753 | - 1 571 | - 1 593 | - 2 265 |
| Jordan | - 228 | - 216 | - 443 | - 460 | - 483 |
| Kuwait | - 430 | - 520 | - 954 | - 925 | - 986 |
| Lebanon | - 251 | - 310 | - 410 | - 379 | - 484 |
| Lybia | - 473 | - 722 | - 1 168 | - 1 089 | - 1 155 |
| Mauritania | - 43 | - 46 | - 71 | - 89 | - 101 |
| Morocco | - 195 | - 254 | - 246 | - 213 | - 149 |
| Oman | - 97 | - 124 | - 361 | - 349 | - 379 |
| Pakistan | - 1 | - 15 | - 93 | + 36 | + 146 |
| Qatar | - 86 | - 105 | - 227 | - 222 | - 244 |
| Saudi Arabia | - 971 | - 1 484 | - 3 389 | - 3 464 | - 3 403 |
| Somalia | + 11 | - 31 | - 63 | - 55 | - 38 |
| Sudan | + 426 | + 474 | - 64 | - 223 | + 262 |
| Syria | - 92 | - 24 | - 261 | - 251 | - 288 |
| Tunisia | - 77 | - 136 | - 289 | - 204 | - 481 |
| Turkey | + 1 137 | + 1 002 | + 1 552 | + 1 382 | + 2 096 |
| U.A.E. | - 348 | - 407 | - 919 | - 1 032 | - 1 083 |
| Yemen Arab Rep | - 160 | - 208 | - 407 | - 342 | - 434 |
| Yemen Dem. | - 58 | - 74 | - 173 | - 148 | - 203 |
| TOTAL : | | | | | |
| ARAB STATES | - 5 948 | - 6 948 | - 16 219 | - 15 768 | - 18 989 |
| NON-ARAB STATES | + 112 | - 432 | + 476 | - 140 | + 738 |
| TOTAL NEAR EAST | - 5 081 | - 7 380 | - 15 743 | - 15 908 | - 18 251 |

* Agricultural Trade Balance = Agricultural Exports - Agricultural Import

Source : FAO/Agrostat (1992)

Table 2

Trends in Food Imports in the Near East Region (Million US $)

| COUNTRY | 1970 - 75 Average | | | 1983 - 88 Average | | |
|---|---|---|---|---|---|---|
| | Cereals | Other Food | Total Food | Cereals | Other Food | Total Food |
| Afghanistan | 10.6 | 28.3 | 38.9 | 23.9 | 89.3 | 113.2 |
| Algeria | 168.2 | 292.3 | 460.5 | 734.9 | 963.7 | 1,698.6 |
| Bahrain | 10.9 | 24.6 | 35.5 | 28.1 | 153.8 | 181.9 |
| Cyprus | 23.3 | 27.7 | 51.0 | 54.5 | 67.7 | 122.2 |
| Djibouti | 3.0 | 4.1 | 7.1 | 13.5 | 25.8 | 39.3 |
| Egypt | 350.3 | 156.8 | 507.1 | 1,588.7 | 1,406.8 | 2,995.5 |
| Iran | 233.8 | 392.4 | 626.2 | 744.8 | 991.6 | 1,736.4 |
| Iraq | 110.3 | 200.6 | 310.9 | 732.4 | 976.2 | 1,708.6 |
| Jordan | 26.6 | 70.4 | 97.0 | 147.6 | 325.3 | 472.9 |
| Kuwait | 36.7 | 130.3 | 167.0 | 125.7 | 700.1 | 825.8 |
| Lebanon | 57.3 | 107.2 | 164.3 | 78.7 | 318.6 | 397.3 |
| Libya | 78.8 | 160.4 | 239.2 | 247.1 | 579.2 | 826.3 |
| Mauritania | 11.7 | 17.8 | 29.5 | 45.1 | 58.1 | 103.2 |
| Morocco | 119.9 | 180.4 | 300.3 | 273.2 | 238.8 | 512.0 |
| Oman | 10.2 | 18.6 | 28.8 | 70.2 | 237.2 | 307.4 |
| Pakistan | 100.3 | 80.4 | 180.7 | 130.3 | 537.8 | 668.1 |
| Qatar | 5.8 | 25.2 | 31.0 | 29.4 | 131.9 | 161.3 |
| Saudi Arabia | 104.8 | 189.6 | 294.4 | 1,163.9 | 1,988.8 | 3,152.8 |
| Somalia | 15.0 | 10.7 | 25.7 | 60.9 | 38.6 | 99.5 |
| Sudan | 21.5 | 60.6 | 82.1 | 122.2 | 82.9 | 205.1 |
| Syria | 64.9 | 111.7 | 176.6 | 240.0 | 248.0 | 488.0 |
| Tunisia | 39.3 | 86.8 | 126.1 | 176.7 | 192.4 | 169.1 |
| Turkey | 93.9 | 54.7 | 148.6 | 131.0 | 255.3 | 386.3 |
| U.A.E. | 28.0 | 66.8 | 94.8 | 127.3 | 744.3 | 871.6 |
| Yemen Arab Rep. | 25.2 | 30.3 | 55.5 | 130.6 | 228.1 | 358.7 |
| Yemen Dem. | 20.0 | 26.0 | 46.1 | 65.2 | 122.3 | 187.5 |
| TOTAL : ARAB STATES | 1,308.4 | 1,971.1 | 3,279.5 | 6,201.4 | 9761.0 | 15,962.4 |
| NON-ARAB STATES | 461.9 | 583.5 | 1,045.4 | 1,084.5 | 1,941.7 | 3,026.2 |
| TOTAL NEAR EAST | 1,770.3 | 2,554.6 | 4,324.9 | 7,285.9 | 11,702.7 | 18,988.6 |

Source : FAO/Agrostat (1992)

## FACTORS AFFECTING CHANGE IN FOOD CONSUMPTION PATERNS IN THE ARAB COUNTRIES

In examining the factors affecting change in food consumption in the Arab countries, it should be observed, that there are vast differences in socio-economic, ecological and cultural conditions in the different countries. The Region contains the poorest countries (Somalia, Sudan) and the richest countries (U.A.E., Qatar) of the world; the over populated Egypt to the least populated Qatar and from those of highest illiteracy rates (Yemen, Mauritania) to those with some of the lowest rates (Jordan, Tunisia) in the developing world. Due to these wide differences and the complex interrelations among the factors affecting food consumption in the Arab Region it is difficult to consider all the factors involved. In addition, differences in government policies and programmes (particularly as regard to the socio-economic development plans in the countries of the Region and their implications) also significantly affect food consumption and nutrition.

Finally in the context of the Arab food carries special social and cultural meanings in various communities and psychological significance well beyond consideration of nutritional value or physiological needs.

### 1. Economic Factors

The food consumption pattern in a given country is a function of food prices and consumer income. Food consumption patterns change as personal income grows. In fact, there is a positive relation between GNP/capita and food energy derived from animal sources, fat and sugar. Additional factors are that low income groups tend to be conservative in their food choices and resistant to change, while high income groups show increased demand for convenience foods and for eating meals outside the home (FAO, 1989).

Food prices are conditioned by several factors. Locally produced food costs are initially affected by prices of agricultural inputs, such as fertilizers, insecticides, high yielding varieties, as well as by rainfall and/or the price of water for irrigation. They are also affected by the marketing and distribution systems, seasonal

variations, food taxation or subsidies, price control or free market, storage and processing, food losses and wastages, use of by-products (as in the case of wheat bran, or molasses in case of sugar industry) and international market demand (as in the case of olive oil in Tunisia or potatoes and rice in Egypt). Several countries ration basic food commodities such as Jordan, Egypt and presently Iraq especially for vegeable oils, sugar and rice. The price of imported food is affected by the international market (suppy and demand) and by agreements between governments as in the case of wheat prices (FAO, 1989).

Many governments of the region do have certain food policies especially as regard to price control mechanisms for basic food commodities as in the case of wheat bread in Egypt, couscous in Tunisia, sugar in Syria and rice in Jordan. These food policies need to be reviewed and modified. Recently, Egypt has adopted structural adjustment progammes for both the producers and consumers. These programmes have affected supply and demand for several food commodities. In addition to the above, economic factors such as devaluation of local currency, inflation, and exchange rates also affect food prices.

Consumer income is fundamental in determining food choice. It is influenced by the degree of the economic development of the country, distribution of income, family size, cost of non food items, employment policies and income generating activities as well as the geographic location of the consumer in rural or urban areas.

## 2. Environmental Factors

The amount of rainfall and its distribution, affect food production and, in turn, food prices and farm income. Certain countries such as Sudan, Somalia and Morocco sometimes suffer from drought. As the price of sorghum increases in Sudan, the price of livestock decreases due to the shortage in animal feed and its high price. Floods also affect food production. Seasonal variations also determine food availability as in the case of fruits and vegetables.

### 3. Social and Cultural Factors

Social and cultural factors affect food consumption patterns. The level of education, family size, employment of women, health and nutrition education are important determinants. In addition, cultural factors including religion, beliefs and taboos and local traditions are also significant. This is seen in the spread of bottle feeding replacing breast feeding in many parts of the region as well as the widespread adoption of street foods for low income groups and of fast and convenience foods for those with high income. With the changes in life styles, particularly in countries importing labour, new food habits have emerged. This is especially noticeable in the Gulf countries that import large numbers of Asian workers.

### 4. Food Industries and Advertisements

The food industries and their advertisements play a vital role in changing consumption patterns in several countries of the Arab Middle East. This is exemplified in the wide spread consumption of soft drinks and "empty calorie" foods. Furthermore the canning and freezing industries, make it possible for the consumer to have access to several food choices all the year around. The expansion of the dairy industries has also contributed to the increased consumption of dairy products for certain income groups. The food industries also change consumption patterns by improving food appearance such as colour, texture, odour, and flavour, and accordingly the food demand increases. In most countries of the Arab Region food industries are expanding at a very fast rate. As a result of these expansions, more urban as well as rural consumers are becoming users of processed foods such as biscuits, sweets, soft drinks, and snack foods.

### 5. Physiological and Psychological Factors

Age, sex and physiological requirements, play major roles in food choices. Psychological conditions of the consumer affecting emotions, moods and appetites can significantly change food consumption patterns as in the case of marriage and other special occasions such as religious feasts. This is well seen in the Arab countries particularly during the month of Ramadan where an

increase in consumption of certain types of food commodities, especially fat, sugar, and meat are observed.

### 6. Disaster

The Arab Region faces both man-made disasters, especially wars and international conflicts, as in Iraq, Sudan and Somalia as well as natural disasters such as drought and flood. These disasters have short and long implications on changes in food consumption patterns. Food aid has also contributed to these changes as in the case in Sudan of wheat replacing sorghum which was not previously known to the nomadic population (FAO/RNEA, 1992).

## TRENDS IN FOOD CONSUMPTION PATTERNS FOR DIFFERENT FOOD GROUPS IN THE ARAB REGION DURING THE LAST 30 YEARS

The trends in food consumption patterns in the Arab Region are derived from the FAO Food Balance Sheets showing per capita food availability by commodity in a year (FAO/Agrostat, 1992). Only very limited numbers of countries in the Region have data on national household food consumption derived from surveys based on representative samples of their communities. Food consumption surveys, however, tend to over-estimate actual consumption, particularly for some commodities that can be subject to partial loss and wastage during preparation and consumption. Such over-estimation also includes, other commodities that can be stored at household level such as cereals, oils and sugar.

### Cereals

Cereals contribute more than half the food energy and protein supply to the population of the Arab countries. The most popular cereal in many of these countries is wheat which is largely imported and heavily subsidized. Rice follows wheat in order of importance, while sorghum is the basic cereal for a country such as Sudan. Barley is also consumed in North African countries.

For the purpose of this paper a review of the trends of the consumption of major food commodities is presented and discussed briefly using the Food Balance Sheet data.

Cereals availability on per caput basis increased in all the Arab Countries during the period 1961/63 to 1988/90. The lowest cereal consumption was in Somalia at 108.6 kg/head with the highest in Egypt 241.7 kg. (1988/90). Prior to 1961/63 the per caput cereal availability did not exceed 200 kg/head/year in any of the countries. However, in 1988/90 the per capita availability exceeded 200 kg/head/year in Algeria, Egypt, Iraq, Morocco, Syria and Tunisia. Lebanon and Somalia have not shown significant increases in cereal availability during the last 30 years in comparison with the other countries of the Arab Region.

**Wheat**

The per capita availability of wheat increased in all the Arab countries. Very high increases in the availability of wheat have occurred. These include Yemen (8 fold), Mauritania (6 fold), Somalia and Sudan (3 fold) and an almost doubling in Egypt. The highest per capita availability of wheat was noted in Tunisia (1988/90), followed by Syria, Algeria, Iraq and Egypt. These countries have a very heavy subsidy programmes for wheat. The lowest availabilities for wheat are in Sudan, Somalia and Mauritania. The per capita availability of wheat exceeds the average figure of the Near East (141.9 kg/Year) in Algeria, Egypt, Iraq, Jordan, Libya, Morocco, Syria and Tunisia.

**Rice**

Rice availability increased in all the countries between 1961/63 and 1988/90 with the exception of Saudi Arabia. Rice availability in Yemen and Mauritania has increased by 5 fold, while it has doubled in Algeria, Somalia and Syria. Rice is an important cereal in Egypt, Iraq, Jordan, Mauritania and Saudi Arabia where the supply is in excess of 20 kg/head/year. These countries exceed the average figures of 16.4 kg./head/year for the Near East Region.

**Pulses**

There was no significant change in the consumption of pulses during the period from 1961/63 to 1988/90 with the exceptions of Lebanon, Libya, Morocco, Saudi Arabia, Somalia and Tunisia. High consumption of pulses was observed for Lebanon, Mauritania and Morocco where the supply exceeds 10 kg/head/year. Promotion of the consumption of pulses needs to be emphasized for the Arab Countries and especially for a country such as Somalia.

**Sugar**

The per capita sugar availability increased for all the countries of the Near East Region during the period from 1961/63 to 1988/90. Increases were by 100% for Algeria, Egypt, Libya and Syria. Very high increases (almost 300%) were observed for Saudi Arabia during the same period 1961/63 to 1988/90. With the exception of Somalia, per capita availability of sugar increased by more than 50% in all the Arab countries. Per capita availability exceeded 35 kg./head/year (more than the average figure for the Near East of 28 kg./head/year) in Algeria, Egypt, Jordan, Libya and Morocco.

**Vegetable Oils**

All the countries of the Arab Region showed a very high increase in per capita oil supply during the period from 1961/63 to 1988/90. The highest increases were seen in Yemen (almost 600%), Mauritania, Libya (more than 350%), Algeria (almost 300%), Tunisia (over 250%), and Morocco (over 200%). In countries such as Algeria, Iraq, Lebanon, Libya, Syria and Tunisia the per capita oil availability exceeded the average figure for the Near East Region. The highest vegetable oil availability was observed for Tunisia and Libya (20 kg/head/year) and the lowest in Yemen (4.7 kg/head/year).

**Total Meat**

The per caput meat availability increased for all the countries except Sudan, Somalia and Mauritania. A very high increase was noticed in both Saudi Arabia (7 fold) and Libya (4 fold). Algeria

showed the lowest meat supply (10 kg/head/year) while the highest was in Saudi Arabia (43.7 kg/head/year).

**Poultry**

Comparing 1961-1963 with 1988-1990 values for the Near East Region, per caput poultry supply increased, on average, by over 300% during the last 30 years. The largest changes in per capita availability were noted for Saudi Arabia from, 0.8 kg/head/year to 32 kg/head/year, for Jordan from 0.8 kg/head/year to 20.3 kg/head/year, for Libya from 0.3 to 13.7 kg/head/year, for Iraq from 0.6 kg/head/year to 12.2 kg/head/year and for Yemen from 0.4 kg/head/year to 6.6 kg/head/year. In contrast the per capita availability of poultry in Somalia, Sudan and Mauritania has not changed significantly over the last 30 years. The per capita availability of poultry in such countries as Iraq, Jordan, Lebanon, Libya and Saudi Arabia exceeds, by far, the Near East average. The highest per capita supply of poultry was observed for Saudi Arabia, Jordan and Lebanon, while the lowest supply was seen in Sudan and Somalia.

**Milk**

The per capita availability of milk at the regional level did not significantly increase during the last 30 years. However, the per capita supply of milk doubled in Algeria, and almost tripled in Libya and Saudi Arabia. In contrast milk supply decreased in both Mauritania and Iraq. The highest per capita milk availability was observed in Somalia, Mauritania and Sudan while the lowest per capita supply was in Egypt and Morocco.

**Vegetables**

The average per capita availability of vegetables generally increased for the Arab Region over the last 30 years. A very high per capita availability was observed for Algeria (3 fold), Saudi Arabia and Libya (4 fold) with the supply almost doubling in both Tunisia and Lebanon.Vegetable availability decreased however in Jordan, Somalia and Sudan. The lowest availability for vegetables was noted for Somalia and Mauritania, while the highest was seen in Lebanon, Libya, Egypt and Syria.

**Fruits**

Only a slight increase in the per capita supply of fruits has occurred in the Arab Region during the last 30 years. The highest rate of increase in fruit availability has been in Morocco, Yemen and Saudi Arabia. There were, however, no significant changes in fruit availability over the same period in either Algeria or Egypt. The highest per capita fruit supply, over 100 kg/head/year, was noted in Lebanon, Saudi Arabia and Syria, while the lowest was seen in Somalia, Sudan and Mauritania.

In summary, therefore, it can be concluded from the food availability data that :

- There has been an increase in the availability of all food groups at the Region level over the last 30 years.

- Cereals (especially wheat and rice), sugar, vegetable oils, meat and poultry showed significant increases in availability, while there were only slight increases in the per capita supply of pulses, milk, fruits and vegetables over the same period.

- There were large variations between countries in the food availability trends. High rates of increase were noted for Libya, Saudi Arabia and Yemen, while very low increases, even sometimes negative, were noted in Sudan, Somalia and Mauritania.

- Changes in per capita GNP have affected changes in food consumption patterns of several countries.

- The prevalence of under-nutrition (particularly micronutrient deficiencies) and of over-nutrition, in the different countries are associated with changes in the per capita average availability of different food groups.

**TRENDS IN AVERAGE PER CAPUT/DAY CONSUMPTION OF FOOD ENERGY, PROTEINS AND FATS IN SELECTED COUNTRIES OF THE ARAB REGION**

Food Balance Sheet data reflect national per capita food availabilities according to the sources of different food

commodities as converted into food energy, proteins and micronutrients. Table 3 shows Food Balance Sheet data for countries in the Arab Region. Food energy, protein and fat availability per caput per day increased at different rates in most countries from 1961, 1971, 1981 and 1989 respectively. For example, the daily per caput food energy availability in Libya doubled from 1,654 Kcal in 1961 to 3,324 Kcal in 1989. For the same country, protein supply ranged from 39.2 g. in 1961 to 80 g. in 1989 which also doubled. In Saudi Arabia, food energy availability increased from 1,772 Kcal in 1961 to 2,874 Kcal in 1989, and protein supply increased from 48 g. in 1961 to 86 g. in 1989. Both the above countries also experienced a very high increase in fat availability. For example, in Saudi Arabia, fat availability per caput per day increased from 26.5 g. in 1961 to 82.5 g. in 1989, almost a 3 fold increase. In Libya, fat availability increased from 32.2 g. in 1961 to 108.3 g. in 1989. This represents an increase of more than three times. However, other countries in the Region, such as Egypt, Iraq, Jordan, Lebanon and Tunisia showed steady increases in food energy, protein and fat availability, but were not as high as those for Libya and Saudi Arabia (FAO, 1989).

Other countries in the Region such as Yemen showed a limited increase in food energy supply but still remained below the average daily requirement. For Sudan, Somalia and Mauritania there was no significant change in the availability of food energy, protein and fat during the same period.

It should be pointed out that while Food Balance Sheet data indicate the trend of availability for different food commodities in different years, they do not reflect the distribution of these foods among different socio-economic groups or illustrate intra-family distribution. Therefore, the Food Balance Sheet data should be supplemented with household food consumption survey data and household budget expenditure survey data of different socio-economic groups and at family level. Food Balance Sheets, by themselves, do not demonstrate differences that may exist in the diets consumed by different population groups or by different socio-economic groups, ecological zones and geographical areas within a country; neither do they provide information on seasonal variations in the available total food. Nevertheless, Food Balance Sheets constitute the main source of data used for the assessment

and appraisal of the global food situation. High food energy intakes per caput per day coupled with large increases in fat consumption are known to be associated with the prevalence of non-communicable diseases of affluent societies such as cardiovascular diseases, hypertension, diabetes and cancer and hence, such data may be used to alert the countries involved to take the necessary action. On the other hand, low average per caput daily food energy availability reflects the prevalence of under-nutrition among large numbers of the population and is especially significant for the vulnerable groups.

## CONCLUSIONS AND RECOMMENDATIONS

- The Arab Region has witnessed an enormous changes in its food consumption patterns during the last 30 years. Such changes for different food groups have not occurred previously throughout the long history of the Region. These changes were not only in the oil rich countries, but were also in the poor countries of the Region such as Sudan and Mauritania in which wheat and rice are replacing the traditional cereal sorghum.

- The greatest changes were seen in the consumption of cereals, sugar, vegetable oils and meat which are mostly imported. Changes for pulses, milk, fruits and vegetables were less significant than for the other food groups.

- The absence of a clear and well defined Food and Nutrition Policy, as well as the lack of nutritional awareness are both contributing to widening the production-import gap for food in the Arab Region which is increasing at an alarming rate. Food production is failing to meet the increasing demand for certain food commodities.

- In some countries present policies, especially regarding subsidies for wheat, rice, sugar and vegetable oils, are encouraging over consumption and in consequence increasing food waste.

- There is an urgent need to raise the level of awareness regarding food and nutrition issues to policy makers, planners,

communities and even individuals. Food and nutrition awareness must be also expanded to cover all segments of the population including rich and poor, as well as those from urban and rural areas.

In view of the major health problems associated with diet in the Arab countries increased nutrition awareness will play a critical role in the future. This should include :

- Promotion of the concept of a balanced diet through use of the mass media.

- Emphasizing the need for energy dense foods such as cereals and pulses as well as increasing the use of vegetables and fruits among poor communities.

- Partial replacement of energy-rich foods such as cereals, sugar, fats and meat with foods such as low-fat milk, fruits and vegetables among the high income groups of population.

- Development of nutrition awareness messages formulated according to the socio-economic conditions and geographical location of the target groups.

- Consumer education on the quality and safety aspects of food. Special emphasis should be given to the promotion of hygienic practices in the handling of foods at household level and in food establishments.

Nutrition surveillance and food information systems should be established particularly, in drought-prone areas of the Region. Such surveillance activities should be linked to the decision-making process such that information is provided to the specialists who need it in a timely manner, so that food shortages and potential of famine may be averted.

To achieve the above food and nutrition goals, countries of the Arab Region are urged to formulate National Plans of Action for Nutrition, which should be guided by the International Conference on Nutrition (ICN) World Declaration and Plan of Action for Nutrition, which were adopted unanimously by all countries of the Arab Region in December 1992.

## REFERENCES

FAO (1989). A Balance Diet - A Way to Good Nutrition - Paper presented to the 12th FAO Regional Conference for the Near East - Tunis, Tunisia, 12-16 March 1990.

FAO/Agrostat (1992). Food Balance Sheets 1961-1989. Food and Agriculture Organization, Rome, Italy.

FAO/RNEA (1992). Regional Food and Nutrition Problems and Programmes in the FAO Near East Region - Paper presented to the FAO/WHO Near East and Eastern Mediterranean Regional Meeting for the preparation of the ICN, Cairo, April 1992.

FAO (1993). Regional Food and Agricultural in a Global Contest - A 20 Year Perspective - Paper presented to the Fifth Session of the Near East Economic and Social policy Commission, Nouakchott, Mauritania, 17-21 October 1993.

Miladi S. and Farrag M. (1993). Population, Food and Nutrition in the Arab World, FAO/RNEA, Cairo.

Patwardhan V. and W. Darby (1972). The State of Nutrition in the Arab Middle East, Vanderbilt University Press, Nashville.

Table 3
Average consumption of calories, protein and Fat per Caput/day according to the National Food Balance Sheets

| COUNTRY | 1961 | | | 1971 | | | 1981 | | | 1989 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Calories | Protein (g) | Fat (g) | Calories | Protein (g) | Fat (g) | Calories | Protein (g) | Fat (g) | Calories | Protein (g) | Fat (g) |
| Algeria | 1736 | 47.9 | 32.1 | 1834 | 48.1 | 35.9 | 2604 | 66.9 | 59.6 | 2866 | 76.6 | 61.2 |
| Egypt | 2272 | 61.3 | 45.2 | 2467 | 64.7 | 53.3 | 3206 | 79.4 | 73.3 | 3336 | 83.5 | 78.4 |
| Iraq | 2066 | 58.3 | 41.9 | 2291 | 61.3 | 43.6 | 2815 | 73.8 | 62.1 | 2887 | 71.8 | 75.3 |
| Jordan | 2218 | 56.3 | 48.1 | 2497 | 68.3 | 62.2 | 2629 | 68.9 | 56.5 | 2634 | 71.4 | 62.0 |
| Kwait | 2595 | 76.8 | 76.0 | 2640 | 74.6 | 71.3 | 2961 | 90.2 | 93.0 | 3195 | 95.3 | 104.9 |
| Lebanon | 2466 | 65.0 | 62.2 | 2474 | 64.2 | 61.9 | 2875 | 83.0 | 85.2 | 3274 | 86.2 | 97.1 |
| Libya | 1654 | 39.2 | 32.2 | 2506 | 60.5 | 73.8 | 3564 | 88.0 | 128.9 | 3324 | 80.5 | 108.3 |
| Morocco | 2141 | 57.3 | 35.3 | 2464 | 65.5 | 42.1 | 2697 | 71.2 | 49.6 | 3020 | 81.3 | 55.6 |
| Mauritania | 1939 | 77.3 | 49.0 | 1874 | 71.8 | 50.9 | 2095 | 71.8 | 57.3 | 2685 | 79.3 | 61.0 |
| S. Arabia | 1772 | 48.1 | 26.5 | 1886 | 48.3 | 33.9 | 2777 | 77.7 | 80.2 | 2874 | 86.5 | 82.5 |
| Somalia | 1699 | 59.0 | 56.4 | 1714 | 58.1 | 62.8 | 2075 | 62.0 | 78.5 | 1906 | 59.1 | 65.3 |
| Sudan | 1832 | 55.9 | 53.8 | 2209 | 61.6 | 68.2 | 2312 | 68.6 | 76.8 | 1974 | 57.2 | 63.7 |
| Syria | 2362 | 65.1 | 59.7 | 2412 | 64.2 | 65.0 | 3105 | 84.2 | 93.7 | 3003 | 78.6 | 82.7 |
| Tunisia | 2103 | 56.4 | 43.1 | 2368 | 63.1 | 57.6 | 2779 | 77.5 | 65.3 | 3119 | 83.3 | 85.7 |
| U.A.E. | 2814 | 72.5 | 85.2 | 3208 | 78.2 | 76.1 | 3199 | 101.6 | 110.3 | 3309 | 101.6 | 111.5 |
| Yemen | 1908 | 58.9 | 36.4 | 1961 | 58.8 | 36.0 | 2070 | 61.8 | 39.1 | 2142 | 60.0 | 33.5 |
| WORLD | 2262 | 61.9 | 49.9 | 2455 | 65.2 | 56.0 | 2610 | 68.5 | 62.7 | 2710 | 71.0 | 68.5 |

Source : FAO/Agrostat (1992)

# DIET-RELATED NON-COMMUNICABLE DISEASES IN BAHRAIN

ABDULRAHMAN O. MUSAIGER

Department of Food Sciences and Nutrition, Faculty of Agricultural Sciences, UAE University, Al-Ain, UAE.

## INTRODUCTION

Bahrain, like other Arabian Gulf countries, has experienced rapid changes in food habits and socio-economic status during the past three decades, mainly due to increase in income as a result of the oil boom. These changes have lead to a great change in trends of diseases and mortality. Infectious and parasitic diseases have gradually disappeared and diet chronic non-communicable diseases such as heart disease, cancer, diabetes, obesity and dental caries are become the main causes of morbidity and mortality.

A major challenge for Bahrain as well as other Arab Gulf countries is therefore, to adapt to current health situation by developing programmes and services to over come diet related chronic non-communicable diseases. This paper review the current situation of these diseases in Bahrain.

## CARDIOVASCULAR DISEASES

Cardiovascular diseases are the most common cause of death in Bahrain representing about 28% of total death among Bahraini population. The rate was higher among non-Bahraini males (41.5%), whereas it was only 13.6% among non-Bahraini females (Table 1).

In Bahrain, the death rate due to diseases of the circulatory system for age group 50 years and above has increased from 77/10000 in 1976 to 120/10000 in 1986. (Public Heath Directorate, 1987). Deaths due to diseases of the circulatory system occur early at 20-34 years age group, and increased sharply thereafter. Whereas deaths due to hypertension occur at 45-54 years age group and continue to increase thereafter. In general, males are more susceptible to cardiovascular diseases than females

TABLE 1

Major causes of death in Bahrain by nationality and sex, 1993.

| Cause of Death | Bahraini (1385) M % | Bahraini (1385) F % | non-Bahraini (329) M % | non-Bahraini (329) F % |
|---|---|---|---|---|
| Infections and parasitic dis. | 1.1 | 1.4 | 1.2 | 2.5 |
| Neoplasms | 15.0 | 13.2 | 4.0 | 7.4 |
| Endocrine, nutritional & metabolic & immunity disorders | 8.1 | 13.3 | 2.4 | 3.7 |
| Diseases of the circulatory system | 27.8 | 27.0 | 41.5 | 13.6 |
| Diseases of the respiratory system | 7.7 | 6.7 | 5.2 | 6.2 |
| Diseases of the digestive system | 4.9 | 3.9 | 4.0 | 1.2 |
| Congenital anomalies | 3.8 | 4.3 | 2.4 | 12.3 |
| Conditions originating in the prenatal period | 11.1 | 10.1 | 8.5 | 29.6 |
| Undefined illness | 6.8 | 9.8 | 2.0 | 3.7 |
| Injury & poisoning | 6.8 | 2.4 | 26.6 | 11.1 |
| Others | 6.9 | 7.9 | 2.2 | 8.7 |
| TOTAL % | 100.0 | 100.0 | 100.0 | 100.0 |
| No | (740) | (645) | (248) | (81) |

Source : MOH (1995).

The high intake of saturated fatty acids, dietary cholesterol and sodium may play an important role in increasing the risk of heart diseases in Bahrain. Transition from traditional diet to a western diet is likely to result in a significant increase in the intake of animal foods, and hence saturated fatty acids and dietary cholesterol.

**DIABETES MELLITUS**

Diabetes is another important public health problem in Bahrain. Morbidity due to diabetes has increased remarkably in the past 10 years, and has become one of challengeable health problems especially in the urban societies. Deaths due to diabetes are underreported, as physicians rarely consider diabetes as the main cause of death. It was estimated that 4% for the total deaths in Bahrain were due to diabetes mellitus. Deaths due to diabetes occurred at age 45 years and over. At age group 45-54 years old, the death rate of diabetes was four times higher among males than females. At 55 years and more the death rate was higher among females than males (Muaiger, 1990).

The main type of diabetes in Bahrain, is non-insulin dependent diabetes (type II). Obesity may play an important role in the occurrence of this type of diabetes. It is evident that obese subjects develop diabetes mellitus more often than those of normal weight or the lean subjects. The apparent increasing incidence of diabetes is also associated with higher average life expectancy, changes in the standard of living, and an increased survival rate of young diabetics to the reproductive age (Musaiger, 1992a).

The statistics of the Ministry of Health in 1993 showed that, of 32320 patients seen at the Salmaniya Medical Center, 1.2% had diabetes. About 54% of the hospitalized patients with diabetes were males. There was a relatively high percentage of juvenile diabetic patients; 18% of the hospitalized diabetic patients were under the age of 15 years. The proportion of females was higher among the age group 15-44 years and those above 64 years of age. (MOH, 1995).

A community-based study on nutritional status of 481 Bahraini mothers aged 18 to 48 years demonstrated that 8.5% of these mothers had diabetes (95% CI, 5.6-10.4%). The true

prevalence of diabetes in Bahrain is probably higher than this estimate (8.5%) as many cases of diabetes are not recognized (Musaiger and Al-Sayyad, 1991).

A more recent study on dietary habits of elderly Bahrainis aged 65 years and older demonstrated a higher prevalence of diabetes (13.4%) among this age group. The prevalence of diabetes was higher among elderly women compared to men (15% and 10.2%, respectively) (Musaiger, 1992b).

Diabetes occurs more commonly among overweight people, the elderly and women. The reasons for the differences between sexes are still unclear. Multiple pregnancies contribute to the development of diabetes among women. Also women live longer than men, they are more likely to develop diabetes. Bahrain women, in general, have a high risk of developing diabetes, possible due to multiple pregnancies, obesity, inactivity and food habits.

**CANCER**

Cancer is the third cause of death in Bahrain, behind diseases of circulatory systems and prenatal mortality. The percentage of deaths due to cancer increased from 2.5% in 1976 to 13% in 1993 and the incidence was higher among males than females. Between the age of 35 to 54 years old the cancer death rate was higher among females than males. However, from 55 years old and upward the death rate was almost double among males than females

World-wide epidemiological studies showed a correlation between dietary fat intake and the incidence of cancer of the breast, colon, prostate and endometrium. Low dietary fiber intake was found to be linked with breast and colon cancer. Death statistics in Bahrain showed that the main types of cancer were: lung (33.3%), gastrointestinal (22.0%), liver (7.3%) and breast (5.7%).

The high intake of animal fat, low intake of dietary fiber and high incidence of obesity may be responsible in part for the increasing incidence of some types of cancer in Bahrain. It was

reported that the daily per capita intake of animal fat in Bahrain increased by 77.5% during the period 1970-1980 (Musaiger, 1990)

The majority of Bahraini dishes are low in fiber content. Polished rice and bread made of low extraction rate wheat flour constitutes the staple diet in the country. The intake of fruits and high fiber vegetables are low. More investigations are therefore needed to find out the association of dietary habits with some types of cancer in Bahrain.

**DENTAL CARIES**

Dental caries is considered as a nutritional disorder because dietary carbohydrates play an important role in its occurrence, and because some nutrient help in preventing it occurrence. The incidence of dental caries in all Arabian Gulf countries has been found to be very high. In Bahrain there are few reports concerned with dental and oral health. In 1980, Mobayed et al (1980) found that 46.8% of children aged 6 to 11 years had teeth decay. Barmes (1980) showed that the DMFT (Decayed, missing or filled teeth) index among 12 years old Bahraini children was 1.0. A recent survey by Westwater (1986) on school children aged 6, 12 and 15 years old has shown that the DMFT index was 2.8, 1.3 and 1.9 for these age groups respectively. The prevalence of caries and flourishes among school children in Bahrain is alarming (Table 2). In general the DMFT among 12 year old Bahraini children is below the WHO goal for 2000 (WHO is recommending 3 or less DMFT). However, it is essential not to let the current level rise.

The frequency of consumption of sweets is of prime importance in the occurrence of dental caries. The intake of soft drinks, chocolates, and sweets, cakes and other high sugar foods between meals especially by school children has been associated with rising caries rates. The high consumption of bottled water which contains a low concentrate-ion of fluoride is another contributing factor to the occurrence of dental caries in the country. Prevention programmes should focus on the improvement of dietary habits and oral hygiene of school children.

TABLE 2

Percentage of caries and fluorosis among school children in Bahrain, 1985.

| Age group | Sex | No. Examined | Caries % | Flurosis % | DMFT |
|---|---|---|---|---|---|
| 6 yr (deciduous teeth) | Male | 165 | 75.2 | - | 3.2 |
| | Female | 183 | 61.7 | - | 2.5 |
| | Total | 348 | 68.1 | - | 2.8 |
| 12 yr | Male | 168 | 40.5 | 34.5 | 1.1 |
| | Female | 174 | 51.1 | 33.3 | 1.6 |
| | Total | 342 | 45.9 | 33.9 | 1.3 |
| 15 yr | Male | 175 | 53.7 | 52.0 | 1.7 |
| | Female | 153 | 54.9 | 36.6 | 2.1 |
| | Total | 328 | 54.3 | 44.8 | 1.9 |

## OBESITY

Obesity has become one of the major public health problems in Bahrain, especially among adult females. Amine (1980) reported that 39% of the adult females in Bahrain were obese (>120%, wt/ht). A recent study showed that 64% of mothers aged 18 years and above were obese (based on BMI equal or above 25) (Musaiger and Al-Sayyad, 1990).

Factors associated with obesity in Bahrain have not been well investigated. Some possible factors are lack of physical exercise, a high intake of energy-rich foods, sedentary life style, multiple pregnancies, and socio-cultural factors. Zaghloul et al (1985) found that the energy, fat, protein and carbohydrates intake of obese girls in Bahrain was significantly higher than that of non-obese. Additionally 65% of obese girls were categorized as less active compared to 29% of non-obese (Table 3). Amine (1980) demonstrated that the total number of children of obese mothers is likely to be higher than that of non-obese mothers. Of the obese mothers, 40.2% had seven children and more, compared to 27.7% among non-obese mothers.

A study by Musaiger and Al-Ansari (1991) showed that the educational level, employment, family history of obesity, and exercise contributed significantly to obesity among adult females in Bahrain, whereas nationality, ownership of a car, availability of housemaid, age and marital status were not significant contributory factors. Food faddism was more prevalent among these females, suggesting that these groups lack sound nutrition knowledge.

Childhood obesity tends to persist into adulthood in some individuals, and to be associated with a variety of physical, social and psychological problems. In Bahrain, Zaghloul (1985) showed that 12% of preschool children aged from 1 month to 5 years were overweight (>110% of Harvard Standard). The highest percentage (30%) occurred in the first six months of life which means that obesity started early in some children. A study among Bahraini school girls aged 7 to 18 years reported that 19% of these girls were obese, based on the sum of four-skinfold and arm muscle circumference. In general, Bahraini girls had small muscle mass and low physical work capacity (Blair and Gregory, 1985).

TABLE 3

Nutrient intake and activity level of obese and non-obese adolescent Bahraini Girls 1984.

| | Obese (N=40) | Non-obese (N=34) |
|---|---|---|
| Nutrients intake (mean) | | |
| Total energy, kcal | 2529.0 | 2057.0 |
| Protein, g | 78.0 | 63.0 |
| Fat, g | 79.0 | 61.0 |
| Carbohydrates, g | 37.6 | 31.4 |
| Activity level | % | % |
| Less active | 65.0 | 29.0 |
| Moderately active | 25.0 | 53.0 |
| Active | 4.0 | 18.0 |

Skinfold and arm circumference measurements done on 1593 Bahraini school children aged 6 to 18 years indicated a high subcutaneous fat store, suggesting a lack of muscle development (Musaiger and Gergory, 1987). Fat patterning is of concern from a clinical perspective. Trunk and upper body fat distribution have been shown to a risk factor for hear diseases and diabetes.

## RISK FACTORS ASSOCIATED WITH DIET RELATED CHRONIC NON-COMMUNICABLE DISEASES IN BAHRAIN

Studies on risk factors associated with diet related chronic diseases in Bahrain are at most scanty. Al-Roomi et al (1994) carried out a population-based case-control study to explore the importance of lifestyle in the occurrence of Acute Myocardial Infarction (AMI) among Bahraini aged 30-79 years. The findings showed that the prevalence of tobacco smoking among the first-time AMI cases (64%) was higher than that among controls (44%), with current cigarette smokers being 2.1 times more likely to have an episode of myocardial infarction than those who had never smoked regularly. Walking regularly and spending less time watching television at home also appeared to be associated with a reduced risk of developing AMI. It is interesting to note that patients with myocardial infarction tended to consume fresh vegetables and fruits less frequently per week than the community controls (although the risk estimates were not statistically significant).

Of the control subjects, 12% had been told that they had hypertension compared with 44% of patients with myocardial infarction. The comparative figures for diabetes were 9% and 22% among community controls and AMI cases, respectively. Among those who had ever been told that they had hypertension, 65% of patients with first-time AMI and 81% of control subjects were receiving treatment at the time of the AMI or set the time of survey for control subjects. Of AMI patients with a history of diabetes, 88% were receiving treatment compared with 65% of controls with a history of diabetes.

Because the AMI cases and community controls had different sex and age distributions, multiple logistic regression was used to estimate the risks of the occurrence of AMI in relation to

hypertension, diabetes, lifestyle and dietary habits. The adjusted OR (adjusted for age, sex and several other confounding variables) for the occurrence of an episode of first-time AMI in a subject with history of hypertension was 5.04 and in those with history of diabetes 3.28. The risk of developing AMI, in line with many studies from western communities, was higher among men than women in those not currently married and increased with older age. Although 22% of first-time AMI cases were obese subjects (BMI≥30), this proportion was lower than that among the community controls (33% were obese) using weight as a single measurement, the mean weight of cases was slightly lower than that of controls (66.5kg ± 16.1, and 68.4 kg ± 14.9, respectively).

People who did not walk regularly for exercise who reported infrequent intake of fresh fruits and who infrequently consumed fresh vegetables were still at an increased risk of developing myocardial infarction, even after adjusting for the effects of all the other factors . Similar findings were obtained when the logistic regression analysis was repeated excluding those aged 60-79 years (30 cases and 130 controls).

## CONCLUSIONS AND RECOMMENDATIONS

Improved standards of living and health services have contributed to a longer life expectancy in Bahrain. In addition, the change from traditional diet to a more westernized diet which characterized of energy-dense foods rich in fat and free sugars and deficiency of complex carbohydrates foods. All these changes have lead to increase the incidence of diet-related chronic non-communicable diseases in Bahrain. In order to control these diseases the following measures are suggested.

1. Develop a nutrition intervention programme to be applied by the Ministry of Health, with emphasis on malnutrition of affluence.

2. Expanding the activities of nutrition in both primary and secondary health cares.

3. Nutrition education programmes should focus on the prevention of heart disease, obesity, diabetes, dental caries and cancer.

4. Training health staff on nutritional management of these clinical disorders. Community health nurses should have the priority in such training.

5. Improve the curriculum of health and medical schools by introducing more information on prevention and management of nutritional disorders associated with affluence.

6. Integrate nutrition activities with the oral hygiene programme in primary schools.

7. Establishing a dietary guideline for the community in order to advice them on sound dietary habits. For example, the dietary guideline should include advice on decreasing the intake of animal fat, increasing the intake of fish, reducing the consumption of refined sugar etc.

8. Encouraging physical exercise, by supporting physical fitness programmes for males and females in schools and clubs.

9. Carrying out epidemiological studies on factors associated with such clinical disorders.

**REFERENCES**

Al-Roomi, K., Musaiger, A.O. and Al-Awadi, A. (1994). Lifestyle patterns and the risk of acute myocardial infarction in a Gulf Arab population: A community- based case-control study. Int. J. Epidemiol. 23, 931-939

Amine, E.K. (1980): Bahrain Nutrition Status Survey, UNICEF Gulf Area Office, Abu-Dhabi; UAE.

Barmes, D. E. (1981): Oral Health Situation Analysis, Bahrain, WHO, EMRO, Alexandria.

Blari, D. and Gregory, W.B. (1985): The Nutrition Status of Bahraini Schools Girls aged 7-18 years old. Bahrain Sport Institute; Bahrain.

Ministry of Health (1985): Annual Report, 1993. Bahrain.

Mobayed, M. Et al (1980): The Need and Situation of Children in Bahrain. UNICEF/ High Council for Youth and Sorts, Bahrain (in Arabic).

Musaiger, A.O. (1990): Nutritional disorders associated with affluence in Bahrain. Family Practice 7,9-13.

Musaiger, A.O. (1992 a): Dietary Habits of Elderly in Bahrian. Ministry of Health, Bahain.

Musaiger, A. O. (1992 b): Diabetes mellitus in Bahrain: an overview. Diabetic Medicine 9, 574-578.

Musaiger, A. O. and Al-Ansari M. (1991): Factors associated with obesity among adult females in Bahrain. Int. Quart. Hlth Ed 12, 2, 129-136.

Musaiger, A. O and Al-Sayyad, J. (1991): Nutritional Status of Mothers and Children in Bahrain. Ministry of Health, Bahrain.

Musaiger, A. O., Gregory, W.B. and Haas, J. D. (1989) Growth patterns of school children in Bahrain. Ann. Hum. Biol. 16, 155-167.

Public Health Directorate (1987) : Annual Report, 1986. Ministry of Health, Bahrain.

Westwater, A. (1986): School Dental Survey, Bahrain. Ministry of Health, Bahrain.

Zaghloul, N. E., and Dodani, T. (1984): A study of the growth pattern of Bahraini children. Bull High Inst. Publ Hlth (Alexandria) 14, 147-156.

Zaghloul, N. E., El-Sherbini, A. F. and Al-Shayeb, F. A (1984): Dietary factors and physical activity of obese and non-obese adolescents. Bull High Inst Publ Hlth (Alexandria) 14:31-49.

# NUTRITION-RELATED CHRONIC DISEASES IN KUWAIT

ZAMZAM AL-MOUSSA

Nutrition Unit, Ministry of Public Health, Kuwait

## INTRODUCTION

Anthropological studies show that the diets of our ancestors were low in fat, very low in sugar and high in fibre and other complex carbohydrates. It was only some 200 years ago that agricultural and industrial evolution brought radical improvements in methods of food production, processing, storage and distribution of food. People then started to indulge in preferred foods and these dietary preferences have influenced the development of several major chronic diseases.

Chronic diseases including coronary heart disease, stroke, various cancers, diabetes mellitus, obesity and gallstones are linked to the affluent diet. This involves high consumption of energy-dense foods prepared with added fat, sugar and salt.

In virtually every developing country in the world diet-related chronic diseases are becoming the new health problem as the population abandons traditional healthy diets in favour of affluent foods. This is due, not only to the increased availability of foods rich in fat, sugar and salt, but also to inappropriate public perception of what constitutes an appropriate diet and by a tendency to equate "good" food with "rich" food.

Dietary changes from tradition high fibre diets to those containing refined flour and sugar have coincided with the adoption of sedentary life styles. This has led to increased obesity and diabetes followed by higher incidence rates of hypertension and coronary heart disease. The increase in chronic diseases which occurs in middle and later adult life has been attributed to an improved food supply and to the control of infectious diseases. Even a modest increase in prosperity can induce the considerable burden of chronic disease.

Thus changes in the dietary pattern towards the affluent diet have increased the incidence of diet-related disease even in

developing countries. If such trends continue, cardiovascular disease and cancer will be major health problems in every country in the world. There is a need for population wide approach to the prevention of diet-related chronic diseases. The entire population of most affluent countries is at high risk and intervention is needed to change dietary patterns towards a safer range of intakes. In undertaking such mass interventions, governments are challenged to develop policies that will allow consumers to make healthy food choices (WHO, 1991).

In the last two decades the State of Kuwait has witnessed a dramatic increase in income due to immense oil revenues. This has resulted in a rapid economic and social development and has put pressure on people to adapt to industrialization and urbanization. An unprecedented opportunity occured for indulging in fat and sugar rich foods with a consequent rapid change in the life style for many.

According to Food and Agricultural Organization Food Balance Sheets for Kuwait (1977-1979) versus (1987-1989), food availability data showed a general increase in all food groups with an overall increase food energy availability by 220 kcal, protein by 5.5 grams. and total fats by 18.5 grams. per capita per day. (FAO, 1990).

These changes in food availability together with decreased physical activity have led to the emergence of nutrition related chronic diseases. This paper reviews studies on the increased prevalence of obesity, hypertension, diabetes, and ischemic heart disease and cancer in Kuwait together with the rather paradoxical increased incidence of anaemia.

## NUTRITION RELATED CHRONIC DISEASES

### Obesity

The major diseases linked to obesity include hypertension, coronary heart disease, diabetes, gallstones, osteoarthritis, and other gastrointestinal disorders. In addition obese women face increased risk of cancers of the gall bladder, breast (after the menopause) and uterus. In men obesity increases the risk of

cancers of prostate and kidney. The importance of these health risks increases according to the severity of obesity (WHO, 1991).

Obesity is a public health problem in Kuwait (Table 1). It occurs in all age groups and is more prevalent in females than in males. Obesity (120% or more than standard weight for height median (WHO, 1983) was found to be prevalent among school children being 18.1 % among boys and 26.8 % among girls (Eid et al., 1986b). Obesity among Kuwaiti adults was reported to be 24.6% among males and 47.9% among females (Mustafa and Nuwayhed, 1981). The Kuwait Health Survey (MOH 1985) showed that the prevalence of obesity was 49% among adult males and 59% among adult females. A study on Kuwaiti students (6-14 years) showed that 20% of males and 23.1% of females were obese (Nutrition Unit, 1992). A recent survey on primary school students (6-9 years) reported a prevalence of obesity of 12.8% among boys and 14.9% among girls.

## Diabetes

Non-insulin dependent diabetes mellitus is a chronic metabolic disorder involving impairment in the body's capacity to utilize glucose derived from carbohydrate foods, from body stores of glycogen or from body and dietary protein. The disease usually starts in middle adulthood and is strongly associated with increased risk of coronary heart disease as well as a range of renal and neurological and ocular disorders. A major risk factor is obesity, with risk increasing according to both duration and degree of obesity. The occurrence of diabetes within a community appears to be triggered by a number of environmental factors such as sedentary lifestyle, stress, urbanization and socio-economic status as well as by dietary factors. The prevention of obesity through both exercise and diet is the most promising approach to the prevention of this disease. Glucose tolerance improves as weight is reduced. Exercise, apart from helping to reduce weight, has its own beneficial effect on insulin metabolism.

A study on Diabetes mellitus (MOH/CDC, 1980) showed that it is more prevalent among Kuwaiti than Non-Kuwaiti and more among Kuwaiti females than males (Table 2). The highest prevalence for both Kuwaiti males and females were found to be

TABLE 1
Prevalence of Obesity in Kuwait

| Age (Years) | Sex | Sample Size | Obesity* (%) | Source |
|---|---|---|---|---|
| <5.0 | Combined | 1611 | 1.8 | Nutrition Unit, 1979 |
| <5.0 | Combined | 2479 | 5.2 | Health Science College, 1995 |
| 6 -7 | Male | 2186 | 18.1 | KISR,1984 |
| | Female | 1986 | 26.8 | |
| 6 - 14 | Male | 3896 | 20.0 | Nutrition Unit, 1992 |
| | Female | 3551 | 23.1 | |
| 6 - 9 | Male | 5378 | 12.8 | Nutrition Unit, 1995 |
| | Female | 4752 | 14.9 | |
| 13+ | Male | ------ | 49.0 | |
| | Female | ------ | 59.0 | (MOH, 1985) |
| 18+ | Male | 897 | 24.6 | Nutrition Unit, 1981 |
| | Female | 1170 | 47.9 | |

* weight / Height > 120 % Std. Ref.

TABLE 2

Prevalence of diabetes in Kuwait by sex and nationality

| | Prevalence rate / 1000 | | |
|---|---|---|---|
| | Kuwaiti | Non-Kuwaiti | Total |
| Males | 17.0 | 13.9 | 15.3 |
| Females | 18.7 | 12.5 | 15.7 |
| Total | 17.8 | 13.3 | 15.5 |

(MOH/CDC, 1980)

TABLE 3

Age specific prevalence of diabetes for Kuwaiti

| | Prevalence rate / 1000 | |
|---|---|---|
| Age group (years) | Males | Females |
| < 20 | 0.6 | 0.2 |
| 20 - | 2.2 | 5.2 |
| 30 - | 23.3 | 29.6 |
| 40 - | 77.4 | 69.0 |
| 50 - | 124.1 | 160.6 |
| 60 - | 115.9 | 128.3 |
| 70 + | 71.8 | 124.0 |

(MOH/CDC, 1980)

in the age group 50-59 years (Table 3). The increasing rate of prevalence of diabetes specially among females in Kuwait may be related to fact that obesity alters the body response to insulin.

The number of new cases of diabetes and of the out patient visits to the diabetic clinics have shown an overall increase in number from 6,999 cases in 1985 to 14,723 cases in 1992, an increase of 110%.

**Hypertension**

Excessive weight can affect blood pressure while salt intake has a significant relationship to the gradual increase of blood pressure that accompanies aging. The prevalence of hypertension among Kuwaiti adults as defined by a diastolic blood pressure in excess of 90 mm Hg indicates that about one fifth of the adults suffer from hypertension (Al-Awadi and Desuki, 1980). A later study (MOH, 1985) as part of the Kuwait Health Survey showed slightly higher values for males but somewhat lower percentages for females (Table 4). It was also shown by the latter survey that the percentage of adults with hypertension was greater among diabetics and the obese than among non diabetics and normal weight adults.

**Cardiovascular Disease**

Diseases of circulatory system are the major cause of death in Kuwait (Table 5). The risk of developing heart disease is increased by three major factors, high serum cholesterol, high blood pressure and cigarette smoking. Diet is known to have a direct impact on both serum cholesterol and on blood pressure. As the population has changed its former life style to that characterised by western countries, mortality from ischemic heart disease has increased.

Chronic ischemic heart diseases, acute myocardial infarction, essential hypertension, atherosclerosis and hypertensive heart diseases are among the ten leading causes of death in Kuwait. Chronic ischemic heart diseases, essential hypertension and hypertensive heart disease have all increased as

TABLE 4

Prevalence of hypertension among adults (20 year and above) in 1980 and 1985

| Study and year | Male | Female | Total |
|---|---|---|---|
| | % | % | % |
| Al-Awadi and Desuki (1980) | 20.3 | 23.9 | 21.8 |
| MOH (1985) | 22.6 | 16.1 | 19.3 |

TABLE 5

Ten Major causes of death for Kuwaitis (1989 - 1994 (ICD - 9), 1975)

| Major Groups (17) Causes of Death | 1989 | | 1992 | | 1993 | | 1994 | |
|---|---|---|---|---|---|---|---|---|
| | % | R* | % | R* | % | R* | % | R* |
| Dis.Circu.Sys. | 37.7 | (1) | 34.5 | (1) | 34.8 | (1) | 36.7 | (1) |
| Neoplasm | 11.6 | (2) | 10.4 | (3) | 12.7 | (2) | 12.4 | (2) |
| Accidents & Vio. | 10.9 | (3) | 13.7 | (2) | 11.6 | (3) | 10.6 | (3) |
| Certain Causes of perinatal | 7.2 | (4) | 6.4 | (5) | 6.6 | (4) | 7.0 | (4) |
| Congenital Anomo. | 6.3 | (5) | 4.4 | (8) | 5.6 | (4) | 6.7 | (5) |
| Dis. Respira.Sys. | 5.5 | (6) | 8.0 | (4) | 6.1 | (5) | 5.7 | (6) |
| Symptoms of ill-defined condi. | 5.4 | (7) | 6.3 | (6) | 5.5 | (7) | 5.1 | (7) |
| Endocrine & Nutrt. metabolic disease. | 3.8 | (8) | 4.6 | (7) | 3.3 | (9) | 3.8 | (8) |
| Dis.Genito-urinary System | 1.6 | (10) | 2.5 | (9) | 3.2 | (10) | 3.3 | (9) |
| Infection & parasitic Diseases | 2.5 (10) | (9) | 2.5 | (10) | 4.7 | (8) | 3.0 | |
| Total (no) | 1881 | | 1977 | | 1914 | | 1936 | |

* (R=Rank)
Source : MOH (1995)

TABLE 6
The first ten diagnosis for Kuwait Cancer Center (1985 - 1988)

| Code | Diagnosis | 1985 | | 1986 | | 1987 | | 1988 | |
|---|---|---|---|---|---|---|---|---|---|
| | | (%) | R* | (%) | R* | (%) | R* | (%) | R* |
| 174 | Breast cancer | 14.6 | (1) | 8.2 | (1) | 10.6 | (1) | 10.5 | (1) |
| 162 | Trachea & Lung | 4.3 | (4) | 1.4 | (8) | 4.3 | (5) | 6.9 | (2) |
| 200 | Lymphosarcoma | 4.7 | (3) | 2.7 | (3) | 6.8 | (2) | 5.6 | (3) |
| 201 | Hodgkin disease | 3.5 | (8) | 1.4 | (10) | 4.8 | (3) | 4.7 | (4) |
| 183 | Ovary & adnexia | 3.9 | (7) | 1.8 | (5) | | | 4.4 | (5) |
| 188 | Bladder | | | 1.9 | (4) | 3.8 | (7) | 4.2 | (6) |
| 205 | Myoloid leukemia | 4.1 | (6) | | | | | 3.9 | (7) |
| 193 | Thyroid | | | 1.5 | (7) | 4.2 | (6) | 3.8 | (8) |
| 203 | Multiple myeloma | | | | | | | 3.4 | (9) |
| 204 | Lymphoid leukemia | | | | | 3.2 | (10) | 3.1 | (10) |
| 147 | Nasophyarynx | 3.2 | (9) | | | 4.3 | (4) | | |
| 161 | Larynx | 7.5 | (2) | 5.3 | (2) | 3.5 | (8) | | |
| 180 | Uterus, unspe. | 4.2 | (5) | 1.8 | (6) | 3.5 | (9) | | |
| 202 | Other lymphotic | 3.1 | (10) | | | | | | |
| 141 | Tongue | | | 1.4 | (9) | | | | |
| Total of all Diag. | No. | 942 | | 1060 | | 864 | | 955 | |
| | % | 53.0 | | 56.7 | | 47.8 | | 50.6 | |
| Total of ten Diag. | No. | 1776 | | 1868 | | 1807 | | 1888 | |
| | % | (100.0) | | (100.0) | | (100.0) | | (100.0) | |

(MOH, Health Statistics : 1985 - 1992)

percentages of total deaths since 1985. It was reported that heart diseases as a group are the leading cause of death amounting to 19-26% of all deaths depending on the grouping used.

**Cancer**

Dietary factors have a significant overall impact on global cancer rates. In developed countries where the cancer rates are highest and can account for approximately one-quarter of deaths, some 30-40% of cancer in men and up to 60% in women have been attributed to dietary factors. Cancers that have been linked to dietary factors in different populations are cancers of oral cavity, pharynx, larynx, oesophagus, stomach, large bowel, liver, pancreas, lung, breast, endometrium and prostate. (WHO, 1991).

Data for cancer cases by the Kuwait Cancer Control Center (MOH, Health Statistics : 1985-1989) are shown in Table 6. Breast cancer occupied the first rank during the whole period. Trachea and lung cancer occupied the second rank. Cigarette smoking is an important risk factor for lung cancer and the Kuwait Health Survey (MOH, 1985) showed that 27.3% of males above 12 years of age were smokers. Cancers of the female reproductive system are also among the ten most common cancers. A report on the incidence of cancer in Kuwait showed that, except for lung cancer, the incidence of cancer was higher among non-Kuwatis and this was attributed to difference in ethnic backgrounds, religion and food habits (Mansi, 1982).

Analysis of the available data on breast cancer showed that the incidence rate of breast cancer among Kuwaiti women showed an overall increase through the period from 1970's to the 1980's. This also applies for other types of female reproductive system cancers. These changes could well be linked with dietary changes that has taken place over the same period (Gjorgov, 1986).

**REFERENCES**

Al-Awadi, A. and M. Desuki. (1980). Blood pressure level and epidemiology of high blood pressure in Kuwait. Department of Social Research of Council of Ministers, Kuwait.

Eid, N., S. Al-Hooti, N. Bourisly and M. Khalafawi. (1986a). Anaemia in school children : A preliminary study. The Journal of Kuwait Medical Association; 20 : 39-43.

Eid, N., S. Al-Hooti, N. Bourisly and M. Khalafawi. (1986b). Nutritional anthropometry of school children in Kuwait. Nutrition Report International; 33(2) : 253-260.

FAO (1990). Agrostat. PC. Food Balance Sheets for Kuwait. (1977-1989). Food and Agriculture Organization. Rome.

Gjorgov, A.N. (1986). Breast Cancer in Kuwait 1974-1983. The Journal of Kuwait Medical Association; 20 : 75-84.

Mansi, S. (1982). Epidemiological approach to cancer in Kuwait. Preventive Health Division, Ministry of Health, Kuwait.

Mustafa, S.A. and H.Y. Nuwayhed. (1981). Nutritional Status Assessment of Adults (Kuwaiti). Nutrition Unit, Preventive Health Division, Ministry of Public Health, Kuwait.

MOH/CDC. (1980). A Description of Diabetes in Kuwait, (1977-1978). Ministry of Health, Kuwait and Center for Disease Control, U.S.A.

MOH (1985). Kuwait Health Survey. Ministry of Health, Kuwait.

MOH (1985-1992). Health Statistics. Vital and Health Statistics Division, Ministry of Health, Kuwait.

Nutrition Unit. (1992). The Nutritional Status of Kuwaiti Students as Evidenced by Anthropometric Measurements, Nutrition Unit, Preventive Health Division, Ministry of Health, Kuwait.

Nutrition Unit. (1995). Growth Patterns of Kuwaiti Primary School Students, Preventive Health Division, Ministry of Health, Kuwait.

WHO. (1983). Measuring Changes in Nutritional Status. World Health Organization, Geneva.

WHO. (1991). Diet, Nutrition and prevention of chronic diseases. (Executive Summary) World Health Organization, Geneva. (WHO/CPL/CVD/NUT/91.1).

# NUTRITION-RELATED CHRONIC DISEASES IN QATAR

ABOELMONEM S. HASSAN[1] AND ABDULRAHMAN O. MUSAIGER[2]

[1]Dietetics & Nutrition Section, Hamad Medical Corporation, Doha, Qatar, [2]Department of Food Sciences and Nutrition, Faculty of Agricultural Sciences, UAE University, Al-Ain, UAE.

## INTRODUCTION

The role of the diet in the development of the most common causes of premature death is now well documented in developed industrialized countries. Coronary heart disease (CHD) and cancers are the most prevalent chronic diseases leading to premature death in these countries. Both diseases are strongly associated with dietary factors such as excess intakes of fat, salt, refined carbohydrates and alcohol. Obesity has been identified as major risk factor for CHD and diabetes mellitus (DM). Many developed countries have been implementing nutrition intervention programs based on prevention-oriented health policies. In some developed countries such as North America, these policies have actually resulted in reduced mortality from CHD and reduction in the prevalence of hypertension over the past 20 years. On the other hand there have been considerable increases in the prevalence of chronic disease in some developing countries. For example in the countries of tropical South America mortality from chronic disease underwent a relative increase of 105% during the 1970s (WHO, 1990). During recent decades the populations of many developing countries have gone through rapid changes in lifestyles and dietary and health patterns. This transition, i.e. increase in mortality from chronic diseases, is being witnessed currently in the Arab countries of the Gulf.

Recent reports on public health in many of Arab countries of the Gulf have identified nutrition related chronic disease (NRCD) as major health problems in the region (WHO/EMRO, 1989). There is, however, a considerable lack of well documented information pertaining to trends in mortality and morbidity of these disease in the countries of the region. This observation is very true when considering reported information related to trends in chronic diseases in Qatar. This article reviews available information on trends in diet related chronic diseases in Qatar.

Information was drawn from three sources, namely, vital statistics, hospital records and Household Expenditure Survey.

The state of Qatar occupies a peninsula along the western coast of the Arabian Gulf, bordered by Saudi Arabia to the South, the United Arab Emirates to the south east and Bahrain to the west. The state holds a population of 486,473 persons according to the 1990 official figures. A characteristic feature of the population pyramid is the domination of the male population in the age group 20-25 years. This reflects the large number of expatriate workers who migrated to Qatar in the mid 1970's to mid1980's period for the purpose of implementing development plans. Oil is the mainstay of the economy with recent investment to develop natural gas fields. Revenues from oil are the basis of socioeconomic development.

## TRENDS IN MORTALITY FROM NRCD

Trends in leading causes of deaths in Qatar at present resembles those reported for developed countries. The leading cause of death is diseases of circulatory system followed by neoplasms. Table 1 shows that deaths from these two diseases as percentages of total deaths (34%, 12%, respectively), are much higher than values for developing countries (19%, 5% respectively). At the same time, deaths from infection and parasitic disease have declined considerably in Qatar (3% of total deaths), a figure well below that of developing countries (40%) and below that of developed countries (8%). The latter observation reflects advances in health and medical services established in the State in the last decade. Deaths from injury and poisoning (19% of total deaths) are mainly due to transport accidents (12%). This is common in most of the Arabian Gulf States, and in fact the figure for Qatar may be relatively low compared to other countries in region.

Deaths due to different types of neoplasm and diseases of the circulatory system have shown marked increases in the last decade. Between 1982 and 1992 the percentage of deaths due to different neoplasms has increased from 8.8% to 12.3% and that of the diseases of the circulatory system has increased from 21.4% to 34% as shown in Table 2. The incidence of all leading causes of deaths in Qatar, except that of injury and poisoning is more among the Qatari nationals than among non-Qatari. This

observation should be interpreted with caution since non-Qatari usually leave the country before the age of sixty. Data presented here are not age-adjusted. Incidence of all leading causes of death is greater among the male population in general, whether Qatari or non-Qatari. The high incidence of leading causes of deaths among the non-Qatari male may, however, reflect domination of male population over the female population rather than a true distribution between the non-Qatari male and female population.

Registered deaths due to diseases of the circulatory system in the year 1994 in Qatar show high incidences of ischaemic heart disease (IHD) and cerebrovascular disease. Both disease are well known to be diet-related. The incidence of both diseases is high among the Qatari male. Deaths due to neoplasm of digestive organs and peritoneum accounts for about one third of all deaths due to different types of neoplasm followed by deaths due to neoplasm of lymphatic and haematopoietic organs. The incidence of deaths due to neoplasm of bones, connective tissues and genitourinary organs is higher among Qatari and non-Qatari females compared to Qatari and non-Qatari males.

## TRENDS IN MORBIDITY OF NRCD

Very limited data are available on morbidity of NRCD. Outpatients attendance of clinics in the only general hospital in Qatar are shown in Table 3. An increase in attendance of cardiology clinics (58%), oncology-hematology clinics (47%) and hypertension clinics (200%) between 1988 and 1992 may reflect increase in morbidity of the three diseases. However, since these are hospital-based records they cannot be related to the prevalence of these diseases. The decrease in outpatient attendance of the diabetic ophthalmology clinic may reflect improved medical management and control in patients with diabetes mellitus. Nutrition management of NRCD patients has been emphasized in recent years by upgrading hospital dietetic and clinical nutrition services. This may be seen from the 75% increase in outpatient attendance of dietetic clinics.

A recent study by Musaiger et al (1994) investigated the prevalence of three main chronic diseases among women in Qatar, diabetes, hypertension and heart diseases. The women were asked whether or not they currently had any of these chronic diseases.

TABLE 1

Leading causes of deaths in Qatar (1994)

| Cause of Death | % Total[1] | % Total[2] Disease | Developed[1] Countries | Developing[1] Countries |
|---|---|---|---|---|
| Circulatory System | 34 | 42 | 54 | 19 |
| Neoplasm | 12 | 16 | 19 | 5 |
| Endo.- Nutr.- Met.-Imm. [4] | 3 | 5 | - | - |
| Respiratory System | 4 | 5 | - | - |
| Infection & Parasitic | 2 | 3 | 8 | 40 |
| Injury & Poisoning[3] | 19 | - | 6 | 5 |
| All Others | 26 | - | 12 | 21 |

Adapted from : MPH, (1995)

1 = Percent of total deaths

2 = % of total deaths due to disease only

3 = 12% Transport Accident & 7% other Injury and Poisoning.

4 = Endocrine, Nutritional, Metabolic and Immune Diseases

TABLE 2

Percentage of deaths due to some nutrition related chronic diseases in 1982 and 1994 (% of total deaths)

| Disease | 1982 | 1994 | % of change from 1982 |
|---|---|---|---|
| Neoplasm | 8.8 | 12.3 | 3.5% |
| Endo-Nutr-Met-Imm | 2.8 | 3.2 | 0.4% |
| Circulatory System | 21.4 | 34 | 12.6% |

Source : MPH (1995)

TABLE 3

Outpatient Attendance of Selected Clinics at Hamad General Hospital (X 1000)

| Clinic | 1988 | 1992 | % Change |
|---|---|---|---|
| Cardiology | 12 | 19 | + 58% |
| Diabetes | 12 | 12 | - |
| Oncology/Hematology | 2.3 | 3.4 | + 48% |
| Hypertension | 0.3 | 0.9 | + 200% |
| Cardiac Surgery | 2.2 | 2.2 | - |
| Diabetic Opthalmology | 0.2 | 0.1 | - 50% |
| Dietetics | 2 | 3.5 | + 75% |

Source : MPH (1993)

The prevalence of diabetes and hypertension among women studied was very similar (12.9% and 12.3%, respectively). These figures compared favourably with that reported in Bahrain among women aged 29 to 79 years (Al-Roomi et al. 1994). The prevalence of heart disease was 3.8%. Actually, this category includes a group of diseases such as myocardial infarction, angina, and stroke, however, since the women generally could not differentiate among these diseases, they were asked about whether or not they had any diseases related to the heart.

A high statistically significant association was found between these diseases and age of women (Table 4). The prevalence of diabetes was 0.6% among those aged less than 25 years and then increased by 10% for every ten years to reach 37% among those aged over than 44 years. The situation for hypertension was different as the proportion tripled after age 34 years and then tripled again in those aged over 44 years to reach 51% among this age group. Surprisingly, 1.2% of women aged less than 25 years reported a history of heart disease. This relatively high prevalence may be due to congenital heart disease.

The relationships between the prevalence of diabetes and heart disease to a family history of these diseases were found to be statistically significant ($p<0.001$ and $p<0.02$, respectively). Of women who had diabetes, 70% had a family history of diabetes, compared to 44%, of those who had no diabetes. The percentage for heart diseases were 43% and 23% among those who had heart diseases and those who had not, respectively (Table 5).

## FACTORS ASSOCIATED WITH NRCD

### Changes in Dietary Habits

Before the discovery of oil, fish, rice and dates were the most commonly consumed food in coastal areas in Qatar. In the desert, rice, dates, milk and milk products (sour milk and yogurt) were the most consumed foods among the Bedouins. Meat tended to be consumed only when guests were invited or by the upper social classes (Musaiger, 1987). The economic development resulted in increased purchasing power and introduction of wide variety of foods. In Qatar 22.3% of the family income is spent on food purchases (CSO, 1989). Food availability depends

predominantly on imports since the domestic agricultural production is low (MPH, 1993). Food habits of immigrant populations from Middle Eastern and Asian countries have become integrated into the Qatari food habits. The consumption of meat has increased over the consumption of fish. Compared to non-Qataris, the Qataris consume higher amounts of meat (Table 6).

Consumption of rice among Qataris is very high. Qataris also consume high levels of salt and sugar and sweets and apparently adequate quantities of vegetable and fruits. Food consumption data presented in Table 7 are based on household expenditure and do not reflect true intakes. However, it can be concluded from these data that consumption of rice, meat, salt and sugar is relatively high among Qataris. Similar trends in food consumption have also been reported in other Arabian Gulf countries (Kamel & Martinez, 1984, Aziz, 1985).

The Qatari population is undergoing rapid transition towards affluence. Chronic diseases develop as countries become more affluent. With affluence there is a progressive increase in consumption of animal fat and free sugars. Based on epidemiological data from developing and developed countries (Burkitt and Trowell, 1975) concluded that with westernization of the diet, chronic diseases emerge first as diabetes, followed by CHD and cancer of the digestive system. Changes in life style in Qatar have led to emergence of diet-related chronic disease in patterns typical for those observed in developed countries.

**Smoking**

Smoking has been repeatedly found to be one of the main risk factors for cardiovascular disease (Lakier, 1992). There was no studies on smoking among men in Qater. Musaiger et al (1994) found that the prevalence of smoking among women in Qatar is very low (3.2%) compared to that reported in other Gulf countries (Hamadeh et al., 1993). However, a high prevalence of smoking was found among husbands (38%) of women who are currently married. Thus a high proportion of women could be defined as passive smokers.

TABLE 4

History of some chronic diseases of women in Qatar by age (N=603)

| Age (years) | Diabetes % | Hypertension % | Heart diseases % |
|---|---|---|---|
| < 25 | 0.6 | 4.7 | 1.2 |
| 25 - 34 | 10.4 | 5.2 | 3.6 |
| 35 - 44 | 21.9 | 14.9 | 3.5 |
| > 45 | 37.1 | 51.4 | 11.4 |
| Total | 100.0 | 100.0 | 100.0 |
| | $p < 0.001$ | $p < 0.001$ | $p < 0.004$ |

TABLE 5

The relationship between the prevalence of diabetes and heart disease with family history of these diseases among women in Qatar.

| History of the Disease | Prevalence of the Disease | | | | | |
|---|---|---|---|---|---|---|
| | Yes | | No | | Total | |
| | N | % | N | % | N | % |
| Family history of diabetes | | | | | | |
| Yes | 55 | 70.5 | 233 | 44.4 | 288 | 47.8 |
| No | 23 | 29.5 | 292 | 55.6 | 315 | 52.2 |
| $p < 0.001$, O.R. = 3.0 (95% C.I., 1.73-5.22) | | | | | | |
| Family history of heart diseases | | | | | | |
| Yes | 10 | 43.5 | 135 | 23.3 | 145 | 24.0 |
| No | 13 | 56.5 | 445 | 76.7 | 458 | 76.0 |
| $p < 0.02$, O.R. = 2.5 (95% C.I., 1.00 - 6.4). | | | | | | |

TABLE 6

Estimated per caput consumption of various foodstuffs in Qatar - Grams per person per day (1988)

| Foodstuffs | Qatari | Non-Qatari |
|---|---|---|
| Rice | 313 | 120 |
| Wheat Flour | 60 | 73 |
| Meat | 173 | 113 |
| Fish/Shellfish | 57 | 60 |
| Fresh Milk (ml) | 30 | 60 |
| Eggs (each) | 0.5 | 0.5 |
| Citrus Fruits | 125 | 110 |
| Other Fruits | 242 | 197 |
| Fresh Vegetables | 276 | 281 |
| Legumes & Pulses | 9 | 13 |
| Salt | 23 | 17 |
| Sugar & Sweets | 127 | 97 |

Source : CSO (1989).

**Physical Exercise and Obesity**

It is believed that a sedentary lifestyle and high intake of food rich in fats are the main factors determining obesity in the Gulf, including Qatar (Musaiger, 1987). Musaiger et al (1994) found that more than half of women in Qatar (56.5%) did not practice any type of exercise; 27.5% practiced exercise infrequently while only 16.5% of women practiced exercise regularly. Most of these were non-Qatari. The common exercises practiced were walking and swimming. The low percentage of women who practice exercise could be attributed to several reasons, such as lack of health awareness, lack of places for women to practice exercise, and cultural barriers.

Typically, as reported in all Gulf countries, overweight was highly prevalent among women in Qatar (63.7% had BMI > 25). About one-third of women were overweight and a similar proportion were obese (BMI > 30). The association between overweight (based on BMI) and age of women was highly statistically significant ($P<0.001$). The prevalence of overweight among older women (35 years and over) was astonishing as about 80% of these women had a BMI equal or greater than 25 (Table 7). This percentage is higher than that reported in women in other countries in the region (WHO/EMRO, 1989).

**Heart Disease Risk Appraisal**

A simple tool to assist health workers in evaluation of coronary heart disease risk was implemented. This tool is based on nine known risk factors for coronary heart disease namely smoking, blood pressure, diet, stress, exercise, weight, age, gender and heredity. Detailed information on how these risk factors were scored are available elsewhere (Delugolecka and King, 1989). The results showed that, using a combination of risk factors, 7% of women had generally average risk, and 1% had moderate risk. However, when risk was associated with age, it was found that the proporation of women who had generally average risk increased slightly with age till age 35-44 years, and then the risk become three times more for those aged over 44 years. None of the women had a moderate risk at age less than 25 years, and then the risk increased gradually to reach 4.3% in those aged over 44 years (Table 8).

TABLE 7
Prevalence of obesity in women in Qatar by age group.

| Obesity | Age (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | <25 | | 25- 44 | | >45 | | Total | | | |
| | N | % | N | % | N | % | N | % | N | % |
| Underweight (BMI < 20) | 36 | 21.6 | 20 | 8.0 | 4 | 3.5 | - | 0.0 | 60 | 10.0 |
| Normal (BMI 20-24.9) | 69 | 41.3 | 58 | 23.2 | 20 | 17.5 | 11 | 15.7 | 158 | 26.3 |
| Overweight (BMI 25-29.9) | 40 | 24.0 | 86 | 34.4 | 32 | 28.1 | 23 | 32.8 | 181 | 30.1 |
| Obese (BMI 30+) | 22 | 13.2 | 86 | 34.4 | 58 | 50.9 | 36 | 51.5 | 202 | 33.6 |

* Weight and height were not taken for two women.

TABLE 8

Heart disease risk appraisal for women in Qatar by age.

| Level of risk | Age (years) | | | |
|---|---|---|---|---|
| | <25 | 25-34 | 35-44 | >45 |
| Well below average risk | 55.6 | 27.2 | 14.9 | 8.6 |
| Below average risk | 43.8 | 68.0 | 73.7 | 57.1 |
| Generally average risk | 0.6 | 4.4 | 9.6 | 30.0 |
| Moderate risk | 0.0 | 0.4 | 1.8 | 4.3 |

## CONCLUSIONS

With the recently introduced changes in life style, nutrition related chronic diseases are becoming major health problems in Qatar accounting for most of the mortality and morbidity and incurring substantial health care costs. The trends in chronic diseases observed in Qatar are very similar to those identified in developed countries and countries undergoing transition towards affluence.

No programmes of formal instruction in nutrition have been established yet in Qatar. Medical professionals and other health workers are not trained in the field of nutrition in general and in the role of diet in prevention of chronic disease in particular.

In line with the WHO study group recommendations to national governments on nutrition and prevention of chronic disease (WHO, 1990), it may be recommended that the Ministry of Health in Qatar ensures the availability of experts in the field of monitoring nutrition and health status, who can develop a nutrition-health surveillance system. Health authorities should take the initiative to establish a national board for food and nutrition to formulate policies in field of food and nutrition, to advise the council of Ministers in related matters, and to coordinate between different government sectors in implementing programmes in nutrition and health based on information obtained through community surveys.

## REFERENCES

Al-Roomi, K., Musaiger, A.O. and Al-Awadi, A. (1994). Lifestyle patterns and the risk of acute myocardial infarction in a Gulf Arab population. A community-based case-control study. Int. J. Eprdemiol. 23, 931-939.

Aziz, M. (1985). Population Growth and Food Levels in Arab Gulf States. J. Gulf Arabian Peninsula Studies. 11 : 63-95.

Burkitt, D. and Trowell, H. (1975). Refined Carbohydrate Foods and Disease. Some implications of Dietary Fiber. Academic Press, London.

CSO. (1989). Household Expenditure Survey 1988. Central Statistical Organization, Presidency of Council of Ministers, Qatar.

Delugdecka, M. J. and King, S. A. (1989). A simple tool for heart disease risk appraisal in general practice. J. Roy Soc. Health 109:98-99.

Hamedh, R.R., McPherson, K. and Doll, R.C. (1993). Prevalence of smoking in Bahrain. Tobacco Control 1, 102-106

Kamel, B.S. and Martinez, O.B. (1984). Food Habits and Nutrient Intakes of Kuwaiti Males and Females. Ecol. Food Nutr. 15 : 261-272.

Ministry of Public Health (MPH) (1993). Vital Statistics Annual Report 1992. Preventive Health Department. Ministry of Public Health, Qatar.

Ministry of Public Health (MPH) (1995) Vital Statistics Annual Report 1994. Preventive Health Department. Ministry of Public Health, Qatar.

Musaiger, A.O. (1987). The state of food and nutrition in the Arabian Gulf countries. Wld. Rev. Nutr. Diet 54, 105-173.

Musaiger, A.O. et al (1994) Risk factors for cardiovascular disease among women attending health centers in Qatar Emir. J. Agrice. Sci. 6, 36-35.

WHO (1990). Diet, Nutrition, and the Prevention of Chronic Diseases. Report of a WHO study Group, WHO, Technical Report Series 797.

WHO/EMRO (1989). Clinical Disorders Arising from Dietary Affluence in Countries of Eastern Mediterranean Region, Alexandria, Egypt.

# PREVALENCE OF DIABETES MELLITUS, OBESITY AND HYPERCHOLESTROLEMIA IN SAUDI ARABIA

ABDUL-RAHMAN AL-NUAIM[1], KHALID AL-RUBEAAN[1], YAGOB AL-MAZROU[2], TAWFIK KHOJA[2], OMER AL-ATTAS[3] AND NASSER AL-DAGHARI[3].

[1]King Khalid University Hospital, [2]Ministry of Health, [3]King Saud University, Riyadh, S.Arabia.

## INTRODUCTION

Obesity, hypercholesterolemia and diabetes mellitus are the known major risk factors of cardiovascular diseases. The importance of estimating the prevalence of such chronic metabolic diseases can not be over emphasized. The knowledge about the level and distribution of diseases can help the policy makers and health planners in resource mobilization and reallocation for the control of any given disease. The prevalence rates can be used as baseline data for monitoring any national program for the control of such diseases and over a period of time, the study can be repeated and the changed incidence rates would indicate how efficient or otherwise, the national program was.

Over the last 20 years, Saudi Arabia has witnessed major socio-economic development, leading to significant changes in standards of living and life-style. The change of the society into more of affluent society has also resulted in changes in dietary habits and related social practices, many of which are not necessarily healthy ones. This was compounded by lack of regular exercise among large segment of society. These factors and others have contributed to the emergence, and in large magnitude, group of diseases which have essentially replaced the communicable diseases, among these are: obesity, hypercholesterolemia and diabetes mellitus.

We have conducted cross-sectional national kingdom wide epidemiological house-hold survey of 37000 Saudi adults to find out the prevalence of diabetes, obesity and hypercholestrolemia in Saudi Arabia. This paper highlight the summary of this survey. Detailed information are presented in the final report (Al-Nuaim et al, 1995).

## OBESITY

A cross-sectional epidemiological survey was conducted to study the effect of gender, age and the regional distribution on the prevalence of overweight and obesity among adult Saudi subjects. A total sample of 13177 Saudi subjects, over the age of 15 years were selected randomly. Of the sample, 52% were male and 48% were female subjects. The range and mean of age was 15-95 and 33 years for male and 15-95 and 33 years for female subjects.

The randomly selected samples from different regions of Saudi Arabia were visited by general practitioners at their houses, the subjects were interviewed, and later examined at the Primary Care Clinics, where, their anthropometric measurements, height and weight were done and registered by the general practitioner in charge.

Mean weight (kg) for male subjects was significantly higher than for female subjects. There was a progressive increase in mean weight for male and female subjects, reaching maximum at the 5th decade. The difference between mean weight for given age group and the mean weight for the consecutive age group was significant between all age groups, except between the 5th and 6th decades for male subjects. The mean weight for male subjects was significantly higher than for female subjects throughout all age groups.

Mean BMI of female subjects was significantly higher than for male subjects. There was a progressive increase in BMI for male and female subjects with age, reaching maximum at the 5th decade. The difference between mean BMI for given age group and the mean of BMI for the consecutive age group was significant between all the age groups, except between the 5th and 6th decade for male and female subjects. The mean BMI for female subjects was significantly higher than for male subjects, throughout all the age groups.

The prevalence of overweight, BMI 25-30, for male subjects was significantly higher than for female subjects (29% vs. 27%). The prevalence of obesity, BMI>30, for female subjects was significantly higher than for male subjects (24% vs. 16%). Prevalence of morbid

obesity, BMI>40, for female subjects was higher, however not significant than for male subjects (2.2% vs. 0.7%).

There was gender variation within each region with respect to prevalence of overweight, where there was higher prevalence of overweight among male subjects, throughout all the regions, except the Southern region, however, it did not reach significant difference for any of the regions. There was gender variation within each region with respect to prevalence of obesity, where all the regions showed significantly higher prevalence of obesity among female subjects, when compared with male subjects for any given region.

There was a regional variation with respect to prevalence of overweight, where the prevalence was highest in the Central region for male and female subjects (32% and 30%), respectively. There was a regional variation with respect to prevalence of obesity, where the prevalence was highest in the Eastern region (23%) for male subjects and in the Northern region (32%) for female subjects.

The prevalence of overweight among Saudi subjects was similar to reported prevalence from developed countries, however, the prevalence of obesity, specifically among Saudi female subjects was several fold higher than the reported prevalence from developed countries.

**HYPERCHOLESTEROLEMIA**

Epidemiological data on the prevalence of hypercholesterolemia (HC) from middle eastern countries are scarce. A population based survey was conducted to study the pattern of serum cholesterol concentration (SCC) distribution and prevalence of HC is Saudi Arabia.

4548 Saudi adult subjects randomly selected from different regions of Saudi Arabia, were studied. There was 2294 (50.4%) males and 2254 (49.6%) females with a mean age of 33 (range 15-98).

Mean SCC was significantly higher in females (4.25 vs. 4 mmol/L.) than in males. There was no significant difference in the prevalence of cholesterol 5.2-6.2 mmol/L. between males and females (17.5% vs. 21% respectively), nor in the prevalence of

cholesterol level > 6.2 mmol/L. (7.5% vs. 9%, respectively). There was a progressive and significant increase in the prevalence of HC with age till 6th decade. There was considerable regional variation in the prevalence of HC (<5.2 mmol/L.) with the lowest found in the Northern region and the highest in the Eastern region.

**DIABETES MELLITUS**

There was 13177 subjects 52% were male and 48% were female subjects. The mean (SD) of age was 33 (15) years for male and female subjects. The mean of random serum sugar concentration (RBS) of male subjects was higher than the mean RBS for female subjects (5.35 vs. 5.2 mmol/L.) (P=0.004).

There was a regional variation in RBS, where the highest was found in the Northern region (6.3 and 6.5 mmol/L for male and female subjects, respectively).

Prevalence of diabetes mellitus was 11.8% and 12.8% for male and female subjects, respectively (P=0.001). Prevalence of impaired glucose tolerance test (IGT) was 10% and 9%, respectively (P=0.001).

There was a progressive increase in the prevalence of diabetes mellitus with age reaching up to 40% at the decade. There was a regional variation with respect to prevalence of diabetes mellitus highest 17.6% was achieved in the astern region for male subjects and 18.6% for female subjects in the Northern region.

There was a regional variation with respect to prevalence of IGT. highest 12.3% and 9.9% for male female subjects, respectively in the Central region.

**EFFECT OF URBANIZATION ON PREVALENCE OF OVERWEIGHT AND OBESITY**

As stated earlier, there were 13177 Saudi adult subjects, 52% were male and 48% were female subjects. There were 54% of subjects living in urban communities and 46% subjects were living in rural communities. Mean age for subjects living in rural communities was significantly higher than for subjects living in urban

communities (34 vs. 33 years for male subjects and 33 vs. 32 years for female subjects, respectively).

Mean BMI was significantly higher among subjects living in urban communities vs rural communities (25vs. 24 for male subjects and 27 vs. 25 for females subjects, respectively).

There was a progressive increase in mean BMI with age for male and female subjects living in either urban and rural communities. There was a progressive increase in percentage of male and female subjects with high BMI values in urban communities and progressive decrease in percentage of male and female subjects with high BMI values in rural communities.

Prevalence of overweight was significantly higher among subjects living in urban communities, when compared with the rural communities (31% and 26% for male subjects, 29% and 24% for female subjects, respectively).

Prevalence of Obesity was significantly higher among subjects living in urban communities, when compared with rural communities (18% and 12% for male subjects, 28% and 18% for female subjects, respectively).

**EFFECT OF URBANIZATION ON PREVALENCE OF HYPERCHOLESTEROLEMIA**

There were 4548 Saudi adult subjects, 50.4% were male and 49.6% were female subjects. There were 59.9% living in urban communities and 40.1% living in rural communities.

Mean age of male subjects living in rural communities was significantly higher than male subjects living in urban communities (34 vs. 33 years). The mean serum cholesterol concentration (SCC) was significantly higher for subjects living in rural communities, when compared with urban communities (4.2 vs. 3.9 for male subjects, respectively and 4.3 vs. 4.2 mmol/L. for female subjects, respectively).

Prevalence of hypercholesterolemia (5.2-6.2 mmol/L.) was higher among male subjects living in rural communities, however, did not reach significant level (12.1% vs. 10%). The difference reached a

significant level for the prevalence of hypercholesterolemia (>6.2 mmol/L.) (8.2% vs. 5.6%) for male subjects living in rural and urban communities, respectively.

Prevalence of hypercholesterolemia (5.2-6.2 mmol/L.) was higher in rural communities among female subjects, however, did not reach significant difference (14% vs. 12.2%, respectively). Prevalence of hypercholesterolemia (>6.2 mmol/L.) was higher in rural communities among female subjects, however, did not reach significant difference (8.8% vs. 7.7% respectively).

## EFFECT OF URBANIZATION ON PREVALENCE OF DIABETES MELLITUS

There were 13177 Saudi adult subjects, 52% were male and 48% were females subjects. 57% were living in urban communities compared to 43% of the subjects living in rural communities.

Mean age of subjects living in rural communities were higher than mean age for subjects living in urban communities, however, it was significantly different in case of male subjects (34 vs. 33 years for male subjects and 33 vs. 32 years for female subjects).

Mean random blood sugar concentration was significantly higher among subjects living in urban communities (5.7 compared to. 4.9mmol/L. for male subjects and 5.5 vs. 4.9 for female subjects).

Prevalence of diabetes mellitus and impaired glucose tolerance (IGT) was significantly higher among male subjects living in urban communities vs. rural communities (11.7% vs. 6.8% for diabetes mellitus and 10.9% vs. 8.4% for IGT).

Prevalence of diabetes mellitus and IGT was higher among female subjects living in urban communities vs. rural communities, however, it only reached significant level in case of diabetes mellitus and not IGT (13.8% vs. 7.4% for diabetes mellitus and 9.1% vs. 8.1% for IGT).

## CONCLUSIONS

This epidemiological household survey has shown high prevalence of obesity among the study population. The prevalence of obesity

among females was among the highest prevalence of obesity reported so far. As prevalence of obesity increase with age and considering that the majority of Saudi population are less than thirty year old at present, then the magnitude of obesity is expected to be even higher in the near future. Modernization and the consequent changes in dietary habits, either in quality or quantity, in general, has led to the increase in the prevalence of overweight and obesity among both males and females living in the urban areas. This has rather reached an alarmingly high magnitude among females living in urban communities.

Though the prevalence of hypercholesterolemia is higher among females and increases with age, still it is lower than the prevalence levels reported or the developed countries. Further, the higher prevalence in general among rural residents and the highest levels observed among rural females indicates the need for conducting further community based cholesterol studies, especially in relation to body weight distribution, nutritional habits and life-style.

The prevalence of diabetes mellitus in Saudi Arabia is high and comparatively higher than the prevalence rate observed in the developed nations. It is similar, however, to the prevalence in Oman, a neighboring Gulf State which shares the same culture and similar life-style. However, such high prevalence in a country with predominately young population is an indicator of impending epidemic. The prevalence reached still higher levels for both diabetes mellitus and IGT for females living in urban areas.

It can be concluded that the present study has shown the following :

- High prevalence of diabetes mellitus and almost equal prevalence of impaired glucose tolerance among both males and females.

- High prevalence of obesity among males and critically higher prevalence of obesity among females.

- Prevalence of hypercholesterolemia in Saudi Arabia is lower than the prevalence reported from developed countries.

- Prevalence of diabetes mellitus, impaired glucose tolerance and obesity was lower among those living in rural communities whereas the prevalence of hypercholesterolemia was higher among rural communities.

- Finally, the observed prevalence of diabetes mellitus, glucose intolerance and obesity in Saudi Arabia are among the highest in the world, despite of the fact that the majority of the population are young (<30 years). Hence the prevalence is expected to reach epidemic proportions in the near future with the increase in age of the majority population.

**RECOMMENDATIONS**

1. There is a need to address, systematically, the causes of such a high degree of prevalence of obesity and initiate multidiciplinary efforts towards educating the community on the health hazards of obesity and establish means to control the broad range of obesity related health problems.

2. There is an urgent need to address the issues specifically related to the potential risk factors of diabetes mellitus (such as genetic, environmental and obesity) and consider initiating national programs for monitoring and controlling diabetes mellitus and strengthen infrastructure and technical facilities for the management of diabetes related complications.

3. Diabetes mellitus and obesity are major risk factors for cardiovascular and other vascular diseases which are considered to be the main causes of death at the present time. There is urgent need to establish national control programme for combating these diseases, among the specific functions of such programme are :

(a) Establish registry of diabetes mellitus and vascular diseases (hypertension, coronary artery diseases).

(b) Establish regional offices for disease control which will be responsible for screening, case finding, and follow-up of the high risk population.

(c) Establish appropriate setup for treating and monitoring for control and complication among diabetic subjects.

(d) Establish awareness programme for the risk of obesity among all sectors of population, among them school children.

(e) On priority basis, the above mentioned programs are to be initiated and reinforced in urban areas, as the urban population is at higher risk for vascular diseases.

## REFERENCES

Al-Nuaim, A. et al (1995): National Chronic Metabolic Diseases Survey (Part 1). Ministry of Health and King Saud University, Riyadh, Saudi Arabia.

TABLE 1

Summary of statistical information on obesity, hypercholesterolemia and diabetes mellitus, NCMDS, Saudi Arabia 1990-93

| | | Male | Female |
|---|---|---|---|
| **OBESITY** | | | |
| Sample size* | | 6873 | 6304 |
| Mean (SD)of age (years) | | 33 (15) | 33 (15) |
| Mean (SD) Body Mass Index | | 25 (5) | 26 (6) |
| Prevalence (%) of overweight | | 29 | 27 |
| Prevalence (%) of obesity | | 16 | 24 |
| Prevalence (%) of obesity | urban | 18 | 28 |
| | rural | 12 | 18 |
| **HYPERCHLESTEROLEMIA** | | | |
| Sample size * | | 2294 | 2254 |
| Mean (SD) of age (years) | | 33 (15) | 33 (15) |
| Mean (SD) of serum cholesterol concentration (mmol/L.) | | 4 (1.5) | 4.25(1.5) |
| Prevalence (%) of hypercholestrolemia (5.2-6.2 mmol/L) | | 10 | 12 |
| Prevalence (%) of hypercholestrolemia (>6.2 mmol/L.) | | 7.5 | 9 |
| Prevalence .(%) of hypercholesterolemia (>6.2 mmol/L. | urban | 6 | 8 |
| | rural | 8 | 9 |
| **DIABETES MELLITUS** | | | |
| Sample size * | | 6873 | 6304 |
| Mean (SD) of age (years) | | 33 (15) | 33(15) |
| Mean (SD) of random serum glucose concentration (mmol/L.) | | 10 | 12 |
| Prevalence (%) of impaired glucose tolerance | | 10 | 9 |
| Prevalence (%) of diabetes mellitus among all population | | 11.8 | 12.8 |
| Prevalence (%) of diabetes mellitus among population 30-64 years | | 16 | 20 |
| Prevalence (%) of diabetes mellitus | urban | 11.7 | 13.8 |
| | rural | 6.8 | 7.4 |

* Sample adjusted for gender, age, region and urban-rural

# THE AFFLUENT DIETARY DISEASES IN SAUDI ARABIA

KHALID A. MADANI[1] and RUFAIDA H. KHASHOGGI[2]

[1]Ministry of Health, Jeddah; [2]King Abdulaziz University, Jeddah, S. Arabia

## INTRODUCTION

In the last three decades, Saudi Arabia has faced rapid changes in health, education, social services, and agriculture. These changes have profound effect on food consumption patterns and health and nutritional status of the people. Disease trends have changed dramatically from infectious, parasitic diseases, and severe cases of undernutrition, to affluence related health problems like obesity, diabetes, cancer, and cardiovascular diseases. The purpose of this review is to highlight the status of affluence related health problems in Saudi Arabia.

## OBESITY

The prevalence of obesity in Saudi Arabia ranges from 14% to about 82% (WHO, 1989; Al-Shammari et al., 1994). This wide variation could be due to the differences in criteria used to define obesity and differences in age, sex, and health status of sample studied.

The available data indicates that the prevalence of adult obesity in the Kingdom is high, and affects women in particular. These are several factors contributing to the high incidence of obesity among women. Watching television and eating snacks are the main activities during their leisure time, especially when the majority of women are not employed. Excessive intake of food is also responsible for obesity in the region (Saudi Food Balance Sheet, 1987-1989). The attitude towards obesity is another important factor. The traditional, long, comfortable, and wide clothes worn by women has not let them notice the gradual gain in weight (Musaiger, 1987). The modernization and affluence in Saudi Arabia over the last three decades has probably caused the problems of obesity in vulnerable persons to surface (Khashoggi et al., 1994). Some might even consider obesity as a sign of affluence (Hamilton et al., 1995).

The risk of childhood obesity and its continuation to adulthood is now well established (Rimm and Rimm, 1976). A survey utilizing the National Center for Health Statistics Standards carried out in the Kingdom (WHO, 1989) revealed 14% childhood obesity among newborn to six years of age. The tracking of body mass and obesity from child-hood through adulthood impious that the genetic, behavioral, and cultural involved in obesity operate early in life, can be identified in youth, and can be intervened upon (Harlan, 1993). The challenge for early identification and intervention has important public health implications.

Recently, Al-Nuaim et al. (1995a) conducted a national epidemiological house-hold survey to study the chronic metabolic disease in 13,177 Saudis, 6873 (52%) male and 6304 (48%) female subjects, aged fifteen years and above. The results of the survey indicated that the prevalence of overweight (BMI = 25 to 30) increased with age in male and female subjects. The prevalence of obesity (BMI >30 to 40) also increased with age, reaching a maximum at the 5th decade for male and female subjects. For the age group of fifteen to twenty years, the prevalence of overweight for male and female subjects was 12% and 15% respectively. The investigators indicated that the modernization and the consequent changes in dietary habits has led to the increase in the prevalence of obesity among both males and females in Saudi Arabia. They have recommended a need to establish programs for promoting the awareness of health hazards and the means of controlling obesity.

Binhemd et al. (1991) studied the height and weight of 1072 Saudis (477 men and 595 women), age 18-74 years, with a view to determining the prevalence of obesity in patients attending the primary health care center of King Fahd Hospital, Alkhobar. Of the total group, using a criterion of body mass index of greater than 25, 51.5% of the men, and 65.5% of the women were considered obese. More women were found to be obese than men. Similar findings were also reported by Al-Attas et al. (1990), indicating obesity was found more frequently in females than in males.

Khashoggi et al. (1994) studied the factors affecting obesity among females aged 11 and 70 years in the western Provinces of

the Kingdom. The sample involved 950 females attended primary health care centers. The prevalence of obesity was 64.3% using BMI >25. Multiple regression analysis indicated that five variables were significant predictors for obesity; age, marital status, number of servants, having children, and parity. Other factors studied, such as education and income, were of no predictive value.

In another study (Khwaja and Al-Sibai, 1987) on a sample of 467 married non-pregnant Saudi female patients, using BMI>30 it was found that the overall prevalence of obesity was 27%. Age, rather than parity, was a contributing factor to obesity. This appears more likely since the interval between pregnancies is usually short, and does not allow the female to lose the weight gained during pregnancy. This is particularly true in Saudi Arabia where grad multiparity (the births of five or more viable infants) is a common occurrence (Cochran and Faqeera, 1982; Madani et al., 1994a).

Al-Shagrawi et al. (1994) conducted a study to evaluate the factors affecting the prevalence of obesity among Saudi college female students. A sample of 460 Saudi female students, representing 21.2% of the total students was selected using a systematic random procedure. The results showed that obesity was present among 20.9% of the students using BMI >25. There was a significant relationship between age, social status and daily dietary intakes of energy, fat and carbohydrate with obesity. The researchers recommended that more attention should be given to nutritional education for university students regarding the selection of a balanced diet.

Al-Shammari et al. (1994a) studied the prevalence of obesity and whether there is an association between low back pain and obesity in Arab patients attending primary health care centers. A case-control study of 2460 Arab patients with low back pain (cases) attending health centers in Riyadh were compared with patients free from back pain (control). The results showed that the prevalence of obesity for the cases was 82.4% as compared with 57.4% among control. The mean BMI (±SD) of cases was 30.6±6.1 compared with 26.7±5.8 of control. Body mass indices were higher among females, for those of lower education, housewives, non-Saudis and the divorced or widowed than other groups. It seems clear, however, that obesity increase the

symptoms of an existing low back pain and increases the risk of complications in connection with surgical management of the condition. It is recommended that promotive programmes aimed at preventing or reducing obesity in the community need more emphasis and commitment.

In a recent study, Hamilton et al. (1995) quantify the prevalence of obesity in females in the infertility clinic at King Faisal Specialist Hospital in Riyadh. The results showed that the prevalence of overweight and obesity are high among infertile Saudi females. Eighty percent of the females were either overweight or obese before the introduction of ovulation-inducing agents (see table 1). The influence of obesity on reproduction, as reported in this study, is just one aspect. The high incidence of obesity, as found in this Saudi infertile population, must urge workers in the health care sector to inform the public about these adverse effects and start implementation of preventive measures.

The prevalence of obesity in diabetic patients was higher than non-diabetics. In one Study (Bacchus et al., 1982), 65% of the diabetic patients were overweight compared to 26% of the non-diabetic population. Diabetes in Saudi Arabia appears to be related to obesity (Fatani et al., 1989). Similar findings were also reported b Fatani et al. (1987) regarding a study of the prevalence of diabetes mellitus in the Western Region of the Kingdom. They defined obesity as BMI equal to or higher than 27 for men, and equal to or higher than 25 for women. Among 5,222 adult subjects, aged over than 14 years, the rate of obesity among diabetic subjects (41.4%) was significantly higher than that among normal subjects (29.3%). The investigators reported that the obesity rate in men was significantly higher among diabetic subjects (39.1%) than in normal subjects (21.3%). Women did not have a significant difference in the rate of obesity in diabetic (42. 4%) and normal subjects (39.3%).

In another study, using the same criteria of obesity as the previous one, Al-Attas et al. (1990) studied the metabolic indices in 217 Saudi diabetic patients and 57 controlled subjects in relation to BMI. Obesity was found more frequently in females (82.7%) than in males (40.9%).

TABLE 1.

Comparision of studies on obesity among Saudi famale population in the Kingdom of Saudi Arabia.

| Study | Mean age yrs. (±SD) | Percentage ideal weight BMI 20-24.9 | Percentage over weight BMI 25-29.9 | Percentage moderate obese BMI 30-40 | Precentage morbid obese BMI>40 |
|---|---|---|---|---|---|
| Khwaja and Sibai (1987) n=467 | 15-49 [a] | 35.1 | 27.0 | 18.8 [b] | 8.2 [c] |
| Binhemd et al. (1991) n=595 | 18-74 [a] | 34.6 [d] | 34.1 | 27.9 | 3.4 |
| Al-Shammari etal. (1994) n=1385. | 32,2(±11.7) | 26.0 [d] | 26.8 | 41.9 | 5.1 |
| Al-Shagrawi et al. (1994) n=460 | 21 (±5) | 21.3 | 8.7 | 12.2 | - |
| Hamilton et al. (1994) n=1755 | 28.9 (±5.8) | 17.0 | 42.0 [e] | 25.0 [f] | 13.0 [g] |
| Al-Nuaim et al. (1995a)n=6340. | 33 (±15) | 32.5 [h] | 27.0 [i] | 24.0 | 2.2 |

[a] Range of age in years [b] BMI from 30 to 34.9, [c] BMI equal to or greater than 35, [d] BMI less than 25, [e] BMI from 25 to 30 [f] BMI from 30 to 35, [g] BMI greater than 35, [h] BMI from 19 to 24.9, [i] BMI from 25 to 30.

## DIABETES MELLITUS

Diabetes has become one of the most challenging public health problems in Saudi Arabia. The prevalence range from 1.5% to as high as 40%, depends on age and sex (Fateni et al., 1987; Sebai, 1987; Baccus et al., 1982; El-Hazmi, 1990; El-Hazmiand and Warsy, 1989; Al- Nuaim et al., 1995a). Many researchers (Fatini et al., 1987; Sebai, 1987; Al-Nuaim et al., 1995a) suggest that he rapid socio-economic changes in the country over the last thirty years have contributed to the high prevalence rate of diabetes. 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 (Famuyiwea, 1992). Health education for the dietary management of diabetes is urgently needed. These education efforts should be provided through the public media, by radio, television and newspapers. Dietary recommendations for diabetics should be simple, easy to understand, acceptable in practice, and of proven effectiveness if they re to have appreciable influence on the quality of diabetic management (Al-Rowais et al., 1993).

On their national chronic metabolic diseases survey (Al-Nuaim et al. 1995) indicated that the prevalence of diabetes mellitus in Saudi Arabia is high. It was 11.8% and 12.8% for male and female subjects, respectively. Prevalence of impaired glucose tolerance (IGT) was 10% and 9% for male and female subjects, receptively. If the prevalence of diabetes mellitus and IGT is added together, it will amount to more than 20% of the Saudi population having a degree of glucose intolerance. There was a progressive increase in prevalence of diabetes mellitus with age reaching up to 37% for males and up to 40% for females at the 6th decade.

El-Hazmi et al. (1995) conducted a study in Riyadh to determine the prevalence of diabetes mellitus and impaired glucose tolerance on Saudi male and female adults (2402) and children (1579) during a household screening program. The results showed that the overall prevalence of diabetes in the Riyadh population is around 4.4% but when subjects were grouped according to age, a significant increase in the prevalence was observed in both males

and females. In adults over the age of 30 years, 16% of the males were found to suffer from diabetes mellitus, compared to 12. 34% of the females in the same age group. In each age group, the prevalence of noninsultin-dependent diabetes mellitus was significantly higher in males when compared to females. This prevalence is significantly higher than that reported earlier by Bacchus et al. (1982) for the Riyadh population. This may indicates that the prevalence of diabetes mellitus is increasing with changing lifestyles in Saudi Arabia.

Al-Nuaim et al. (1995b) investigated the pattern of lipid alteration among Saudi diabetic patients. The results showed that of a total of 318 Saudi adult diabetic patients, 43% were dyslipidemic with an equal distribution of dyslipidemic patients with respect to type of dyslipidemia, i.e. combined hyperlipidemia, hypercholoesterolemia and hypertriglyceridemia. There was a higher percentage of dyslipidemic female patients, compared to males. This predominance continued when important risk factors were considered, such as obesity, poor glycemic control, and duration and therapy of diabetes mellitus. The researchers concluded that there is a lack of awareness and treatment of dyslipidemic diabetic patients among practicing physicians. They recommended periodic screening and early therapy for dyslipidemia among diabetic patients in Saudi Arabia.

**CANCER**

Cancer in Saudi Arabia is an increasing problem caused by changes in food consumption patterns, lifestyles, and an increase in longevity (Sabi, 1989). El-Akkad et al. (1986) should an increase in the incidence s of lung, breast, colon, and rectal cancer; and a decreased in esophagus cancer. The investigators relate these trends to the rapid pace of economic progress, industrialization, and affluency. The importance of diet and food consumption patterns and the etiology were studied by Amer (1982). The dietary variables were found to storgly correlate, geographically, with several types of cancer (Amer, 1982). Cancer of the breast, corpus uterus, and colon have been found to be highly associated with the total amount of protein and fat consumption, particularly meat and animal fat, while gastric cancers, and possibly head and neck cancers, have been related to malnutrition, especially the deficiency of vitamins (Amer, 1982;

Madani, 1988). Changing trends in gastric cancers have been attributed to changes in dietary patterns and asoicated lifestyles and practices (Amer, 1982). Many researchers (Rabadi, 1987; Koreich and Al-Kuhaymi, 1984; Saigh, 1995) indicated that gastrointestinal tract malignancy was the most common neoplasm in the Saudi Arabian population.

Breast cancer is the most common female malignancy (Rabadi, 1987; Stirling et al., 1979; Koreich and Al-Kuhaymo, 1984; Mahboubi, 1987; Saigh, 1995). Adopting a Western diet with high fat content may play a role in the high incidence of breast cancer (Lubin et al., 1981; Miller et al., 1978). The daily per capita consumption of fat has increased from 33.6 to 90.4 grams in Saudi Arabia during the years 1974 to 1989 (Madani, 1995a). All these studies were hospital based, thus, the results are not representative of a region or the country as a whole. A true incidence of cancer in Saudi Arabia cannot be known until a national population based cancer registry is established (Johson and Woodhouse, 1992; Mohboubi, 1987; Doll, 1984; Saigh, 1995). Fortunately, for patients admitted and for outpatients diagnosed on or after January 01, 1994, the National Cancer Registry under the Ministry of Health began collecting cancer data on the newly diagnosed incidences of cancer from all hospitals, clinics and laboratories throughout the Kingdom. The data collectd with enable health care providers through government support to provide concurrent cancer screening, detection and prevention programs as well as conducting cancer epidemiological and biostatistical studies. It has been estimated that about 80% of all cancers could be avoided if preventive measures involved primarily lifestyle modification, early detection and treatment (Ajarim, 1992; Madani, 1995b)

## CARDIOVASCULAR DISEASES

The incidences of cornonary artery disease (CAD) is rapidly increasing in Saudi ARabia, the contribution of hypercholesterolaemia as a risk factor for CAD is well established (Posner et al., 1993 Martin, 1986). Al-Nuaim et al.(1995a) indicated in their national survey that the prevalence of hypercholesterolemia for all male and female subjects were 9% and 11%, respectively. The prevalence of hypercholesterolemia increased with age, reaching a maximum (19%) at the 5th decades

for males and 12% and 16% at the 4th and 6th decades for females.

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. (1984, 1986) and Al-Jebrin et al. (1985) demonstrated that many Saudi Arabian dishes contain a high amount of saturated fatty acids and cholesterol, but low amounts of poly and monounsaturated fatty acids. Al-Khalifah (1993) analysed the chemical composition of ten common take away dishes from Saudi Arabia restaurants. The results showed that oleic, palmitic, linoleic and stearic acids were the predominant fatty acids. The polyunsaturated: monounsaturated: saturated fatty acid ratios, as well as the polyunsaturated : saturated fatty acid ratios, were generally not compatible with recommended values. Additionally, there is evidence that the level of plasma lipids in the Saudi population is elevated (Khoja et al., 1993; Inam et al., 1991).

Dietary modification is the logical and effective approach to lowering the prevalence of high serum chlesterol arterial disease (Madani et al., 1990). Al-Nozha et al. (1993) also reported an excess of sodium intake resulting in elevation of blood pressure. Khalid et al. (1994) indicated that hypertension was attributed significantly to the higher body mass index values. There is an urgent need to initiate targeted nutrition education programs to correct the dietary situation to that of a more physiologically normal life-style. Reduction of common sodium intake most probably will reduce the risk of genetically predisposed normotensives to develop hypertension with age (Al-Nozha et al., 1993). Tabe 2 shows age, number, and total plasma cholesterol for healthy Saudis of different studies.

The results of Khoja et al. (1993) and Sair et al. (1995) indicate that total cholesterol levels were found to be considerably lower than those of Western nations, however other plasma lipid levels of the healthy Saudi Arabian population are comparable with those of other populations.

Finally, as Saudi Arabia has undergone a very rapid socieconomic transition, there is a decreasing prevalence of breast-feeding along with a diminishing length of nursing period

TABLE 2.

Comparison of studies on plasma total cholesterol level in healthy Saudi population.

| Study | Age (Years) | Number | | Plasma total cholesterol | |
|---|---|---|---|---|---|
| | | Males | Females | Males | Females |
| El-Hazmi et al. (1982) | 20-29 | 578 | 226 | 115-231(a) mg/dl | 132-209 mg/dl |
| Khoja et al. (1993) | 20-60 | 1613 | 886 | 184.0±0.8(b) mg/dl | 177.8±1.1 mg/dl |
| Sair et al. (1995) | 18-34 | 128 | 32 | 183.6±1.4 mg/dl | 172.3±2.5 mg/dl |
| Al-Nuaim (1995a) | 15-95 | 2294 | 2254 | 4±1.5 mmol/l | 4.5±1.5 mmol/l |

a) The normal range (95%), mean ± 2 stander deviation.
b) Means ± stander error of means.

(Khashoggi, 1986; Madani et al., 1994b; Khashoggi et al., 1993). There is a need for campaigns to discourage the early use of food supplements and to encourage the maintenance of breast-feeding of infants up to two years of age. Other liquids and solid foods are to be given to the infants by the age of four to six months. In order to ensure the success of the campaigns, the practice of breast-feeding should be given by health personnel during the antenatal and post partum period, (Madani et al., 1994b).

## CONCLUSION

Rapid socioeconomic development has led to changes in life style and food consumption patterns. As a result, the affluent dietary disease have become major health problems in Saudi Arabia. Based on the available information, there is an urgent need to initiate nutrition education programmes to correct the dietary habits, food consumption patterns, and to strees a balanced diet. Epidemiological studies on factors associated with food habits as well as the link between dietary habits and chronic diseases are highly recommended.

## REFERENCES


Ajarim, D. S. (1992). Cancer at King Khalid University Hospital, Riyadh. Ann. Saudi Med. 12:76-82.

Al-Attas, O.S.; Laajam, M.A.; Khan, M.S.; Al-Drees, A.Z. (1990). Obesity and major metabolic indices in newly diagnosed Saudi diabetic patients. Trop. Geogr. Med. 42:140-145.

Al-Jebrin, A.; Sawaya, W.N.; Salji, J.P., Ayaz, M. ; Khalid, J.K.(1985). Chemical and nutritional quality of some Saudi Arabian dishes based on cereals and legumes. Ecol. Food Nut. 117:157-164.

Al-Khalifah, A. (1993). Chemical composition of selected take away dishes consumed in Saudi Arabia. Ecol. Food Nutr. 30:137-143.

Al-Nozha, M.M.; El-Shabrawy, M.; Karrar, A. A. (1993). Community based epidemiological study of hypertension in Riyadh Region. Journal Saudi Heart Association. 5:25-30.

Al-Nuaim, A.; Al-Rubeaan, K.; Al-Mazrou, Y.; Khoja. T.; Al-Attas, O.; Al-Daghari, N. (1995a). National chronic metabolic diseases survey, part I. Ministry of Health and King Saud University, Riyadh, Saudi Arabia.

Al-Nuaim, A.; Famuyiwa, O.; Greer, W. (1995b). Hyperlipidemia among Saudi diabetic patients-pattern and clinical characteristics. Ann. Saudi Med. 15:240-243.

Al-Rowais, N.A.; Alhaider, A.A.; Al Hassan, M.I.; Abou-Auda, H.S.; Jarallahm, J.S. (1993). A look at the diabetic patient compliance in Riyadh district. Saudi pharmaceutical Journal. 1:50-55.

Al-Shagrawi, R.A..; Al-Bader, A,; El-Hag, E.A. (1994). Factors effecting the prevalence of obesity among Saudi college female students. Emir. J. Agric. Sc. 6:227-236.

Al-Shammari, S.A.,; Khoja, T.A.; Kremli, M.; Al-Balla, S.R. (1994a). Low back pain and obesity in primary health care, Riydh, Saudi Arabia. Saudi Med. J. 15:223-226.

Al-Shammari, A.; Khoja, T.A.; Al-Maataouq, M.A.; Al-Nuaim, L. (1994b) High prevalence of clinical obesity among Saudi females: a prospective cross-sectional study in the Riyadh region. J. Trop. Med. Hygiene. 97:183-188.

Amer, M.H. (1982). Pattern of cancer in Saudi Arabia: A personal experience based on the management of 1000 patients. Part 1. King Faisal Specialist Hospital Medical Journal. 2:203-215.

Bacchus, R.A; Bell, J.L.; Madkour, M.M.; Kilshaws, B. (1982). The prevalence of diabetes mellitus in male 'Saudi Arabs. Diabetologia. 23:330-332.

Binhmed, T; Larbi, E. B.; Absood, G. (1991). Obesity in primary health care centres: a retrospective study. Ann. Saudi Med. 11:163-166.

Cochran, T.E.; Faqeera, F. (1992). Demographic data: Saudi obstetic patients. Saudi Med. J. 3:25-30.

Doll, R.(1984). Prevention of cancer: practical prospects. Ann. Acad. Med. 13:1192-1308.

El-Hazmi, M.A. (1990). Diabetes mellitus - present state of the art. Saudi Med. J. 11:10-17.

El-Hazmi, M.A.; Al-Faleh,F.Z.; Al-Mofleh I.A.; Wary, A.S.; (1982). Establishment of normal (References) ranges from biochemical parameters for healthy Saudi Arabs. Tropical and Geographical Med. 34: 323-332.

El-Hazmi, M.A.; Al-Swilem, A., Warsy, A.S.; Al-Sudiary, F.;Sulaimni, R.; Al-Swailem, A.; Al-Meshari, A. (1995). The prevalence of diabetes mellitus and impaired glucose tolerance in the population of Riyadh. Ann. Saudi Med. 15:598-601.

El-Hazmi, M.A. and Warsy, A.S. (1989). A comparative study of hyperglycemia in different regions of Saudi Arabia. Ann. Saudi Med. 19:434-437.

Famuyiwa, O.O.; Sulimani, R.A.; Laqajam, M.A.; Al-Jasser, S.J.; Mekki, M.O. (1992). Diabetes mellitus in Saudi Arabia: The clinical pattern and complications in 1,000 patients. Ann. Saudi Med. 12:140-151.

Fatani, H.H.; Mira S.A.; El-Zubeir, A.G. (1987). Prevalence of diabetes mellitus in rural Saudi Arabia. Diabetes Care. 10:180-187.

Fatani, H.H.; Mira, S.A.; El-Zubeir, A.G. (1989). The pattern of complications in Saudi Arabian diabetics. Ann. Saudi Med. 9:44-47.

Inam, S.; Cumberbatch, M.; Judzewitsch, R. (1991). Importance of cholesterol screening in Saudi Arabia. Saudi Med. J. 12:215-220.

Hamiltion, C.J.; Jaroudi, K.A.; Sieck, U.V. (1995). High prevalence of obesity in a Saudi infertility population. Ann. Saudi med. 15:344-346.

Harlan, Wr. (1993). Epidemiology of childhood obesity. A national perspective. Ann. New York Acad. Sciences. 699:1-5.

Jhonson, K.; Woodhouse, N.J. (1992). Thyroid cancer in Saudi Arabia. Saudi Med. J. 13:340-343.

Khalid, M.E.; Ali, M.E.; Ahmed, E.K.; El Karib, A.O. (1994). Pattern of blood pressures among high an low altitude residents of Southern Saudi Arabia. J. Hum. Hypertens. 8:755-769.

Khashoggi, R.; Madani, K.; Ghaznawi, H.; Ali, M. (1994). Socioeconomic factors affecting prevalence of obesity among adult females in Saudi Arabia. Ecol. Food Nut. 31:277-283.

Khoja, S.M.,; Salem, A.M.; Taha, A.M.; Hakim, N.A. (1993). Plasma lipid levels of a selected Saudi Arabian population in the Western Region. Saudi Med. J. 14:315-321.

Khwaja, S.S; Al-Sibai, H. (1987). The relationship of age and parity to obesity in Saudi female patients. Saudi Med. J. 8:35-39.

Koreich, O.M.; Al-Kuhaymi, R. (1984) Cancer in Saudi Arabia: Riyadh, Al-Kharj (1984). Hospital Programme experience. Saudi Med. J. 5:217-23.

Libin, J.H.; Burns, P.E.; Blot, W.J.; Ziegler, R.G.; Lees, A.W.; Framumeni, J. F. (1981). Deitary factors and breast cancer risk. Int. J. Cancer, 28:685-689.

Madani, K.A. (1988). Role of vitamin A in cellular differentiation. International Clinical Nutrition Review. 9:75-80.

Madani, K.A. (1995a). Food Consumption Patterns in Saudi Arabia. In: Food Consumpton Patterns and Dietary Habits in the Arab Countries of the Gulf. Masaiger, A.O. and Miladi, S.S. (eds.) FAO regional Office for the Near East. pp 50-58.

Madani, K.A. (1995b). Mechanisms for vitamin A in cancer prevention and possible therapy. Malaysian oil Science and Technology. 4:102:106.

Madani, K.A.; El-Zein, S.M.; Gamal Eldin, H.A. (1990). Lovastatin and myalgia: a case report. Jordan Med. J. 24:105-108.

Madani, K.A.; Nasrat, H.A.; Al-Nowaisser, A.A.; Khashoggi, R.H.; Abalkhail, B.A. (1995). Low birth weight in Taif Region, Saudi Arabia. Eastern Mediterranean Health Journal. 1:47-54.

Mahboubi, E. (1987). Epidemiology of cancer in Saudi Arabia. Ann. Saudi Med. 7:265-267.

Martin, M.J.; Hulley, S.B.; Browner, W.S.; Kuller, L.H.; Wentworth, D (1986). Serum cholesterol, blood pressure and mortality; implications from a cohort of 36,1662 men. Lancet. 11;933-936.

Miller, A.B.; Kelly, A.; Choi, N.W.; Mathews, V.; Morgan, R.W.; Munan, L; Burch, J.D.; Feather, J.; How, G.R.; Jain, M. (1987). A study of diet and breast cancer. Am. J. Epidemiol. 107:499-509.

Musaiger, A.O. (1987). The state of food and nutrition in the Arabian Gulf Countries. Wld. Rev. Nutr. 54:105-173.

Rabani, S.J. (1987). Cancer at Dhahran health center, Saudi Arabia. Ann Saudi Med. 7:288-293.

Ponser, B.M.; Cupples, L.A.; Franz, M.M.; Gagnon, D.R. (1993). Diet and heart disease risk factors in adult American men and woemn: The Framingham offspring spouse nutrition studies. International j. Epidemiology. 22:1014-1025.

Rimm, I.J.; Rimm, A.A. (1976). Association between juvenile obesity and severe adult obesity in 73,532 women. Am. J. Public Health. 66:479-481.

Sair, M.M.; Al-Zahrani, H.A.; Omer, M.N. (1995). Plasma lipid profile of healthy Saudi population in Makkah Region. Saudi Heart J. 6:41-47.

Saudi Arabia Food Balance Sheets (1987-1989). Dept. of Economic Studies &Statistics, Ministry of Agriculture and Water, Riyadh, Saudi Arabia, 73-78.

Sawaya, W.N.; Al-Jebrin, A.; Salije, J.P.; Ayaz, M.; Khalid, J.K.(1986). Nutritional evaluation of selected meat-based Saudi Arabian dishs. Ecol. Food Nutr. 18:171-182.

Sawaya, W.N.; Khalid, J.K.; Khatchadourian, A.; Al-Mohamed, M.M. (1984). Nutritional evaluation of various breads consumed in Saudi Arabia. Nutr. Rep. Int. 29:1161-1170.

Sebai, Z.A. (1987). Diabetes mellitus in Saudi Arabia. Post Grad. Doc. 10:582-586.

Sabai, Z.A. (1989). Cancer in Saudi Arabia. Ann. Saudi Med. 9:55-53.

Stirling, G., Khali, A.M.; Nada, G.N. (1989). Malignant neoplasms in Saudi Arabia. Cancer. 1:89-94.

WHO. (1989). Clinical disorders arising from dietary affluence in countries of the Eastern Mediterranean Region. Situation analysis and guidelines for control. EMRO. Tech. Pub. No. 14, Alexandria, Egypt.

# TRENDS IN DIET-RELATED CHRONIC DISEASES IN UNITED ARAB EMIRATES

ABDULRAHMAN O. MUSAIGER

Department of Food Sciences and Nutrition, Faculty of Agricultural Sciences, UAE University, Al-Ain, U.A.E.

## INTRODUCTION

The epidemiological transition phenomenon has been well identified in many Middle East Countries including the United Arab Emirates. Economic Development and improved health care have played an important role in increasing in life expectancy. Lifestyle changes have also occurred and accidents and chronic diseases have become more common. In the United Arab Emirates, the leading causes of death are cardiovascular diseases (20%), accidents and injuries (15%), cancer (5.5%) and congenital anomalies (5.3%) (MOH, 1993). There has been no clear strategy to prevent these diseases in the UAE community. This is mainly due to lack of reliable information on the magnitude of chronic diseases incidence as well as absence of epidemiological community-based studies.

## CARDIOVASCULAR DISEASES (CVD)

Data on morbidity from CVD in UAE is scarce and inconsistent. The only information available is that related to numbers of patients attending primary health care centers (PHC). These data revealed that 40 and 1.9 per 1000 population had morbidity due to hypertensive disease and ischaemic heart disease, respectively (MOH, 1993). It is not clear whether these figures reflect the total number of attendances at PHC or the number of new cases. The rate provided by Ministry of Health for hypertension disease is relatively high when compared to other Middle East countries (Alwan, 1993). The morbidity due to hypertensive diseases was more common among females in UAE citizens, whereas it was higher among males in non-UAE citizens. This may be attributed to high percentage of male expatriates in UAE compared to female (ratio is 3:1).

TABLE 1

Distribution of CVD deaths in UAE by types during 1989-1992

| Causes of death | 1989 | | 1990 | | 1991 | | 1992 | |
|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % |
| Acute Myocardial Infarction | 198 | 37.8 | 208 | 35.3 | 255 | 31.0 | 309 | 36.9 |
| Cerebrovascular Disease | 102 | 19.5 | 120 | 20.3 | 214 | 26.0 | 205 | 24.5 |
| Ischaemic Heart Disease | 89 | 17.0 | 123 | 20.8 | 204 | 24.8 | 151 | 18.0 |
| Hypertensive Disease | 75 | 14.3 | 70 | 11.9 | 68 | 8.3 | 100 | 11.9 |
| Chronic Rheumatic Heart Disease | 37 | 7.1 | 52 | 8.8 | 52 | 6.3 | 48 | 5.7 |
| Artherosclerosis | 23 | 4.4 | 15 | 2.5 | 29 | 3.5 | 24 | 2.9 |
| Other CVD | 0 | 0.0 | 2 | 0.3 | 1 | 0.1 | 0 | 0.0 |
| Total | | | | | | | | |

Source : Ministry of Health (1993)

TABLE 2

Distribution of CVD deaths in UAE among males by type and nationality (1992)

| Type of CVD | UAE | | Non-UAE | | Total | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Rheumatic Heart Disease | 5 | 2.3 | 33 | 15.4 | 38 | 17.8 |
| Hypertensive Disease | 27 | 12.6 | 31 | 8.1 | 58 | 9.7 |
| Ischaemic Heart Disease | 37 | 17.3 | 76 | 19.7 | 113 | 18.9 |
| Acute Myocardial Infarction | 67 | 31.3 | 161 | 41.8 | 228 | 38.1 |
| Cerebrovascular Disease | 71 | 33.2 | 76 | 19.7 | 147 | 24.5 |
| Artherosclerosis | 7 | 3.3 | 8 | 2.1 | 15 | 2.5 |
| Total | 214 | 100.0 | 385 | 100.0 | 599 | 100.0 |

Source : Ministry of Health (1993)

Death registration in UAE has improved remarkably during the past 5 years and therefore, more information on CVD mortality has become available. Acute myocardial infarction (AMI) is the main type of CVD leading to death in UAE (37%), followed by cerebrovascular disease (24.5%) and ischaemic heart disease (18%) (Table 1). No significant differences were reported between males and females in death due to various types of CVD except for rheumatic heart disease and hypertensive disease. Deaths due to rheumatic heart disease occurred more in males (17.8%) than females (6.6%). In contrast, deaths due hypertensive disease occurred more in females than males (17.6% and 9.7%, respectively). The proportions of deaths due to several types of CVD indicated no difference between Emirates and non-Emirati females, whereas the Emirati males were more susceptible to deaths due to cerebrovascular and hypertensive diseases. The non-Emirati males were more likely to die due to acute myocardial infarction and rheumatic heart disease (Tables 2 and 3).

There is no obvious explanation for the difference in CVD between Emirates and non-Emirates. It could be related to different age and sex distribution. The non-Emirates living in UAE are composed of many nationalities each with various ethnic groups and this could make any explanation a difficult task. WHO (1990) reported that there are sharp contrasts among countries or among social or ethnic groups within a country and these special or environmental conditions can well place a population at risk for CVD.

The distribution of CVD deaths by age and sex is presented in Table 4. By age 15-44 years, 25% of males died due to CVD compared to only 9% females. At age 45-59 years, the death rate increased to 36% in males and 15% in females. No significant increase in death has been found in males aged above 59 years, but among females the rate increase dramatically to reach 70%. It is well documented that the incidence of CVD increase with age, and men have higher rates than women. Some reports show that an increase in the incidence of CVD has been observed in post-menopausal women (Isles and Holes, 1992).

Geographically, the distribution of common CVD deaths by sex is similar throughout the main areas in UAE. Exceptions are Umm Al-Qwain and Fujairah where the deaths due to CVD were

higher among women compared to other geographical areas. Numbers are small but these two areas are mostly rural and are inhabited by more UAE citizens than in other ares.

## DIABETES MELLITUS

The incidence of diabetes mellitus in UAE is increasing, and makes a high demand on the existing health services. Diabetic patients occupied 8% of available day-bed units in Al Ain Hospital and the average stay of a diabetic was 14.6 days (Omar et al., 1985). The Ministry of Health (MOH, 1993) reported that 3.5% of deaths in 1992 in UAE were due to diabetes mellitus. About 55% of deaths due to diabetes were among citizens, and the rest among non-citizens. Omar et al. (1985) found that 41% of hospitalized diabetics were nationals, while the rest were expatriates. Most of the nationals were females (62%), but the expatriates showed a greater proportion of males (67%). Type II diabetes mellitus featured predominantly (71.7%) in the national group, but was only 57% for non-nationals. The remaining patients in each group were type I diabetes mellitus.

A recent study on the nutritional status of Emirati women aged 20-60 years showed that 17.1% of these women had a history of diabetes (Musaiger and Hanaya, unpublished). This figure is higher than that reported in other Middle Eastern countries (King and Alwan 1992), and indicates that diabetes in the UAE is a major public health problem among women, especially after 45 years of age.

## HYPERTENSION

It is well documented that hypertension is one of the major risk factors for CVD (NDC, 1991). The statistics of the Ministry of Health (1993) showed that deaths due to hypertensive disease occurred more among men aged over than 59 years (86%), while 50% of women died due to this disease at age 45-59 years, and 32% at age over than 59 years. Musaiger and Hanaya (unpublished) found that the prevalence of hypertension among Emirati women aged 20-80 years was high (20%), and may be the highest in the region. Alwan (1993) reported that the prevalence rates of hypertension in Eastern Mediterranean Region have been found to range from 10% to over 17% of the adult population. The

prevalence of hypertension in this region appears to parallel affluence. In many of the countries in the region, including the UAE, the present epidemiological and clinical patterns of hypertension do not appear to differ markedly from those in Western countries.

## CANCER

The distribution of deaths due to various types of cancer in the UAE during 1989-1992 is presented in Table 5. The most common cancer which led to death was cancer of the digestive organs and peritoneum (29.2%), followed by cancer of trachea, bronchus and lung (24.1%). Female breast cancer represented 9% of total cancer deaths during this period.

The reported deaths from cancer increased from 145 to 234 deaths during same period, an increase of 38%. This increase may be due to the improvement in diagnosis of cancer since health care has focused recently on early detecting of cancer and providing advanced treatment. The proportion of deaths from cancer of digestive organs and peritoneum decreased significantly in 1992 compared to previous years. While the proportion of deaths due to cancer of trachea, bronchus and lung decreased by 6% each year the percentages of deaths from other types of cancer rose steeply from 13.8% in 1989 to 45.3% in 1992. With the absence of data on causes of cancer in this country, it is difficult to explain these trends in cancer deaths.

Males were more susceptible to cancers of stomach and trachea, bronchus and lung than females. Breast and cervix uteri cancers accounted for 36% of deaths from cancer in females (Table 6). There was a slight decline in proportion of deaths due to stomach cancer among both males and females. However, the decline became more apparent in 1992, especially in females, where the percentage of decrease reached 14.3% during the period 1989-1992, compared to 10% in males. The rate differences between males and females in trachea, bronchus and lung cancer fluctuated from year to year, but the gap became clear in 1992 as 28% of deaths in males were due to this type of cancer compared to only 7% in females.

TABLE 3

Distribution of CVD deaths in UAE among females by type and nationality (1992)

| Type of CVD | UAE | | Non-UAE | | Total | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Rheumatic Heart Disease | 2 | 1.3 | 8 | 5.3 | 10 | 6.6 |
| Hypertensive Disease | 29 | 19.1 | 13 | 15.1 | 42 | 17.6 |
| Ischaemic Heart Disease | 23 | 15.1 | 15 | 17.4 | 38 | 16.0 |
| Acute Myocardial Infarction | 53 | 34.9 | 28 | 32.6 | 81 | 34.0 |
| Cerebrovascular Disease | 38 | 25.0 | 20 | 23.3 | 58 | 24.4 |
| Artherosclerosis | 7 | 4.6 | 2 | 2.3 | 9 | 3.8 |
| Total | 152 | 100.0 | 86 | 100.0 | 238 | 100.0 |

Source : Ministry of Health (1993)

TABLE 4

Distribution of common CVD deaths in UAE by age and sex for 1992 (only death records include age)

| Age (Years) | SEX | | | | Total | |
|---|---|---|---|---|---|---|
| | Male | | Female | | | |
| | No. | % | No. | % | No. | % |
| 0 - 1 | 3 | 0.7 | 5 | 3.0 | 8 | 1.4 |
| 1 - 4 | 0 | 0.0 | 2 | 1.2 | 2 | 0.3 |
| 5 - 14 | 4 | 1.0 | 2 | 1.2 | 6 | 1.0 |
| 15 - 44 | 107 | 25.1 | 15 | 9.0 | 122 | 20.6 |
| 45 - 59 | 154 | 36.0 | 25 | 15.1 | 179 | 30.2 |
| > 60 | 159 | 37.2 | 117 | 70.5 | 276 | 46.5 |
| Total 427 | 100.0 | 166 | 100.0 | 593 | 100.0 | |

Source : Ministry of Health (1993)

TABLE 5
Distribution of deaths due to various types of cancer in the UAE during 1989-1992

| Cancer by Site | 1989 | | 1990 | | 1991 | | 1992 | | Total (1988-1992) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % | No. | % | No. | % |
| Digestive Organs & Peritoneum | 52 | 35.9 | 65 | 36.7 | 73 | 32.3 | 48 | 20.5 | 238 | 30.4 |
| Trachea, Bronchus & Lung | 52 | 35.9 | 53 | 29.9 | 55 | 24.3 | 44 | 18.8 | 204 | 26.1 |
| Female Breast | 11 | 7.2 | 15 | 8.5 | 19 | 8.4 | 24 | 10.3 | 69 | 8.8 |
| Cervix Uteri | 10 | 6.9 | 9 | 5.1 | 12 | 5.3 | 12 | 5.1 | 43 | 5.5 |
| Other Malignant Neoplasms | 20 | 13.8 | 35 | 19.8 | 67 | 29.6 | 106 | 45.3 | 228 | 29.8 |
| Total | 145 | 100.0 | 177 | 100.0 | 226 | 100.0 | 234 | 100.0 | 782 | 100.0 |

Source : Ministry of Health (1993)

TABLE 6
Distribution of deaths from various types of cancer among males and females, 1989-1992

| Cancer by Site | 1989 | | 1990 | | 1991 | | 1992 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|
| | M % | F % | M % | F % | M % | F % | M % | F % | M % | F % |
| Malignant Neoplasm of Stomach | 28.6 | 24.1 | 24.6 | 18.8 | 23.9 | 13.1 | 18.2 | 9.8 | 23.4 | 15.2 |
| Malignant Neoplasm of Colon | 4.4 | 3.7 | 8.8 | 5.8 | 9.2 | 7.1 | 3.8 | 2.9 | 6. | 4.9 |
| Malignant Neoplasm of Rectum | 6.6 | 1.9 | 7.0 | 2.9 | 4.2 | 3.6 | 2.3 | 2.9 | 4.8 | 2.9 |
| Malignant Neoplasm of Trachea, Bronchus & Lung | 44.0 | 22.2 | 30.7 | 26.1 | 30.3 | 14.3 | 28.0 | 6.9 | 32.4 | 15.9 |
| Malignant Neoplasm of Female Breast | - | 20.4 | 1.8 | 18.8 | - | 22.6 | - | 23.5 | 0.4 | 21.7 |
| Malignant Neoplasm of Cervix Uteri | - | 18.5 | 0.0 | 13.0 | - | 14.3 | - | 11.8 | - | 13.9 |
| Other Malignant Neoplasm | 16.4 | 9.2 | 27.2 | 14.5 | 32.4 | 25.0 | 47.7 | 42.2 | 32.3 | 25.5 |
| % | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Total No. | (91) | (54) | (114) | (69) | (142) | (84) | (132) | (102) | (479) | (309) |

Source : Ministry of Health (1993)

One of the unique demographic phenomena in the UAE is that the proportion of expatriates exceeds the national population (3:1). These expatriates have come from all over the world, making a rare composition of nationalities. In addition, the majority of expatriates are in an active economic age group (20-50 years), and are dominated by males. These demographic characteristics have affected the disease patterns in the community. The health statistics, in consequence, show a significant difference between nationals and non-nationals in some types of diseases, such as infectious diseases, which are more prevalent among non-nationals (Ministry of Health, 1993). Data on cancer deaths indicate that the deaths due to stomach cancer was higher among Emirati (26.1%) than non-Emirati (14.3%). This can be partially attributed to the differences in dietary habits between these two groups. There was, however, no difference between Emirati and non-Emirati in deaths due to other types of cancer for the average of the four years (1988-1992) but there was some differences between these two groups in some types of cancer from year to year (Table 7).

Statistics on cancer deaths by age were only available for 1992, and the age was not registered in 20% of total cancer deaths. Based on available data, there was generally no significant difference between those aged less than 60 and those aged 60 years and over for most types of cancer. The proportion of breast cancer, however, was 25% among women aged less than 60 years and decreased to 16.1% among those aged over 60 years. This again may be due to early detection of this kind of cancer. However, the difference between these two age groups was more apparent for other types of cancer (54% and 61%, for those aged less than 60 years and those aged 60 years and over, respectively).

## FACTORS ASSOCIATED WITH DIET RELATED CHRONIC DISEASES

### Changes in Food Habits

Studies on food habits in the United Arab Emirates are limited. The department of Preventive Medicine (1995) reported that the food consumption patterns in UAE has become more varied. The intake of traditional foods has declined steeply while that of food rich in fat and refined sugars has increased dramatically. A study on food frequency intake of university girls in UAE showed a high

TABLE 7
Distribution of deaths from various types of cancer among UAE and non-UAE nationals, 1989-1992

| Cancer by Site | | 1989 | | 1990 | | 1991 | | 1992 | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | UAE % | Non-UAE % | UAE % | Non-UAE % | UAE % | Non-UAE % | UAE % | Non-UAE % | UAE % | Non-UAE % |
| Malignant Neoplasm of Stomach | | 28.7 | 24.6 | 27.6 | 16.5 | 27.2 | 13.8 | 22.0 | 8.0 | 26.1 | 14.3 |
| Malignant Neoplasm of Colon | | 3.7 | 4.6 | 3.1 | 13.0 | 9.7 | 7.3 | 2.8 | 4.0 | 4.9 | 7.0 |
| Malignant Neoplasm of Rectum | | 3.7 | 6.2 | 7.1 | 3.5 | 1.0 | 6.5 | 3.7 | 1.6 | 3.9 | 4.3 |
| Malignant Neoplasm of Trachea, Bronchus & Lung | | 33.8 | 38.5 | 27.6 | 30.6 | 25.2 | 23.6 | 17.4 | 20.0 | 25.4 | 26.4 |
| Malignant Neoplasm of Female Breast | | 6.3 | 9.2 | 7.1 | 9.4 | 3.9 | 12.2 | 11.0 | 9.6 | 7.1 | 10.3 |
| Malignant Neoplasm of Cervix Uteri | | 7.5 | 6.1 | 6.1 | 3.5 | 6.8 | 4.1 | 5.5 | 4.8 | 6.4 | 4.5 |
| Other Malignant Neoplasm | | 16.3 | 10.8 | 21.4 | 23.5 | 26.2 | 32.5 | 37.6 | 52.0 | 26.2 | 33.2 |
| | % | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| Total | No. | (80) | (65) | (98) | (85) | (103) | (123) | (109) | (125) | (390) | (398) |

Source : Ministry of Health (1993)

proportion of girls skipped morning and afternoon snack, and the intake of fresh vegetables and fruits was low. In general, the diet of these girls has become more westernized. This trend in food habits may contribute to some chronic diseases at latter stage of life (Musaiger and Radwan, 1995). A recent study in Bahrain (Al-Roomi et al, 1994) reported that patients with myocardial infarction tended to consume fresh vegetables and fruits less frequently per week than community controls.

Musaiger and Abuirmeileh (1996) studied the food consumption patterns of Emirati men and women over 20 years of age. They found that the intake of fresh fruits and vegetables is low. About 46% of men and 52% of men reported daily consumption of fruits, while the corresponding percentages for vegetables were 60% and 65% respectively. A high intake of food rich in dietary fiber such as fruits and vegetables is thought to reduce the risk of CVD through several mechanism, including lowering serum cholesterol (Sharpnel et al, 1992).

**Smoking**

Cigarette smoking is the most preventable cause of CVD morbidity and mortality. Smoking has been associated with a two to fourfold increased risk of coronary heart disease, a greater than 70% excess rate of death from coronary heart disease, and an elevated risk of sudden death (Lakier, 1992). Little attention has been given to studies on prevalence of smoking in UAE. In a preliminary study (unpublished) it was found that 9% of women aged 20-80 years were current smokers; however, 37% of these women were exposed to a smoking environment at home, making them passive smokers. Leone (1993) reported that both active and passive smoking seem to act negatively on the heart causing atherosclerotic coronary alterations, focal myocardial lesions and arrhythmias. Acute exposure to passive smoking impairs cardiac performance in healthy people and subjects who survived a first acute myocardial infarction.

A recent study (Bener, Gomes and Anderson, 1993) demonstrates that smoking is highly prevalent among physicians in the UAE, although the majority (91%) agreed that smoking was hazardous to health. Of 275 physicians studied, 36% were current smokers, and 12.7% were ex-smokers. This is a source of worry as

physicians should have good health behavior to be examples for others and anti-smoking campaigns should start with physicians.

**Hypercholesterolemia**

The relationship between elevated serum cholesterol and cardiovascular disease, especially CHD has been well documented in a number of studies, both within and between countries (La Rosa, 1992). A preliminary study in UAE showed that the prevalence of hypercholesterolemia varied from 47% to 53% in the Arab nationals in UAE and from 22.7% to 44.5% in the non-Arabs. There was no statistical difference in the distribution of cholesterol levels among Emirates and other nationalities which indicates that hyper-cholesterolemia is a problem in most nationalities living in the UAE. Overall, it affects nearly 50% of the adult population (Agarwal, et al. 1994).

**Overweight and Obesity**

Across the Emirati population, over recent years there has been a steady increase in food-energy consumption : a lack of physical exercise is also apparent (Musaiger, 1987). Overweight and obesity, therefore, have risen dramatically in UAE over the past decade. The recent data from National Nutrition Survey (1992) revealed that 33% of married women were overweight and 38% were obese, based on Body Mass Index criteria (Table 8). The prevalence of obesity increased rapidly with age, and reached its peak at age 30-39 years. The prevalence declined slightly at age 40 years and above (40.5%) (Musaiger, 1992).

The prevalence of obesity for married men was much less when compared with women. Of men studied, 40.3% were overweight, but only 15.8% were obese. The prevalence of overweight increased slightly with age. However, it fluctuated with age, it was 18.8% at age 20-29 years, decreased to 15.0% at age 30-39, then increased to 18.2% at age 40-49 years, and decreased again to 13.9% at age 50 years and over (Table 9). In general, the prevalence of obesity in UAE is similar to that reported in other Gulf countries (Al-Awadi and Amine, 1989; Musaiger and Al-Ansari, 1992), but it is higher than that reported in most Western countries for the same age group (Bray, 1990). Obesity is a major public health problem in the UAE community, and may play an

TABLE 8

Obesity among married women in the UAE y age (N = 927)

| Age (years) | | Underweight BMI < 20 % | Acceptable weight BMI 20-24.9 % | Overweight BMI 25-29.9 % | Obese BMI > 30 % | Total % |
|---|---|---|---|---|---|---|
| 17 - 19.9 | | 5.9 | 35.3 | 47.1 | 11.8 | 100.0 |
| 20 - 29.9 | | 6.7 | 34.6 | 31.7 | 26.9 | 100.0 |
| 30 - 39.9 | | 3.3 | 19.2 | 33.9 | 43.6 | 100.0 |
| > 40 | | 2.7 | 24.9 | 31.5 | 40.8 | 100.0 |
| Total | % | 3.9 | 25.0 | 32.8 | 38.3 | 100.0 |
| | No. | (36) | (232) | (304) | (355) | (927) |

Source : Ministry of Health (1993)

TABLE 9

Obesity among married men in the UAE y age (N = 799

| Age (years) | | Underweight BMI < 20 % | Acceptable weight BMI 20-24.9 % | Overweight BMI 25-29.9 % | Obese BMI > 30 % | Total % |
|---|---|---|---|---|---|---|
| 20 - 29.9 | | 7.8 | 37.5 | 35.9 | 18.8 | 100.0 |
| 30 - 39.9 | | 1.5 | 47.0 | 36.5 | 15.0 | 100.0 |
| 40 - 49.9 | | 3.1 | 34.7 | 44.0 | 18.2 | 100.0 |
| > 50 | | 4.5 | 40.6 | 41.0 | 13.9 | 100.0 |
| Total | % | 3.6 | 40.3 | 40.3 | 15.8 | 100.0 |
| | No. | (29) | (322) | (322) | (126) | (799) |

Source : Ministry of Health (1993)

important role in increasing the occurrence of other chronic diseases. It is debatable whether obesity is an independent risk factor for CVD, but it is associated with an increased prevalence of risk factors such as hypertension and diabetes. Overweight and obese subjects also tend to be less active and may have lower glucose tolerance (NDC, 1992).

## CONCLUSION

Diet related chronic diseases are the major cause of death among the adult population in UAE. Indicators from several small scale studies suggest that the standard international risk factors such as change in dietary habits, smoking, obesity and high blood cholesterol level are widely present in the UAE. It is essential, therefore, to conduct a community-based study to determine the prevalence of non-communicable diseases, and the risk factors involved. Such a study should not be done without a well designed plan and fully agreed coordination among several sectors especially involving the Ministry of Health and the UAE University.

## REFERENCES


Agarwal, M.M., P.F. Hughes, A.A. Haliga, P. Newman, M.M. Sheekh-Hussein and A.G. Shalabi. (1994). Relevance of cholesterol screening in UAE : A preliminary study. (Abstract), Workshop on Nutrition and Chronic Diseases in the Arab Middle East Countries, UAE University, Al Ain.

Al-Awadi, F. and E.K. Amine. (1989). Overweight and obesity in Kuwait. J. Royal Soc. Hlth. 109 : 175-177.

Al- Roomi, K., Musaiger, A.O. and Al-Awadi, A. (1994). Lifestyle patterns and the risk of acute myocardial infarction in a Gulf Arab population : a community-based case-control study. Int. J. Epid. 23, 931-939.

Alwan, A.A.S. (1993). Diseases of modern lifestyle : the need for action, Hlth. Serv. J. WHO/EMRO 1:7, 24-34.

Bener, A., J. Gomes and J.A.D. Anderson. (1993). Smoking habits among physicians in two Gulf countries. J. Roy. Soc. Hlth.

Bray, G.A. (1990). Obesity. In Brown, ML (editor). Present Knowledge in Nutrition. International Life Sciences Institute, Nutrition Foundation, Washington, D.C. 23-58.

Isles, C.G. and D.J. Hole. (1992). Changing trend in vascular disease : coronary risk factors today. In Lorimer A.R. and Schepherd J. (editors). Preventive Cardiology, Oxford, U.K., 1-29.

Department of Preventive Medicine (1994), Annual Report, 1992. Ministry of Health, Abu-Dhabi, UAE.

King, H. and Alwan, A. (1992). Diabetes in the Eastern Mediterranean Region. World Hlth. Statistics Quarterly, 45:355-359.

Lakier, J.B. (1992). Smoking and cardiovascular disease. Am. J. Med. 93 (1A) : 85-125.

La-Rosa J.C. (1992). Cholesterol and cardiovascular disease: how strong is the evidence ? Clinical Cardiology 15 : 1112-1117.

Leone, A. (1993). Cardiovascular damage from smoking : a fact or belief? Int. J. Cardio., 38 113-117.

Ministry of Health, MOH. (1993). Annual Report, 1992. Department of Preventive Medicine, Abu Dhabi.

Musaiger, A.O. (1987). The state of food and nutrition in the Arabian Gulf countries. Wld. Rev. Nutr. Diet 54:105-173.

Musaiger, A.O. (1992). The State of Food, Nutrition and Health in UAE. Ministry of Health, Department of Preventive Medicine, Abu Dhabi, UAE.

Musaiger, A.O. and M. Al-Ansari. (1994). Factors associated with obesity among women in Bahrain. Int. Quart. Comm. Hlth. Educ. 12:129-136.

Musaiger, A.O. and Radwan, H. (1995). Food frequency intake of university femal students in United Arab Emirates. In Musaiger, A.O. and Miladi, S. (editors) Food consumption

Patterns and Dietary Habits in the Arab Counties of the Gulf. FAO/Cairo, Egypt.

Musaiger, A.O. and Abuirmeileh, N. (1996). Food Consumption patterns of adult population in United Arab Emirates (In Press).

National Dairy Council (1991). Coronary Heart Disease - I. London, U.K.

Omar, A., K. Elsir, M. Muneer, M. Hamed, D.H. Nazeela, T.K. Moideen, et al. (1985). Diabetes mellitus in Al-Ain : the impact of hospital services. Emirates Med. J. 3 : 119-122.

Sharpnel, W. S. et al (1992) Diet and Coronary heart disease. Med. J. Aust. 156 (Supplement).

WHO. (1990). Diet, Nutrition and the Prevention of Chronic Diseases. Technical Report Series 797, Geneva.

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