

**NUTRITIONAL AND HEALTH STATUS OF
ADOLESCENT GIRLS IN BAHRAIN**

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INTRODUCTION

Adolescence is well known to be a time of rapid growth, and the nutritional requirements increase significantly to support the marked increments in body mass and nutrient stores (ADA, 1989). Health of adolescent girls has been neglected in health programmes in most Arab countries, where the girls become child caretakers well before they become mothers (UNICEF, 1985). Despite the significant improvement in educational and health services in these countries, the health and social status of adolescent girls have not improved consequently.

UNICEF (1985) reported that the concept of adolescence in the Arab World is relatively new, particularly where teenager girls are concerned. In the past, adolescence lay generally buried in the direct transition from childhood to adulthood, as girls married shortly after puberty. Nowadays, with increased educational opportunities and delayed age at marriage, the needs and problems of young girls are becoming more obvious. Their physical and mental health has an impact not only on their own lives, but on the lives and well being of their children and their families as well.

Recent statistics (1992) for the Bahraini population shows that about one quarter (23%) are between age 10 and 19 years old and that of adolescent girls who are aged 15-19 years represents 5% of this population.

Information about health and nutritional status of adolescent girls in the Arabian Gulf countries, including Bahrain is scarce. The current report highlights the health situation of adolescent Bahraini girls based on available data.

SOCIAL AND DEMOGRAPHIC FACTORS ASSOCIATED WITH HEALTH OF ADOLESCENT GIRLS

Age at menarche

Age at menarche is effected by genetic and environmental factors. Low nutritional status has also a negative influence on age at menarche. People living in tropical countries mostly have a late menarche, mainly because their nutritional status is poor. However, well-off children in these areas have menarche at about the same age as children in Temperate areas (Tanner, 1978). The mean age at menarche in Bahrain is 13.0 years (Musaiger *et al*, 1993a). Another study shows that educated mothers (high socio-economic group) were more likely to get menarche at an earlier age than illiterate mothers (Table 1). In this study the mean age at menarche was also found to be about 13.0 years, and ranged from 9 to 19 years (Musaiger *et al*, 1993b). This average is slightly higher than that reported in Western countries. The nature and timing of the pubescent growth spurt and sexual maturation vary considerably among teenagers, but generally the adolescent female achieves physiological maturity about 4 years after menarche (ADA, 1989).

Table 1. Distribution of Bahraini Women by age at menarche and educational level.

Age at menarche (years)	Illiterate		Educated		Total	
	No.	%	No.	%	No.	%
< 12	34	53.1	30	46.9	64	100.0
12-13	143	51.8	133	48.2	276	100.0
14 +	70	42.4	95	57.6	165	100.0
Total	247	48.9	258	51.1	505	100.0

Source : Musaiger *et al* (1993b).

Age at marriage

Early age at marriage is one of the risk factors affecting the health status of mothers and their children. The Central Statistics Organization (1990) reported that a relatively high percentage (13%) of women who got married in 1989 in Bahrain were between 13 and 19 years of age. A recent study (Musaiger and Al-Sayyad, 1991) showed that many Bahraini mothers get married at adolescent age and the mean age at marriage ranged from 14.2 to 22.8 years, with a general average of 18 years. Educated mothers were more likely to get married at a higher age than low education mothers. As educational level of mothers increased the mean age at marriage progressively increased (Table 2). Compulsory enrolment of young girls in primary and intermediate schools is recommended to delay the age at marriage. Promotion of nonformal educational programme for adult females should be also encouraged.

Table 2. Mean age at marriage of mothers by educational level.

Educational level	Age at marriage	
	No.	Mean \pm Standard Deviation
Illiterate	111	14.2 \pm 4.9
Read & write	36	15.0 \pm 3.6
Primary	87	16.8 \pm 4.0
Intermediate	64	18.9 \pm 2.9
Secondary	111	20.4 \pm 3.1
Diploma	26	21.6 \pm 2.3
University	46	22.8 \pm 2.8
Total	481	18.0 \pm 4.7

Source : Musaiger and Al-Sayyad (1991).

Early pregnancy and interval between births

As many Bahraini women get married at an adolescent age, they are more likely to get pregnancy at an early age too. Musaiger *et al* (1993 b) found that 18% of mothers got their first pregnancy between 11 and 15 years old, and about 43% between 16 and 19 years old. The hazards of teenage pregnancy are that it can cause maternal death and infants with low birthweight, which in turn affects child survival. Teenagers who become pregnant within less than 4 years after menarche are at high nutritional risk since they may have to meet their own needs for growth as well as the energy and nutrient demands of pregnancy. It is also possible that pregnancy among these individuals may deplete their often limited nutritional reserves, which can compromise their own health and result in poor pregnancy outcome (ADA, 1989).

It was found that adolescent Bahraini mothers aged 15-19 years were more likely to deliver low-birth-weight (LBW) infants (11%) than mothers in other age groups (7%). In addition to teenage pregnancy, the risk of LBW was higher with the first pregnancy, as it was reported that the incidence of LBW was 10.6% for Bahraini mothers who delivered for the first time compared with 6.3% for mothers who have one child or more (Musaiger, 1985).

Interval between births is also a matter of concern. The recent data of Central Statistics Organization (1990) showed that the majority (61%) of adolescent mothers (13-19 years) gave a space of less than 2 years between births, while the percentages were 32%, 18.7% and 15.3% for mothers aged 20-29, 30-39 and 40+ years, respectively (Table 3). It was reported that Bahraini mothers were least likely to bear LBW babies when the interval between births was more than 2 years. As the interval between births increased the incidence of birth-weights more than 3.5 kg increased (Musaiger, 1985).

Table 3. Interval between births by age of mother*.

Age (yrs)	Interval (years)								Total	
	< 1		1-2		2-3		3+		No.	%
	No.	%	No.	%	No.	%	No.	%		
13-19	5	5.3	57	60.6	24	25.5	8	8.5	94	100.0
20-29	36	1.0	1227	32.3	1146	30.2	1385	36.5	3794	100.0
30-39	13	0.4	618	18.7	808	24.4	1870	56.4	3309	100.0
40 +	0	0.0	71	15.3	123	26.5	271	58.3	465	100.0
Total	54	0.7	1973	25.8	2101	27.4	3534	46.1	7662	100.0

* Exclude mothers who had first pregnancy.

Source : Central Statistics Organization (1990).

Blood relationship (parental consanguinity)

Parental consanguinity has been shown to significantly influence a range of genetic diseases and nutritional status of children and adolescents. It was found that marriage between relatives are favoured through Bahraini families. About 26.1% of Bahraini mothers got married with very close relatives (first cousins), 17.3% with other relatives and 56.6% with no relatives. Educated women (62%) were more likely to get married with unrelated men than illiterate women (52%) (Musaiger *et al*, 1993 b). It is strongly believed that the custom of marrying first and second cousins (especially in rural areas in Bahrain) over generations concentrates the abnormal gene and increase the incidence of hereditary disorders among girls. Hereditary anaemia has become a major health problem in Bahrain as will be discussed later.

DIETARY HABITS

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

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

Breakfast intake

Breakfast can make a valuable contribution to the nutrient quality of the diet of adolescents. It was found that 25% and 35% of girls aged 11-15 and 16+ years skipped breakfast, respectively (Table 4). When the girls were asked about the reasons for skipping breakfast, the main reasons given were; because they woke up late, not accustomed to eating breakfast, not hungry and did not like the food served at breakfast. Cooksey and Ojemam (1983) reported that breakfast was omitted more often when family members did not eat together or when there was no one to prepare it for the girls.

Several studies (Morgan *et al*, 1986, Shiraki and Iwasaki, 1986) reported that skipping breakfast has a significant impact on meeting the Recommended Daily Allowances (RDA). Morgan *et al* (1986) demonstrated that skipping breakfast has a negative effect on the quality of diet, particularly among girls and adolescents. The intake of vitamin A, iron, calcium, magnesium, copper and zinc was found to be less among breakfast skippers. It is important,

therefore, to encourage the adolescent girls to have their breakfast at home before they go to school.

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

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

Table 4. Main foods consumed by adolescent girls at breakfast according to their age.

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

Source : Musaiger & Gregory (1992).

Morning snack

Baseline data on the kinds of foods consumed between meals (snacks) and how these foods contribute to nutrient intake in relation to the overall diet is essential for school meal programme. The findings of this study showed that about 22.3% and 17.6% of adolescent girls aged 11-15 and 16+ years, respectively did not eat any snack between breakfast and lunch. Carbonated beverages, cheese, uncarbonated drinks, meat and liver sandwiches and *falafel* (fried broad bean mixed with spices) were the foods commonly consumed at morning snack by adolescents girls (Table 5).

Table 5. Main foods consumed by adolescent girls at morning snack according to their age.

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

Source : Musaiger & Gregory (1992).

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

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

Lunch intake

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

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

of interest in dietary habits were apparent among those who habitually skipped meals.

Table 6. Main foods consumed by adolescent girls at lunch according to their age.

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

Source : MUSAIGER & GREGORY (1992).

Afternoon snack

The most popular foods consumed between lunch and supper (afternoon snack) were corn-puffs, carbonated beverages, chocolates, uncarbonated canned drinks and fruits (Table 7). The consumption of corn-puffs decreased with age (30% and 18% among 11-15 and 16+ year old girls, respectively). It was documented that corn-puffs is a very poor source of essential nutrients, and its intake therefore should be discouraged. Older girls were more likely to skip afternoon snacks than young girls.

Supper intake

Foods consumed at supper were more varied than those consumed at other meals (Table 8). Bread, carbonated beverages, cheese, *falafel*, chocolates and corn-puffs were the preferred foods at supper by adolescent girls. Supper was less skipped than breakfast, but more often than lunch. The main reasons for skipping supper were: not hungry, sleep early and not accustomed to eating supper.

Table 7. Main foods consumed by adolescent girls at afternoon snack according to their age.

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

Source : Musaiger & Gregory (1992).

Table 8. Main foods consumed by adolescent girls at supper according to their age.

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

* Sambosa is fried vegetable pie.

Source : Musaiger & Gregory (1992).

HEALTH PROBLEMS

Growth and Development

Blair and Gregory (1985) collected anthropometric data from 121 Bahraini girls ages 7 to 18 years. It was found that heights were below the NCHS standard, while 19% had weight less than 75% of the norms; 40% of the 10-12 year olds weighed less than 75% of the NCHS standard. Eight percent of the girls had weights greater than 120% of the standard. The 13-15 year olds appeared to be substantially heavier than the other age groups. Triceps skinfolds were relatively lower than subscapular and a few values were excessively low. Upper arm muscle circumferences tended to be low. About 22% were less than the 5th percentile. Low weight appeared to be due to low muscle mass rather than low body fat. Based on weight, triceps skinfold and arm muscle circumference only 7% were excessively thin, despite the frequent finding of low weight for age.

A comprehensive study on growth patterns of adolescent girls was carried out on 433 girls aged 11 to 18 years from all geographical areas in Bahrain (Musaiger, *et al* 1989). Mean values for height and weight increase with age except for girls aged 17 and 18 years where the height did not increase at age 17 years and decreased slightly (by 1 cm) at age 18 years. Arm circumference and skinfold thickness also increase with age (Table 9).

Comparison of height and weight of Bahraini girls aged 6-18 years with NCHS standards is shown in figure 1. The median height fluctuates between 25th and 5th percentiles for age 11 years. For age 12 years onwards, the median height fluctuates between 25th and 10th percentiles (except for age 18 years). The median weight fluctuates between the 50th and 10th percentiles.

Median arm circumferences and triceps skinfold thickness for Bahraini girls aged 6-18 years plotted on percentiles of the NCHS reference data are shown in figures 2 and 3. In general the median arm circumference lies below or close to 5th percentiles of the standard. The median triceps skinfold fluctuates between 50th and

25th percentiles of the standard, indicating a high subcutaneous fat store and a lack of muscle development.

Table 9. Means for seven anthropometric measurements of adolescent Bahraini girls.

Age (yrs)	N	Weight (kg)	Height (cm)	Arm* (cm)	Triceps (mm)	Biceps (mm)	Subs†* (mm)	Supra‡** (mm)
11-	51	35.0	140.3	19.4	11.6	6.9	9.5	9.0
12-	57	40.1	146.8	20.4	12.6	7.9	10.7	10.6
13-	47	44.0	151.4	21.3	12.8	7.6	11.8	12.1
14-	71	48.3	153.0	22.5	15.2	9.0	14.3	14.0
15-	59	52.2	155.1	22.9	16.1	9.4	16.0	15.9
16-	43	50.6	156.4	22.7	14.8	8.3	14.0	13.6
17-	56	54.4	155.4	23.7	17.0	9.2	17.2	16.0
18-	49	51.9	154.0	23.1	15.8	8.5	16.0	16.3

* Arm : Mid arm circumference.

** Subs : Subscapular.

*** Supra : Suprailliac.

Source : MUSAIGER et al (1989).

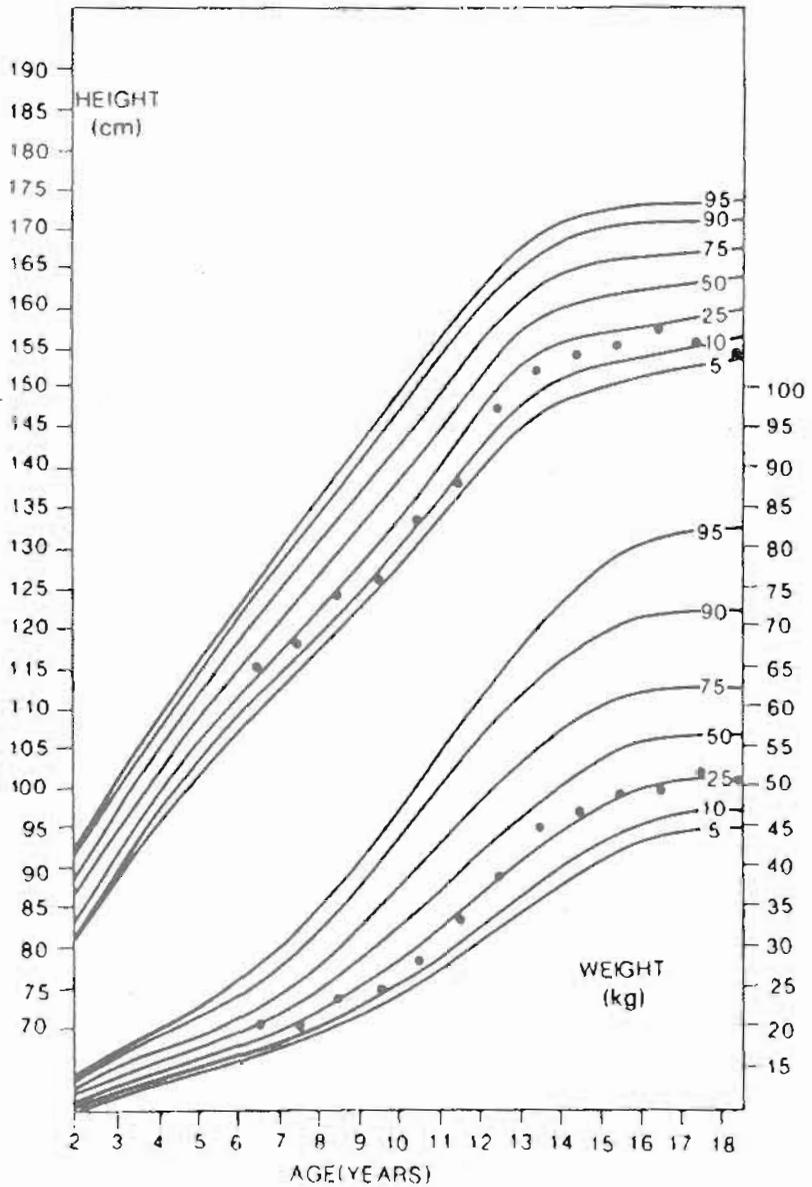


Figure 1: Median height and weight of Bahraini female children plotted on NCHS smoothed percentiles for females aged 6-18 years.

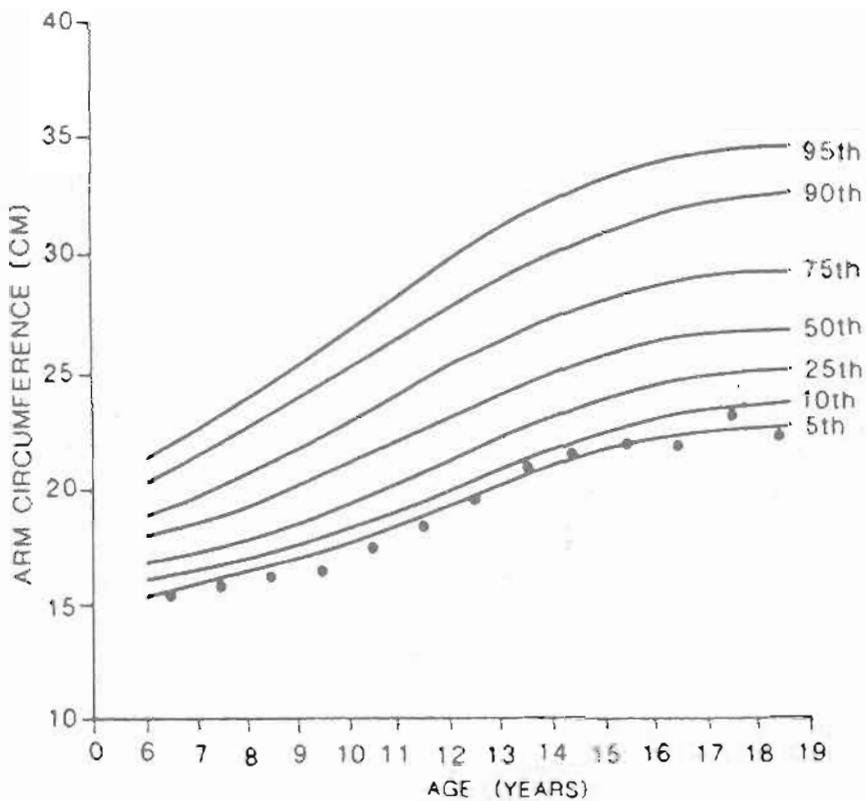


Figure 2: Median arm circumference of Bahraini females plotted on NCHS smoothed percentiles for females aged 6-18 years.

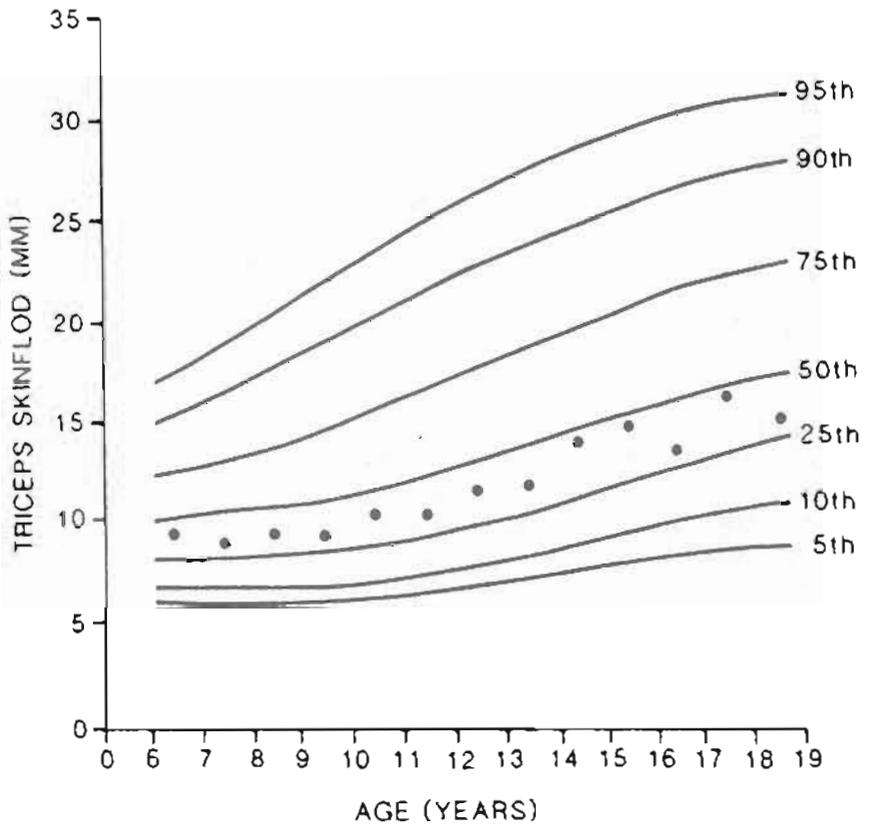


Figure 3: Median triceps skinfold thickness of Bahraini females plotted on NCHS smoothed percentiles for females aged 6-18 years.

Anaemia

1. Iron deficiency anaemia

Iron deficiency anaemia is considered one of the main public health problems among adolescent girls in Bahrain. Using WHO cut-off for haemoglobin (Hb), Amine (1980) found that 42.8% of school girls age 6-17 years had iron deficiency anaemia. The study of Blair and Gregory (1985) showed that mean Hb values for girls aged 7-18 years was 12.2 ± 2.0 g/dl and ranged from 9.3 to 14.4 g/dl. No macrocytic anaemia was observed. Table 10 presents a summary of the blood analysis findings and a categorization of abnormal values. Microcytic hypochromic anaemia with low transferrin saturation, indicative of iron deficiency anaemia was found in 13% of the samples, while 15% of the girls had normal Hb with abnormally low serum iron and low transferrin saturations indicating an earlier state of iron deficiency. A total of 28% of the girls were iron deficient based on transferrin saturation. Slightly more than 7% had sickle cell trait and 21% had an MCV equal or greater than 72 without low transferrin saturation, suggesting thalassaemia minor.

The abnormal blood values of girls by age group are also presented in Table 10. Iron deficiency anaemia with or without other anaemias increases with age and it reached 44% among the 15-18 year old group of girls. The prevalence of microcytic, hypochromic anaemia without low transferrin saturation also increases with age indicating that this category of anaemia is not completely of a genetic origin and may be heterogeneous.

Several factors contribute to the prevalence of iron-deficiency anaemia among adolescent girls in Bahrain. These include, low intake of iron-rich foods, high intake of foods that inhibit iron absorption such as tea, unsound food habits, and parasitic infection.

Table 10. Abnormal hematological findings in Bahraini school girls by age group.

	Total	Age (years)		
		7-10	11-13	15-18
	n=121	n=35	n=33	n=41
	%	%	%	%
<u>Anemic</u>				
Iron deficiency*	12.8	8.6	6.1	22.0
Microcytic, hypochromic(possible thalassemia minor)**	13.8	14.3	6.1	19.5
Normocytic normochromic with sickle cell trait	0.9	-0-	3.0	-0-
<u>Non Anemic</u>				
Sickle cell trait	7.3	11.4	6.1	4.9
Possible thalassemia minor***	7.3	5.7	6.1	9.8
Iron deficiency****	14.7	5.7	15.2	22.0
<u>Total anemia</u>	27.5	22.9	15.2	41.5
<u>Total iron deficiency</u>	27.5	14.3	21.2	43.9

* Low hemoglobin, MCV, MCH and transferrin saturation.

** Low hemoglobin, MCV, MCH, normal serum iron and transferrin saturation.

*** Normal hemoglobin 72; normal transferrin saturation.

**** Transferrin saturation low for age.

Source : Blair and Gregory (1985).

2. Hereditary anaemia

The diagnosis of nutritional anaemias in the adolescent Bahraini girls is complicated by the presence of inherited blood disorders such as sickle cell trait and thalassaemia minor. Hereditary anaemias have become a serious health problem in Bahrain. The existence of these anaemias in the country was first reported by Mobayed et al (1980) who showed that the prevalence of sickle cell disease among 0-5 year old children was 17%, and among 6-11 year olds was 21%. In a comprehensive study on 10327 hospitalized births, Mohamed *et al* (1987) reported that 11% of neonates had sickle cell trait (heterozygotes), 2.1% had sickle cell anaemia (homozygotes), 24% had thalassaemia and 21% had Glucose-6-phosphate deficiency (G6PD).

These figures are alarming and they are making a high demand on health resources. The magnitude of the health problem asserted by the hereditary anaemias arises from the fact that they are both common and chronic (WHO, 1983). It has been shown that the average age at menarche was significantly delayed by almost one year among school girls with sickle diseases when compared with normal girls (Modebe, 1987).

Intestinal Parasitic Infection

Intestinal Parasitic Infections such as ascariasis, hook-worm infection and trichuriasis are among the most common infections in the developing countries. Studies indicate that parasitic infections adversely affect the health status of the population through malabsorption, diarrhoea, growth stunting in young children, and impaired work capacity (WHO, 1987).

A study on 288 Bahraini girls aged 6 to 22 years was carried out to estimate the prevalence of intestinal parasitic infection (Musaiger and Gregory, 1988). The results revealed that 12.5% of girls were infected with parasites. The infection increased with age, as 9.7% of girls aged 6-10 years were infected with parasites, compared to 12.4% and 19.6% among 11-15 years and 16+ year old girls, respectively. No hook-worm was detected.

Infection with *G. lamblia* (4.9%), *T. trichiura* (2.8%), *A. lumbricoides* (2.8%), and *H. nana* (2.1%) were most commonly detected. The prevalence of *Giardia* increased remarkably with age (1.6%, 5.3% and 11.8% for girls aged 6-10, 11-15, 16+ years, respectively), as shown in Table 11.

The prevalence of intestinal parasitic infections among adolescent girls in Bahrain can be attributed to several factors. Inadequate personal hygiene is the most important factor responsible for the higher incidence of parasites in the developing world (WHO, 1987). In some rural areas in Bahrain the hygienic conditions are relatively low which lead to a higher prevalence of parasitic infection in these regions. Mobayed *et al* (1980) showed that parasitic infections was almost double among rural children than urban ones. Musaiger and Aldalla (1984) reported that deaths due to infectious and parasitic diseases are greater in rural than urban areas of Bahrain.

Table 11. Frequency (%) of intestinal parasitic infection among adolescent Bahraini girls by age and type of parasites.

Parasites	Age group (years)			Total
	6-10	11-15	16+	
No. examined	(124)	(113)	(51)	(288)
<u>A. lumbricoides</u>	1.6	2.7	2.0	2.1
<u>G. lamblia</u>	1.6	5.3	11.8	4.9
<u>T. trichiura</u>	4.8	1.8	-	2.8
<u>H. nana</u>	0.8	1.8	5.9	2.1
<u>E. vermicularis</u>	0.8	-	-	0.3

Source : Musaiger & Gregory (1988).

Obesity

Obesity in children and adolescents may be a predisposing factor for adult obesity (WHO, 1990). Several studies have reported that obesity is a problem of concern in the Gulf countries, including Bahrain (Musaiger, 1987, WHO/EMRO, 1989). It is well documented that obesity is a risk factor for many health problems such as cardiovascular disease, diabetes, arthritis, hypertension and some forms of cancer (WHO, 1990). These diseases are the major causes of morbidity and mortality in Bahrain.

Using skinfold thickness technique it was found that 19% of Bahraini girls aged 6-18 years were obese (Blair and Gregory, 1985). A cross-sectional survey on school girls aged between 15 and 20 years showed that 17.4% of these girls were overweight or obese based on a body mass index of more than 25 (Musaiger *et al*, 1993).

The mean body mass index (BMI) for adolescent girls aged 11 to 18 years is presented in Table 12. The mean BMI increased as age of girls increased, and it ranges from 17.5 for girls aged 11 years to 22.5 for girls aged 17 years. This is mostly due to fat accumulation in the body of these girls, as it was found that BMI has a relatively high association with body fat, and a low association with height (Simopoulos, 1985). This finding was confirmed by Musaiger and Gregory (unpublished) as they showed that the sum of skinfold thickness and percent of body fat among school girls in Bahrain increased with the increase in BMI. The accumulation of fat is greatly raised after the mean age of menarche (13 years).

Factors associated with obesity among adolescent Bahraini girls have not been well investigated. Some possible factors are lack of physical exercise, high intake of energy rich foods, sedentary life-style, early pregnancy and socio-cultural factors. Zaghloul and colleagues (1984) found that the energy, fat, protein and carbohydrate intake of obese adolescent Bahraini girls was significantly higher than that of the non-obese. In addition, 65% of

obese girls were categorized as least active compared with 29% of non-obese (Table 13).

An attempt was made to study some social and dietary factors associated with obesity among adolescent girls (15-20 years) in Bahrain (Musaiger *et al*, 1993a). The findings showed that obesity was higher among older girls (18-20), and girls with low family size, illiterate mother or father and those with family history of obesity. Girls who did not eat between meals, and eat 1 or 2 meal per day have a higher prevalence of obesity than those eat between meal and eat 3 meals or more per day. The prevalence of obesity was also higher among girls who eat alone (21%) than those who eat with family (17%).

Table 12. Mean body mass index of adolescent Bahraini girls by age.

Age (years)	Mean body mass index
11-	17.5
12-	18.5
13-	19.2
14-	21.1
15-	21.7
16-	21.1
17-	22.5
18-	21.8

Source : Musaiger & Gregory (unpublished data).

Table 13. Intake of nutrients and activity level of obese and non-obese adolescent Bahraini girls, 1984.

	Obese (n=40)	Non-obese (n=34)
<u>Mean intake of nutrients</u>		
Total energy (kcal)	2529	2057
Protein (g)	78.0	63.0
Fat (g)	79.0	61.0
Carbohydrates (g)	37.6	31.4
<u>Activity level</u>		
Least active	65.0	29.0
Moderately active	25.0	53.0
Active	10.0	18.0

Source : Zaghloul et al (1984).

Diabetes

The traditional belief that diabetes mellitus in adults, in its non-insulin dependent form, is a disease of industrialized countries, is no longer tenable. Recent reports demonstrate that diabetes is highly prevalent in developing countries, and sometimes the prevalence exceeds that in developed countries (King and Rewers, 1991).

There are no proper population-based epidemiological studies on diabetes in Bahrain. The recent statistics of the Ministry of Health (1992) showed that there was a relatively high percentage of juvenile diabetic patients; 21.7% of the hospitalized diabetic patients were under the age of 15 years. About 40% of these young diabetic patients were female, and the rest were male.

Dental Caries

The incidence of dental caries among adolescent girls in Bahrain is alarming. Barnes (1981) showed that the decayed, missing or filled teeth (DMFT) index among 12 year old Bahraini girls was 1.0, while a recent survey (Westwater, 1986) on adolescent girls aged 12 and 15 years indicated that the DMFT index has increased to 1.3 and 1.9 for these age groups, respectively. The prevalence of caries was 51% and 55% for the same age groups, respectively.

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

CONCLUSION

Health programmes in Bahrain have paid less attention to adolescent girls as most of these programmes focused on health of mothers and children. Adolescent girls in Bahrain seem to have several social and health problems. First of all, a relatively high percentage of them get married before they reach 19 years old, and this affects the health of both mothers and children. Even though nutrient requirements for growth and development increase during adolescence, unsound food habits among teenagers in Bahrain are common, increasing the likelihood of inadequate diet. Frequent meal skipping, as reported here, is usually accompanied by increased snacking, often on food high in salt, sugar and fat, and low in essential nutrients. The results are dietary deficiency and occurrence of some nutritional problems.

Studies of adolescent girls in Bahrain demonstrate a number of health and nutritional problems. Iron deficiency is the main problem among adolescents in all socio-economic groups. Also a major concern is inadequate energy intake leading to underweight among a relatively high percentage of these girls. At the same time the prevalence of obesity in adolescent girls has increased suggesting a predisposing factor for chronic diseases such as heart disease, diabetes and hypertension. Such chronic diseases are the main causes of death in the country, and thus any programme to prevent and control these diseases should start with children and adolescents.

RECOMMENDATIONS

In order to improve the health status of adolescent girls in Bahrain, the following activities and programmes should be included in health and social plans in the country.

1. Expanding mother and child health services to include more activities related to teenage girls.
2. Improving of school feeding activities to provide more nutritious foods to schoolchildren such as fruit juices, milk and milk products, and fresh fruits, instead of carbonated beverages, sweets and corn-puffs.
3. Programmes to control iron deficiency anaemia should be given high priority. Several measures must be taken into consideration when attacking this anaemia such as iron tablet supplementation for teenage pregnant girls, blood screening for adolescents girls, prevention and treatment of parasitic infection, iron fortification of some common foods, education to increase the intake of foods rich in iron and vitamin C, and reducing intake of foods which inhibit iron absorption such as tea and coffee.
4. Dietary intervention to modify food habits of adolescent girls. Excessive intake of foods rich in fat , sugar and salt, skipping meals especially breakfast, high consumption of carbonated beverages and low intake of food rich in fiber such as fresh fruits and vegetables are all examples of unsound food habits among these girls, which need to be corrected through health education using mass media.
5. Introducing information on prevention and control of nutritional and health problems in the school curricula.
6. Encouraging exercise habits among both children and adolescents. Regular and frequent isotonic exercise can play an important role in the prevention and control of obesity, hyperlipidemia, hypertension and diabetes. School children and adolescents should be encouraged to adopt a life-style involving some forms of exercise. Health education on physical fitness must

be introduced in schools. It is essential also to allocate sufficient time in school schedule for exercise activities (WHO, 1990).

7. Professional training of health, social and community workers in prevention and management of health problems among adolescent girls.

8. Encouraging education of girls till at least secondary school to delay early marriage and pregnancy.

9. Carrying out further studies on factors associated with health and nutritional status of adolescent girls in Bahrain.

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