

Risk factors of major noncommunicable diseases in Bahrain

The need for a surveillance system

Randah R. Hamadeh, MSc, D Phil (Oxon).

ABSTRACT

Noncommunicable diseases (NCDs) are the major cause of morbidity and mortality in Bahrain. The review examines the prevalence of risk factors of major NCDs from the available literature and determines the impact of the rapid socio economic changes on their burden. It further recommends ways of improving their reporting and monitoring. Smoking, obesity, diabetes, hypertension, hyperlipidemia, physical activity and nutrition are considered. The review points out that data on some of the factors is available but deficient for others. The call for the establishment of an integrated surveillance system using the World Health Organization STEPwise approach is stressed.

Saudi Med J 2004; Vol. 25 (9): 1147-1152

The population of Bahrain according to the 2001 census was 650,604 of whom 62.4% are Bahraini nationals. The Bahraini population is predominantly young where those aged 14 years or younger constitute 36.5%. The majority of the non-Bahraini are in the age group 25-49 years (46.1%) and they are mostly Asian particularly from the Indian Subcontinent.¹ The total population of Bahrain has been increasing, with an average annual growth rate of 2.7% in the 1990s, lower than that of the 1980s (3.6%). The corresponding rates for the Bahraini population were 2.5% in the 1990s and 2.9% in the 1980s.¹ Economic development has followed the discovery of oil and became more pronounced in the 1970s making Bahrain a center for commercial and financial activities. This development has resulted in rapid socio demographic changes in the Bahraini population particularly in education and labor force participation of females (**Table 1**). The country has

also changed in terms of diet and lifestyle that resulted from this economic progress. Major advances in the healthcare system paralleled these economic and socio demographic changes. Health services are provided free to all residents by the government at 21 health care centers, 2 general hospitals, one psychiatric hospital and one geriatric hospital. In addition, the Public Health Directorate (PHD) provides the main preventive health services in the country. The private sector contributes to the provision of health services through several private clinics and hospitals that have been recently on the increase. The country has witnessed an epidemiological transition where noncommunicable diseases (NCDs) have become the leading causes of mortality and morbidity and communicable diseases have become less important.² Circulatory diseases, neoplasms, endocrine, nutritional and metabolic disorders, and injuries are the leading causes of death (**Figure 1**). Circulatory diseases and neoplasms

From the Department of Family and Community Medicine, College of Medicine and Medical Sciences, Arabian Gulf University, Manama, Bahrain.

Address correspondence and reprint request to: Dr. Randah R. Hamadeh, Associate Professor, Department of Family and Community Medicine, College of Medicine and Medical Sciences, Arabian Gulf University, PO Box 22979, Manama, Bahrain. Tel. +973 17 239710. Fax. +973 17 271090. E-mail: randah@agu.edu.bh

Table 1 - Socio demographic changes in the adult Bahraini population by gender, 1981, 1991 and 2001.

Education and labor force participation	Male	Female
Literacy rate (%) *		
1981	74.8	51.9
1991	86.7	71.3
2001	92.5	83
% change	23.7	59.9
% with secondary school education†		
1981	22.2	15.9
1991	38.1	31.8
2001	47.9	46.8
% change	115.8	194.3
Labor force participation†		
1981	77.8	14.3
1991	80.9	18.7
2001	74.2	25.8
% change	- 4.6	80.4

* - ≥15 years, † 15-65 years.

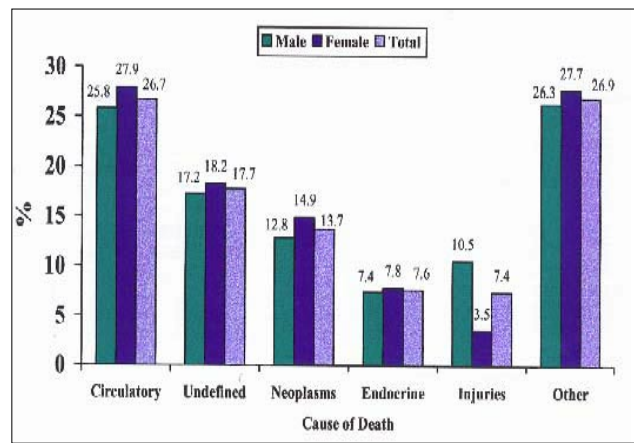


Figure 1 - Main causes of death among the Bahraini population, 2000.

account to 11.8% of the discharges from Salmaniya Medical Complex, the main general hospital in the country.² The latest reported death rates for these conditions are 86.3 per 100,000 for the circulatory diseases and 36.9 per 100,000 for neoplasms.² Recently, more attention has been given to an integrated approach to the surveillance of NCD risk factors and in examining their burden.^{3,4} The World Health Organization (WHO) is moving from surveys to surveillance of NCD risk factors and is pursuing surveillance as a global strategy in the prevention and control efforts of NCDs.⁵ This review aims at examining the prevalence of risk factors of major NCDs from available sources of data and determining the impact of the rapid socioeconomic and lifestyle changes on their burden. It further aims to recommend ways of improving the reporting and monitoring of NCD risk factors. The examined risk factors are limited to those common to major NCDs; smoking, nutrition, physical inactivity, obesity, raised blood glucose and blood lipids.⁶ The review excludes alcohol drinking due to the lack of prevalence data and the non-Bahraini population for its transient nature.

Smoking. Table 2 shows the prevalence of smoking among the Bahraini general population during 1981, 1991 and 2001. The 1981 data is based on a national morbidity survey (NMS) that was carried out on 4.5% of the households in Bahrain⁷ while the 1991 and 2001 are based on the census of the respective year.^{1,8} The definition of a smoker was restricted to daily smokers in the census data and to daily and occasional smokers in the NMS. However, only daily smokers from the NMS were included in Table 2 to allow comparisons. The prevalence of all types of smoking in males has declined in the 1980s reaching 17.6% for all types of tobacco, 16.4% for cigarettes and 1.2% for other types of tobacco in 2001. The decline was sharper in

the last decade compared to that of the previous one. As for females, the prevalence of smoking slightly increased for cigarette smoking but decreased for smoking other types of tobacco and all types of tobacco combined. The prevalence of cigarette smoking in females has risen to 0.7% in 2001 compared to 0.3% in 1981 and 0.6% in 1991. Other tobacco smoking, almost exclusively waterpipe, has dropped to 2.8%, and total smoking to 3.5% in 2001. This rise in cigarette smoking in the last 20 years among females, although small and not alarming, should be monitored and prevented from any further increase. In addition, the increase, most probably is underestimated as reporting of smoking, was by proxy and the interviewee was the head of household in most of the instances. Heads of households would not favor reporting cigarette smoking by female members, as it is not socially acceptable for females to smoke. Moreover, occasional or non-daily smoking was not examined in the census data, although 0.3% and 4.3% of the females were occasional cigarette and waterpipe smokers in 1981.⁷ The increase in cigarette smoking among women aged 30-39, the age women are most likely to have been married, could have resulted from the fact that social values are less strict to smoking by married women and although it is socially unfavorable for all women to smoke cigarettes, it is less stringent for the married ones.

Smoking by age group indicated a rise in cigarette smoking among young boys (15-19 years). This rise should not be dismissed without concern particularly that the prevalence of smoking among high school boys has also increased (Table 3) from 14.8% in the early 1980s to 21.4% in the late 1980s, and to 25.8% in the mid 1990s.⁹⁻¹¹

A matter of further concern to health providers, educators, and all those involved in smoking control in the country, is smoking among health

professionals. The fact that a quarter of male medical students and male physicians smoke^{12,13} is distressing as the exemplars and role models in society and those mostly aware of the health hazards to tobacco smoking, disregard the evidence and continue to smoke despite their knowledge of its dangers (Table 3). Another reason for worry is the fact that smoking among male physicians has almost remained unchanged within 6 years.^{12,14}

It is timely for the governmental and non-governmental organizations that combat tobacco smoking in the country to review the antismoking efforts and evaluate their programs and activities in light of these findings, as smoking is the risk factor with highest priority for its major contribution to premature mortality.

Obesity. Several studies have examined the prevalence of overweight and obesity in Bahrain among the adult population using body mass index.¹⁵⁻¹⁷ These studies however did not use similar age categories, thus, making comparisons difficult. Yet, all these studies have shown that overweight and obesity are a major health problem among Bahraini nationals. Al-Mannai et al¹⁷ have shown that 26.3% of adult (20-65-years) males are overweight (BMI=25-29.9) and 16% are obese (≥ 30) compared to 29.4% (overweight) and 31.4% (obese) of adult females.¹⁷ Obesity is more common among Bahraini women than Bahraini men while overweight is generally more prevalent among men than women (Table 4). The prevalence of obesity among women (48.7%) aged 30-79-years is more than double that of men (21.2%) while approximately one third of both gender are overweight.¹⁵ The prevalence of obesity among women in the 30-79 years age group ranges between 46.9% and 52.5% while that of men from 12.5-33.9% where younger men are more obese than the older ones (Table 4). Men in their fourth decade have the highest proportion of overweight where almost half of them are obese.¹⁵ The high prevalence of overweight among men in the forties is also reported by Al-Mahroos and Al-Roomi¹⁶ where 41.6% of those aged 40-44-years are overweight. Studies have also shown that overweight and obesity are also common among secondary school students.¹⁸ Of the secondary school students aged 15-21 years, 15.6% of the boys and 17.4% of the girls were reported as either overweight or obese (BMI ≥ 25).

It is apparent that obesity is a major health problem in the Bahraini population. The high prevalence of obesity in Bahrain has resulted from the affluence of the society, which has followed the oil boom.¹⁹ The association of obesity with other NCD risk factors has been reported in studies in Bahrain. Physical inactivity, long hours of television watching, frequency of fruit intake and diabetes

Table 2 - Prevalence of daily smoking in 1981, 1991 and 2001 by gender and type.

Type of tobacco	Male			Female		
	1981	1991	2001	1981	1991	2001
Year N	3,537	95,766	128,971	3,548	95,454	128,490
All types						
Prevalence	22.1	21.9	17.6	4.7	6.9	3.5
AD in P	-0.2		-4.3	2.2		-3.4
95% CI	0.0, 1.6		4.0, 4.6	1.3, 3.1		3.2, 3.6
Change (%)	-0.9		-19.6	46.8		-49.3
Cigarettes						
Prevalence	21.5	20.3	16.4	0.3	0.6	0.7
AD in P	-1.2		-3.8	0.3		0.1
95% CI	0.2, 2.5		3.6, 4.0	0.1, 0.6		0.0, 0.2
Change (%)	-5.6		-18.7	100.0		16.7
Other tobacco						
Prevalence	1.5	1.6	1.2	4.5	6.3	2.8
AD in P	0.1		0.4	1.8		-3.5
95% CI	0.0, 0.5		0.3, 0.5	1.0, 2.6		3.3, 3.7
Change (%)	6.7		-25.0	40.0		-55.5

AD in P - absolute difference in prevalence
CI - confidence interval lower limit is given as 0.0 since a negative proportion is not meaningful

Table 3 - Prevalence of smoking in different Bahraini population groups.

Study period	Study population	Prevalence (%)			Refs
		Male	Female		
2000	Physicians	23.8 ^a	1.3 ^a	12	
		9.7 ^b	3.1 ^b		
1994	Primary health care physicians	22.7 ^c	6.3 ^c	14	
1992	Medical students	25.0 ^c	0.0 ^c	13	
1996	Secondary school students	25.8 ^c	-	9	
1989	Secondary school students	21.4 ^c	-	10	
1982	Secondary school students	14.8 ^c	-	11	

a - cigarettes, b - waterpipe, c - all types

Table 4 - Prevalence of overweight and obesity, Bahraini population.

N	Age in Years	Prevalence			
		Overweight (BMI 25-29.9)		Obesity (BMI ≥ 30)	
		Male	Female	Male	Female
(514) ¹⁵	30 - 39	33.9	24.5	33.9	46.9
	40 - 49	47.8	37.4	18.8	47.4
	50 - 59	37.4	29.5	24.7	52.5
	≥ 60	32.5	29.4	12.5	47.1
	Total	35.2	31.0	21.2	48.7
(2,128) ¹⁶	40 - 44	41.6	-	28.6	-
	45 - 49	39.6	-	27.2	-
	50 - 54	35.7	30.7	22.6	40.7
	55 - 59	42.9	36.4	20.8	30.8
	60 - 64	-	32.1	-	32.5
	65 - 69	-	32.2	-	25.0
	Total	39.9	32.7	25.3	33.2
(290) ¹⁷	20 - 65	26.3	29.4	16.0	31.4
(825) ¹⁸	15 - 21	15.6	17.4	-	-

BMI - body mass index

Table 5 - Prevalence of diabetes and hypertension in the Bahraini population aged 40-69-years-old.

Population	Prevalence of Diabetes * (%)				Prevalence of Hypertension † (%)	
	Diabetes		Glucose Intolerance		Male	Female
	Male	Female	Male	Female		
40-49 years	22.9	-	16.6	-	20.8	-
50-59 years	29.6	35.4	15.8	19.4	29.8	32.6
60-69 years	-	37.6	-	22.4	-	43

* Diabetes was defined based on World Health Organization criteria
† Hypertension was defined as anyone on current treatment for hypertension, systolic blood pressure ≥ 160 mmHg or diastolic blood pressure ≥ 95 mm Hg

were reported to be significantly associated with obesity.^{16,17,19,20} It was also reported that the risk of obesity is greater in those with higher education, currently married and those with higher income.^{16,19} Obesity is a modifiable NCD risk factor that the authorities in the PHD and primary health care need to give more attention to. Health education programs, school education in particular, should continue to promote healthy lifestyle and raise public awareness on the unfavorable effects of westernized diets and the healthy aspects of traditional Bahraini food.

Diabetes. Age standardized prevalence of diabetes is 30% among the Bahraini population of both sexes combined, 25% in men and 36% in women, as reported by a recent study.²¹ The population of men included in this study was in the age group 40-59-years and that of women 50-69-years-old. Women aged 60-69 had the highest prevalence of diabetes (37%) among the study population (Table 5). The study also reported the prevalence of impaired glucose tolerance (IGT) in Bahraini women aged 50-59-years (19.4%) and 60-69-years (22.4%) and that of Bahraini men aged 40-49-years (16.6%) and 50-59-years-old (15.8%).²¹ Zurba and Al Garf²² also used the WHO criteria to estimate the prevalence rates of diabetes among the Bahraini adult population. They noted a prevalence of 26.4% in males and 25% in females aged 20 years and over.²² Other studies that reported the prevalence of diabetes in Bahrain used self-reporting and gave lower rates.^{23,24} The risk of diabetes was found to be significantly associated with obesity (odds ratio=1.83, 95% confidence interval: 1.48-4.15) in Bahrain.²⁵ Other factors such as physical inactivity, alteration of food habits and change of social conditions were noted to have caused the high prevalence of diabetes among the Bahraini population.²⁶

Hypertension. Available data on the prevalence of hypertension shows that it is slightly higher in

females aged 50-59-year-old than their male counterparts (Table 5). Hypertension was defined as systolic blood pressure ≥ 160 mm Hg, diastolic pressure ≥ 95 mm Hg or being on current antihypertensive therapy in accordance with WHO criteria. Age and gender standardized prevalence of hypertension was higher in those with diabetes (38%, 95% CI: 34-42%) and impaired glucose tolerance (31%, 95% CI: 27-36%) than in those with normal glucose tolerance (21%, 95% CI: 19-24%).²⁷ Data based on self-reporting also indicated that women had a higher prevalence of hypertension than men. The prevalence of hypertension among adult women (≥ 15 -years) was 7.6% and that of adult men, 4.9%. In those aged 50 years and older, the prevalence of hypertension in women was almost double that in men. It increased by age in both men and women reaching the peak at 60-69-years (men 17.6%, women 28.9%).²³

Hyperlipidemia. Raised cholesterol is the risk factor with the least available data. Available information is limited to the studies by Al Mahroos and McKeigue,^{21,27} which examined its association with diabetes and hypertension. Diabetic men and women had significantly higher mean cholesterol and triglyceride levels than the non-diabetic ($p < 0.001$). A significant difference between total cholesterol and low density lipoprotein cholesterol levels among normotensive and hypertensive men aged 40-59-years was also noted. In women aged 50-69-years, low density lipoproteins cholesterol levels were significantly different ($p < 0.03$) by blood pressure level. Research is deficient in this area and there is an urgent need to establish baseline data.

Physical activity. The limited available data shows that Bahraini women are less physically active than Bahraini men in the general adult population and among physicians.^{16,24,28} Ninety three percent of women aged 50-59-years walk less than one km; 6% in 1-3 km and 1% in 4 km or more compared to one km in 68%; 1-3 km in 21% and 4 km in 11% in Bahraini men.¹⁶ Data on older women (60-69-years) and younger men (40-49-years) give similar results. A low prevalence of physical activity based on self-reporting in adult (30-79 years) men (12.7%) and women (8.3%) has been reported by Musaiger and Al-Roomi²⁴ in 1997. Adult men aged 30-49-years were twice more likely to have reported that they practiced exercise (19.9%) compared to women (9.9%) and the difference was less noted in those aged 50-59-years old (7.5% in men, 6.3% in women). Forty four percent of the male primary health care physicians reported practicing exercise (expending > 1000 kcal/wk at leisure time) compared to 18.2% of their female counterparts.²⁸ This consistent finding of lower physical activity among Bahraini women had been attributed to several social barriers like lack of time due to work and home responsibilities

including the care for children. Other socio cultural barriers such as lack of motivation, lack of encouragement by husband and family, beliefs and attitudes, discrimination against women were also stated. Environmental barriers due to unsuitable weather and the unavailability of women's clubs were also mentioned as factors preventing women from performing exercise.²⁹ Moreover, the association of physical inactivity and obesity among the Bahraini community had been highlighted in some studies and both risk factors pose a threat to the general health status of the Bahraini population, particularly women.¹⁶ Smokers were also reported to be slightly less physically active than nonsmokers, which suggest that preventive programs that aim at the modification of an NCD risk factor require consideration for other risk factors for such programs to be successful.³⁰

Nutrition. There has been a dramatic change in the nutritional habits of the Bahraini population following the oil boom. Consumption of traditional foods like fish, rice, vegetables and dates have declined and foods like eggs, chicken, canned foods and those high in fat and sugar have become popular. Consumption of red meat increased by 76% from the early 1970s to the 1980s. The transition in the diet from "traditional" to "western" underlies the increase in intake of saturated fatty acids and dietary cholesterol.³¹ The inadequate consumption of fruits and vegetables by the Bahraini population, at all life stages has been acknowledged in several reports.³² The low intake of nutrients among pregnant Bahraini women during all the trimesters of pregnancy³³ and the low intake of fruits and vegetables of adolescent girls³⁴ requires the attention of health professionals. Moreover, the lower vegetable and fruit intake of smokers compared to ex-smokers and nonsmokers implies that smoking cessation programs should include counseling on healthy eating habits.³⁰ A study on food composition of Bahraini foods and dishes concluded that the levels of cholesterol and saturated fatty acids are high. Unsaturated fatty acids were also found high in most of the examined foods.³⁵

It is evident from this review that NCDs constitute a health and economic burden in Bahrain. As the governmental health care services are free for all residents, the economic burden imposed on the government requires urgent action by the health authorities. Although, available census and survey data provide adequate information on some NCD risk factors, they are inadequate or deficient for others. This review indicates that available data on NCD risk factors is mostly on smoking and obesity. Existing data on smoking provides estimates of the prevalence of smoking in the general and specific populations and allows time trend assessment. Data on other NCD risk factors is lacking for some and

when available often suffers from not applying similar methodology and is restricted to specific age groups, thus, making monitoring and trend assessment of these risk factors difficult. Most of the surveys were planned without aiming to monitor the burden of several risk factors at one time, as they were generally the work of researchers of different interests. Moreover, most of these surveys were not usually planned for monitoring purposes and for use by decision makers in the formulation and evaluation of health policies and programs.

The implementation of the WHO STEPwise approach is vital for the surveillance of NCD risk factors in Bahrain.⁶ The steps approach to risk factor assessment is based on questionnaires (step 1), physical measurements (step 2) and biochemical analyses (step 3). There are 3 modules involved for describing the data; core, expanded core and optional. Some of the available studies have already assessed NCD risk factors at the various steps recommended by the WHO stepwise approach. Although surveys and censuses provide some of the information required by the steps approach, they cannot replace the proposed comprehensive surveillance system, as there are gaps and deficiencies in current data. However, census data could be used as part of smoking surveillance. Smoking had already been included in the past 2 censuses, 1991 and 2001 and intercensal estimates can be calculated. The implementation of an integrated approach to the surveillance of NCD risk factors would allow the use of surveys and other health information data in NCD prevention and control programs, the choice of appropriate health policies and the formulation of comprehensive health policies. Moreover, an integrated comprehensive approach in surveillance and control of NCD risk factors would provide equity in monitoring of these risk factors and enables prioritization of these factors in risk prevention policies. The surveillance system would also allow measuring the health and economic burden of NCDs in a comprehensive rather than a fragmented manner. Scientific research on NCD risk factors particularly in areas where data is lacking or limited should continue to compliment the surveillance system and be utilized by decision makers. Collaboration between the governmental, non governmental organizations and academic institutions that aim at controlling NCDs or NCD risk factors should be encouraged and their efforts combined in combating NCDs.

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