

# Nutritional status survey of preschool children in Kuwait

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استقصاء حول الحالة التغذوية لأطفال الكويت دون سن المدرسة  
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**خلاصة :** تم تقييم الحالة التغذوية لستمئة وخمسة وأربعين طفلاً وستمئة وخمسة وثلاثين طفلة دون سن المدرسة في الكويت . فجرى استجواب الأمهات لجمع معلومات عن المتغيرات الاجتماعية الاقتصادية . وسُجلت أطوال الأطفال وأوزانهم ، وعُينت تركيزات الهيموغلوبين لديهم . وتبين من النتائج أن 11.5% من الأطفال الذكور و9.9% من الإناث كانوا قصاراً . وكان معدل الضمور متماثلاً إلى حد ما بين الجنسين (10.1% - 10.9% ) . وكانت الإناث أكثر بدانة ( 18.4% ) من الذكور ( 16.1% ) . ووجد أن فقر الدم أكثر انتشاراً بين الذكور ( 32.9% ) عنه بين الإناث ( 25.8% ) . كما وجد أن هناك عوامل تؤثر في انتشار نقص التغذية مثل ترتيب الولادة ودخل الأسرة ومستوى تعليم الأم وارتباطها بعمل .

**ABSTRACT** The nutritional status of 645 male and 635 female preschool children in Kuwait was assessed. Mothers were interviewed to collect data on socioeconomic variables. The length/height and body weight of the children were recorded and haemoglobin concentration was determined. The results show that 11.5% of the boys and 9.9% of the girls were stunted; the prevalence of wasting was fairly similar in both sexes (10.1%–10.9%). Obesity was more prevalent in girls (18.4%) than boys (16.1%). Anaemia was more prevalent in boys (32.9%) than girls (25.8%). Factors such as birth order, family income and mother's education and employment were found to affect the prevalence of undernutrition.

## Enquête sur l'état nutritionnel chez les enfants d'âge préscolaire au Koweït

**RESUME** L'état nutritionnel de 645 enfants de sexe masculin et de 635 enfants de sexe féminin, tous d'âge préscolaire, au Koweït a été évalué. Les mères ont été interrogées pour rassembler des données sur les variables socio-économiques. La longueur/taille et le poids corporel des enfants ont été enregistrés et la concentration d'hémoglobine a été déterminée. Les résultats montrent que 11,5% des garçons et 9,9% de filles présentaient un retard de croissance; la prévalence de l'émaciation était du même ordre chez les deux sexes (10,1%–10,9%). L'obésité était plus fréquente chez les filles (18,4%) que chez les garçons (16,1%). L'anémie était plus fréquente chez les garçons (32,5%) que chez les filles (25,3%). Les facteurs tels que l'ordre de naissance, le revenu familial, l'instruction de la mère et l'emploi affectaient la prévalence de la sous-alimentation.

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## Introduction

The State of Kuwait enjoys a high per capita income when compared with both industrialized and developing countries. The discovery of oil in large quantities generated sudden wealth and the average family income increased sharply. Generous and varied food supplies became available on the market, and with the high purchasing power, meal patterns became more varied. The traditional diet is rapidly disappearing and being replaced by a much more diverse diet [1].

Kuwait has a highly developed health service which is offered free of charge. Kuwait has also achieved remarkable progress in the field of education and the illiteracy rate has been reduced to around 26.4%.

It is difficult to assess the effect of the oil boom on the nutritional status of the Kuwaiti population because limited data are available to describe the food and nutrition situation before 1979. An anthropometric survey conducted in 1979 on a cross-sectional sample of 1611 infants and preschool children showed that undernutrition was not a major health problem; only 1% of the children were wasted. Stunting was present in 3.8% of the sample with a peak prevalence rate of 7.8% in the age group 2–3 years [2]. Results of a nationwide cross-sectional survey on school students showed that the rate of growth was close to international standards. In addition, it was reported that 3.6% of children from low socioeconomic groups were underweight [3,4]. The change in food habits has also been held responsible for the high prevalence of anaemia in preschool children. The prevalence was highest (75%) during the first year of life and declined to 41% in the age group 2–5 years [2].

On the other hand, the results of two national surveys on the prevalence of obe-

sity among males and females indicated that the dietary pattern associated with an affluent lifestyle has been blamed for the increasing prevalence of health problems associated with overnutrition [5,6].

A literature review revealed a serious lack of data describing the nutritional status of preschool children in Kuwait. Such data are greatly needed in order to assess the present situation after the Gulf War, and for use as baseline data in the planning and evaluation of nutrition intervention programmes.

## Material and methods

A national cross-sectional survey of Kuwaiti preschool children aged 6–59 months was conducted. A multistage stratified sample of 1280 Kuwaiti preschool children (645 males and 635 females) was taken to represent children in all governorates. The country is divided into five governorates; the number of children selected from each governorate was based on the number of preschool children in each governorate as listed in the national census.

The mother of each child was privately interviewed at her home by two research assistants from the staff of the Food and Nutrition Administration. The age of the child was determined to the nearest month using date of birth listed in the birth certificate and date of examination. The mother was requested to provide information on some variables such as the birth order of the child, monthly family income and mother's education and employment. Anthropometric measurements were made by a trained research assistant. Height or recumbent length was recorded to the nearest 0.1 cm and the weight of the children wearing minimum clothing was measured to the nearest 0.1 kg using a standard technique

[7]. The height of children up to 23 months of age was measured on a horizontal board; children aged 2 years and over were measured standing. Since the recumbent length is, on average, 0.5 cm greater than the standing height, correction was made by deducting 0.5 cm from all lengths above 84.9 cm. The accuracy of the scales was checked before use and at least twice daily during the survey using a known weight. Field supervisors were responsible for checking the quality of measurements; this was achieved by routinely repeating measurements.

Data were stored on a dBase file and the *Anthro* software package was used in calculating anthropometric indices. The program uses figures from the National Center for Health Statistics, Centers for Disease Control, and Prevention, Atlanta (NCHS/CDC) as an international reference population. The computer program discards odd records that have extreme values or out of range or incorrect values for age, sex, weight or height.

For each of the anthropometric indices, height-for-age, weight-for-age and weight-for-height, comparisons are expressed in terms of the number of children falling into various standard deviation categories from

the international reference population median. The extent of malnutrition is expressed as the percentage falling two or more standard deviations (*s*) below the median. Children were classified as stunted when their height-for-age was below the reference median minus two standard deviations. They were considered as wasted when their weight-for-age or weight-for-height was below the reference median value minus two standard deviations. A blood sample was collected from each child and the cyanometh-haemoglobin method was used to determine haemoglobin (Hb) concentration expressed as grams of haemoglobin per decilitre of blood (g/dl).

## Results

The distribution of nutrition indicator values for male preschool children is presented in Table 1. The results show that 11.5% of the children were stunted and the height of another 19.1% was less than the reference median minus one standard deviation. When low weight-for-height was used as an indicator for wasting, the data show that 10.8% of the children were wasted. On the other hand, data show that obesity was

Table 1 Distribution of nutrition indicator values for male preschool children

Nutrition level	Height-for-age		Weight-for-age		Weight-for-height	
	No.	%	No.	%	No.	%
No. below median - 2 s	74	11.5	65	10.1	70	10.8
No. below median - 1 s	123	19.1	120	18.6	96	14.9
No. between median $\pm$ 1 s	305	47.3	324	50.2	299	46.4
No. above median + 1 s	64	9.9	66	10.2	76	11.8
No. above median + 2 s	79	12.2	70	10.9	104	16.1
Total	645	100	645	100	645	100

s = standard deviation

Table 2 Distribution of nutrition indicator values for female preschool children

Nutrition level	Height-for-age		Weight-for-age		Weight-for-height	
	No.	%	No.	%	No.	%
No. below median - 2 s	63	9.9	69	10.9	61	9.6
No. below median - 1 s	95	15.0	92	14.5	87	13.7
No. between median $\pm$ 1 s	315	49.6	317	49.9	291	45.8
No. above median + 1 s	82	12.9	74	11.7	79	12.4
No. above median + 2 s	80	12.6	83	13.1	117	18.4
Total	635	100	635	100	635	100

s = standard deviation

Table 3 Impact of birth order and family income on the nutritional status of preschool children

Variable	Number examined	Nutritional status					
		Stunted		Wasted		Obese	
		No.	%	No.	%	No.	%
<b>Birth order</b>							
1	292	42	14.4	40	13.7	55	18.8
2	273	31	11.4	34	12.4	46	16.8
3	244	25	10.2	26	10.7	34	13.9
4	215	21	9.8	17	7.9	25	11.6
5+	256	18	7.0	17	6.6	61	23.8
<b>Family income</b> (in Kuwaiti dinars*)							
< 600	296	51	17.2	55	18.6	45	15.2
600-800	312	33	10.6	36	11.5	54	17.3
800+	672	53	7.9	43	6.4	122	18.2

\* Kuwaiti dinar = US\$ 3.3

prevalent in this age group, as the weight of 16.1% of the children exceeded the median value for reference weight-for-height plus two standard deviations.

The nutrition indicator values for female preschool children are presented in Table 2. The results show that 9.9% of the children were stunted, while the prevalence of wasting was around 9.6% when low weight-for-height was used as an indicator for wasting. Obesity was quite prevalent in

this age group and affected 18.4% of the female children. The body weight of another 12.4% was higher than the median weight-for-height plus one standard deviation.

The impact of birth order and family income on the nutritional status of preschool children is illustrated in Table 3. The results show that stunting was most prevalent in first-order children (14.4%), and the prevalence rate decreased gradually to

Table 4. Impact of mothers' employment and educational level on the nutritional status of their children

Variable	Number examined	Nutritional status					
		Stunted		Wasted		Obese	
		No.	%	No.	%	No.	%
<i>Mothers' employment</i>							
Employed	794	84	10.6	56	7.1	118	14.9
Housewife	486	53	10.9	78	16.0	103	21.2
<i>Mothers' education</i>							
Illiterate	109	13	11.9	14	12.8	23	21.1
Primary	183	20	10.9	22	12.0	40	21.9
Intermediate	629	69	11.0	73	11.6	113	18.0
University	359	35	9.7	25	7.0	45	12.5

reach its lowest value in late-order children (7.0%). The prevalence of wasting followed a similar pattern; it was highest (13.7%) in first-order children and decreased gradually to 6.6% in late-order children. The prevalence of obesity followed a different pattern; it was more prevalent in first-order children (18.8%), decreased gradually to 11.6% in fourth-order children and showed a sharp increase to 23.8% in late-order children.

Family income had a clear effect on the prevalence of malnutrition in preschool children. When the monthly family income was less than 600 Kuwaiti dinars (KD), 17.2% of the infants were stunted and 18.6% were wasted. The rate of both forms of malnutrition declined to 7.9% and 6.4% respectively when the family income was higher than KD 800 per month. Children from the latter group were more likely to develop obesity (18.2%) when compared with a slightly lower rate (15.2%) in children from low income families.

The data show that the mother's employment did not have an effect on the prevalence of stunting, which was comparable in children of employed mothers or

housewives, 10.6% and 10.9% respectively. On the other hand, the prevalence of wasting was low among children of employed mothers (7.1%) compared to those of unemployed mothers (16.0%). The prevalence of obesity followed a similar pattern; 14.9% and 21.2% in children of employed mothers and housewives respectively (Table 4).

The results also illustrate that the prevalence of stunting was not significantly modified by the mother's education (Table 4). The rate of stunting was 11.9% in children of illiterate mothers and was slightly lower (9.7%) when the mother was a university graduate. The corresponding rates for wasting were 12.8% and 7.0% respectively. On the other hand, obesity was highly prevalent in children of illiterate mothers (21.1%) and lowest in children of university graduates (12.5%).

The distribution of 765 preschool children by sex and haemoglobin concentration is illustrated in Table 5. The results show that 29.3% of the children were anaemic (Hb < 11 g/dl). The prevalence of anaemia was higher in male children (32.9%) than female children (25.8%). This difference

Table 5 Distribution of preschool children by sex and haemoglobin concentration

Sex	Haemoglobin concentration (g/dl)								Total	
	< 10		10–		11–		12+		No.	%
	No.	%	No.	%	No.	%	No.	%		
Male	48	12.8	75	20.1	151	40.4	100	26.7	374	100
Female	20	5.1	81	20.7	147	37.6	143	36.6	391	100
Total	68	8.9	156	20.4	298	39.0	243	31.8	765	100

$$\chi^2 = 19.06; P < 0.05$$

Table 6 Impact of children's birth order on haemoglobin concentration among preschool children

Birth order	Haemoglobin concentration (g/dl)								Total	
	< 10		10–		11–		12+		No.	%
	No.	%	No.	%	No.	%	No.	%		
1	8	4.6	23	13.1	73	41.7	71	40.6	175	100
2	13	7.9	27	16.5	65	39.6	59	36.0	164	100
3	15	10.3	34	23.3	55	37.7	42	28.8	146	100
4	14	10.9	33	25.6	45	34.9	37	28.7	129	100
5+	18	11.9	39	25.8	60	39.7	34	22.5	151	100
Total	68	8.9	156	20.4	298	39.0	243	31.8	765	100

$$\chi^2 = 27.57; P < 0.05$$

was mostly due to the high proportion of male infants suffering from severe anaemia (Hb < 10 g/dl). The difference was statistically significant ( $\chi^2 = 19.06; P < 0.05$ ).

Data presented in Table 6 show that the prevalence of anaemia was significantly associated with the birth order of the children ( $\chi^2 = 27.57; P < 0.05$ ). Anaemia was least prevalent in first-order children (17.7%) and was 24.4% in second-order children. The highest prevalence of anaemia was observed in fifth-order or later children (37.7%). The data also show that the prevalence of severe anaemia (Hb < 10 g/dl) was highest (11.9%) in children from the latter group as compared with 4.6% in first-order children.

Data presented in Table 7 show that anaemia was more prevalent in preschool children from low income families (36.6%) and decreased to 25.6% when the monthly family income was higher than KD 800. However, the difference was statistically not significant.

The impact of the mother's education on the prevalence of anaemia in preschool children is illustrated in Table 8. The results show that the prevalence of anaemia was inversely related to the mother's education. When the mother was a university graduate, the prevalence of anaemia in the children was 21.5%. This figure increased progressively and was highest (46.5%) when the mother was illiterate. Severe

Table 7 Impact of family income on haemoglobin concentration among preschool children

Family income (KD*)	Haemoglobin concentration (g/dl)								Total	
	< 10		10–		11–		12+		No.	%
	No.	%	No.	%	No.	%	No.	%		
< 600	18	9.8	49	26.8	61	33.3	55	30.1	183	100
600–800	19	9.7	39	20.0	75	38.5	62	31.8	195	100
800+	31	8.0	68	17.6	162	41.9	126	32.6	387	100
Total	68	8.9	156	20.4	298	39.0	243	31.8	765	100

$\chi^2 = 8.44$ ; statistically not significant

\* Kuwaiti dinar = US\$ 3.3

Table 8 Impact of mothers' education on haemoglobin concentration among preschool children

Mothers' education	Haemoglobin concentration (g/dl)								Total	
	< 10		10–		11–		12+		No.	%
	No.	%	No.	%	No.	%	No.	%		
Illiterate	10	17.2	17	29.3	19	32.8	12	20.7	58	7.6
Primary	13	12.7	25	24.5	37	36.3	27	26.5	102	13.3
Secondary	31	8.0	81	20.9	154	39.7	121	31.3	387	50.6
University	14	6.4	33	15.1	88	40.4	83	38.1	218	28.5
Total	68	8.9	156	20.4	298	39.0	243	31.8	765	100

$\chi^2 = 21.05$ ;  $P < 0.05$

anaemia (Hb < 10 g/dl) was particularly prevalent in the latter group (17.2%) and was least prevalent in children of university graduates (6.4%).

## Discussion

It has always been postulated that a sudden and sharp increase in family income would be reflected in an improvement of the nutritional status of family members. High income in Kuwait has been associated with increased dietary intake and with changes in food patterns. As income increased, so

did the consumption of soft drinks, tea, chocolates, sweets, nuts and ready-made foods [8]. Food was abundant among the most privileged and adequate among the relatively low income families [9]. With increased income, purchase and consumption of most food groups, especially protein-rich food, have increased. This is reflected in a sharp increase in the prevalence of obesity in adult females and males [5,6].

Literature review revealed that few studies had been previously implemented to evaluate the nutritional status of preschool children in Kuwait. The results of these studies can be used as a comparison

with the present study to detect any change in the prevalence of nutritional disorders.

In 1979, wasting was reported to be less than 1% [2]; it increased to 4.8% in 1985 [10] and was more than 10% in the present survey (Tables 1 and 2). The prevalence of stunting was also restricted to 3.8% of the children in 1979 [2], increased to 12.2% in 1985 [10] and was slightly lower in the present survey; 11.5% in male and 9.9% in female children. Although the nutritional status of preschool children in Kuwait is better than that reported in Oman [11], Bahrain [12] or Saudi Arabia [13], the results show that the rate of wasting has more than doubled over the last 10 years, suggesting a higher prevalence of acute nutritional deficiency and/or infection.

Several factors may contribute to the prevalence of undernutrition in Kuwaiti preschool children. The results presented in Table 3 show that both stunting and wasting were most prevalent in first children, usually born to young, inexperienced mothers who did not have adequate knowledge on how to feed their infants. This is confirmed by the fact that the prevalence of undernutrition was sharply reduced in late-order children when the mothers had gained more experience of child rearing.

The prevalence of undernutrition was also modified by the family income, being highest in low income families and relatively low in high income groups. In the 1985 survey, it was reported that children from low socioeconomic areas were much shorter, more underweight and more wasted than those from high socioeconomic areas [10].

Data presented in Table 4 show that although the prevalence of stunting was not modified by the mother's employment or education, wasting was most prevalent when the mother was illiterate or a housewife and was least prevalent in children of

university-educated mothers. It is expected that employment and education are related to family income. The majority of the educated mothers are employed and therefore generate more income for their families. They would also have better knowledge about the nutritional requirements of their children and have the necessary income to purchase the foods needed.

The results of this survey show that obesity was found in 16.1% of the boys and 18.4% of the girls. These rates are far higher than those reported in the 1985 survey [10] which was around 3%, but much closer to the rate of obesity reported in a 1986 study in the age group 6-17 years, which was 17.6% in males and 20.1% in females [4]. Several factors affected the prevalence of obesity among preschool children. Obesity was more prevalent in the first child in the family, declined gradually in subsequent children but showed a sharp increase in late-order children. The result suggests that the first child received more care from the young mothers which may be reflected in overfeeding and hence obesity. It could also be postulated that many mothers in the Middle East would prefer to have an overweight or obese infant than an infant with normal body weight. This belief is more common among illiterate mothers. Data presented in Table 4 show that the rate of obesity was higher in unemployed or illiterate mothers or those with only primary school education. University graduates were more likely to keep the body weight of their infants within the normal range. As a result, the prevalence of obesity was sharply reduced.

The fact that obesity, wasting and stunting are more prevalent in first-borns may be attributed to the fact that some of the young mothers are living with their mothers-in-law in extended families. Under these circumstances, infants would enjoy the good



care and experience of their grandmother and would be more likely to be better fed and more liable to become obese. On the other hand, when the young mother is living in a separate home, the child would be more susceptible to undernutrition.

The prevalence of anaemia in preschool children has declined from a high rate of 46.9% in 1975 to 29.3% in the present survey. Although the results reflect a marked reduction in the prevalence of anaemia, nevertheless a good proportion of the children are anaemic. The results show that anaemia was more prevalent in boys (32.9%) than in girls (25.8%). Late-order children were more susceptible to the development of anaemia. The iron stores of mothers are usually depleted after repeated pregnancies, rendering the mothers more susceptible to anaemia. Anaemia in infancy appears at an earlier age in infants born to anaemic mothers [14]. Anaemia also tended to be more prevalent in children from low income families of illiterate mothers who did not have the proper knowledge

about infant nutrition, but this association was statistically not significant. Feeding habits may also affect the occurrence of iron deficiency anaemia. The intake of food rich in vitamin C such as fruit juices is very low, particularly among preschool children. The main dishes commonly consumed in the affluent countries of the Arabian peninsula contain low amounts of iron and vitamin C [15].

Proper intervention programmes should be designed and implemented to control the prevalence of nutritional disorders prevailing in preschool children in Kuwait. The programmes should be directed to control nutritional problems associated with inadequate or improper dietary intake such as stunting, wasting, anaemia and obesity associated with overfeeding and excessive food intake.

### Acknowledgement

This study was funded by a grant from the Kuwait Foundation for the Advancement of Sciences.

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