Low adherence of Kuwaiti adults to fruit and vegetable dietary guidelines

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تدني مستوى امتثال الكويتيين البالغين بالدلائل الإرشادية حول النظم الغذائية الغنية بالفاكهة والخضراوات

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الخلاصة: هدفت هذه الدراسة إلى تقييم امتثال الكويتيين البالغين بالدلائل الإرشادية حول النظم الغذائية الغنية بالفاكهة والخضراوات يومياً. وقد جُمعت المعطيات من دراسات وطنية مقطعية عرضية في المدة من 2006 حتى 2008، وشملت 9350 بالغاً. وقد جمع معطيات ديموغرافية، وحول تكرار استهلاك الفاكهة والخضراوات، ومؤشرات للقياسات البشرية ولأنماط الحياة. وقد ذكر حوالي 11٪ من الناس عن تناولهم 5 حصص من الفاكهة والخضراوات يومياً، وبلغ متوسط الاستهلاك 3.04 مرات يومياً. زاد الاستهلاك مع العمر ومع مؤشر كتلة الجسم، ولكنه انخفض مع التدخين، ومع عدم ممارسة التمارين الرياضية. ولوحظ تغير طفيف في الامتثال بتناول 5 حصص من الفاكهة والخضراوات يومياً بين عامي 2006 و2008. إلا أن متوسط الاستهلاك اليومي لمجمل الخضراوات والسلطة الخضراء قد قل، بينما زاد مجمل تناول الفاكهة وعصير الفاكهة والبطاطس المطبوخة والمقلية. ويشير انخفاض تكرار تناول الفاكهة والخضراوات بين الكويتيين البالغين إلى الحاجة إلى تبنّي أنماط غذائية صحية لمكافحة الأمراض المزمنة.

ABSTRACT The study aimed to assess the adherence of Kuwaiti adults to dietary guidelines for daily fruit and vegetable intake. Data were compiled from national cross-sectional studies from 2006 to 2008 including 9350 adults. Demographic data, frequency of fruit and vegetable consumption and anthropometric and lifestyle indicators were collected. Approximately 11% of people reported consuming 5 or more fruits and vegetables daily with a mean consumption of 3.04 times per day. Consumption increased with age and body mass index but decreased with smoking and non-exercising. Minimal change in compliance with 5-per-day fruit and vegetable consumption was observed between 2006 and 2008. However, the average daily consumption of total vegetables and green salads decreased and of total fruits, fruit juices and cooked and fried potatoes increased. The low frequency of fruit and vegetable consumption among Kuwaiti adults indicates the need to adopt more healthy eating patterns to control chronic diseases.

Faible application des directives diététiques concernant les fruits et les légumes par les adultes koweïtiens

RÉSUMÉ La présente étude visait à évaluer l'application par les adultes koweïtiens des directives diététiques concernant la consommation journalière de fruits et de légumes. Les informations ont été compilées à partir d'études nationales transversales menées entre 2006 et 2008 portant sur 9350 adultes. Des données démographiques, la fréquence de consommation de fruits et de légumes, des indicateurs anthropométriques et les habitudes de vie ont été collectés. Environ 11 % des personnes de l'étude ont indiqué consommer au moins cinq fruits et légumes par jour. La consommation moyenne était de 3,04 fois par jour. La consommation augmentait avec l'âge et l'indice de masse corporelle mais diminuait chez les fumeurs et les personnes sans activité physique. Une faible évolution vers la consommation journalière de cinq fruits et légumes a été observée entre 2006 et 2008. Toutefois, la consommation quotidienne moyenne totale de légumes et de salades vertes a diminué, alors que celle de fruits, jus de fruits frais et pommes de terre cuisinées ou frites a augmenté. La faible fréquence de la consommation de fruits et de légumes chez les adultes koweïtiens démontre la nécessité d'adopter des modes alimentaires plus sains pour lutter contre les maladies chroniques.

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Introduction

Fruit and vegetable consumption is an integral component of healthy eating behaviour [1]. High fruit and vegetable consumption is associated with low risk of diabetes, cancer, hypertension and cardiovascular diseases [2–5]. Data from the 2002–03 World Health Survey of adults aged 19–99 years in 52 low- to middle-income countries showed that 78.0% consumed less than the minimum recommended 5 daily servings of fruit and vegetables [6]. Similar results from high-income countries (United States, France and England) showed a low prevalence of adequate fruit and vegetable intake [7–9]. The Healthy People 2010 guidelines established objectives to increase the percentage of people in the population who consume 3 portions of vegetables and 2 of fruit per day [1]. The World Health Organization (WHO), the United States National Cancer Institute and the Committee on Dietary Guidelines for Americans also recommended increasing the level of fruit and vegetable consumption to improve health [10–12].

In Kuwait about 75% of the adult population are either overweight or obese and suffer from one or more nutrition-related noncommunicable diseases such as diabetes, coronary heart diseases and hypertension [13,14]. A trend of increased overweight and obesity among adults aged 30–60 years was observed between 1996 and 2006, with a faster increase in the obesity rate, from 31% to 46% among men and 48% to 58% among women. In addition, 40%–46% of Kuwaiti adolescents aged 10–19 years are overweight or obese, the highest prevalence in the world [15]. The Food and Agriculture Organization food balance sheets data for Kuwait revealed decreased *per capita* availability of cereals, pulses, fruits and sugar between 1969 and 1971, and 1992 and 1994 and increased *per capita* consumption of vegetables and fat and oils [16,17]. Meats, eggs, fish and milk were more available. The *per capita* vegetables consumed increased from 107 to 147 kg/year while the *per capita* fruit consumed decreased from 128 to 120 kg/year [16].

In the absence of national food consumption data for individuals, determinants of the rapid growth in the prevalence of overweight, obesity and nutrition-related noncommunicable diseases and the level of compliance of Kuwaitis to a healthy dietary pattern are not clear. The current study assessed the adherence of Kuwaiti adults to international fruit and vegetable dietary guidelines using the Kuwait national surveillance system data.

Methods

The Administration of Food and Nutrition of the Ministry of Health in Kuwait established a national surveillance system in 1998 to monitor the health of adult Kuwaitis attending the Kuwait Medical Council and Public Authority for Social Security facilities. The system was designed to collect data on a broadly representative sample of the Kuwaiti population.

Study population

For this report a cross-sectional study design was applied. Adults who attended the health centres of the Kuwait Medical Council or Public Authority for Social Security over the period 2006 to 2008 were recruited for the study. Kuwait Medical Council is the only health facility in the country that provides mandatory checkups for potential employees. If problems are identified during screening, patients are referred to an appropriate health facility for medical intervention. The Public Authority for Social Security provides pension benefits to retirees and health screening. This is the only facility of its type in Kuwait.

Staff from the Administration of Food and Nutrition attended the 2 centres in order to invite randomly selected participants from the waiting rooms of the clinics to participate in the study. The refusal rate was 3%. Information on 9350 adults equally representative of years 2006 (n = 2953), 2007 (n = 3417) and 2008 (n = 3384) was analysed. The purpose of the surveillance was explained at both centres and informed consent was obtained from each subject. The Ministry of Health gave ethical approval for the study.

Data collected

The analysis for this report was based on data collected from surveillance activities in the years 2006–08. The data collected included: measurements of body weight and height to calculate body mass index (BMI); demographic and lifestyle data (age, sex, education level attained, employment status, smoking and physical activity level); and assessment of fruit and vegetable consumption. Employment status, current smoking and physical activity were binary variables (yes/no). The food frequency questionnaire was a 7-item questionnaire based on the Centers for Disease Control (CDC) Behavioral Risk Factor Surveillance System (BRFSS) [18] and included questions about how often fruit juices, fresh fruits, green salads, french fries, potatoes other than french fries, carrots and other vegetables were eaten. Total daily fruit consumption was calculated from the sum of the number of times fruit juice and fresh fruit were consumed, while total daily vegetable consumption was the sum of the number of times the 5 vegetables, including french fries, were eaten. Total daily fruit and total daily vegetable intakes were calculated. To calculate times of consumption per day, weekly frequencies were divided by 7, monthly frequencies by 30 and yearly frequencies by 365.

Statistical analysis

Data were analysed using *SPSS*, version 15. Pearson chi-squared and analysis of

variance (ANOVA) were used to detect differences in the frequency of fruit and vegetable intakes by sociodemographic variables, survey year, smoking, employment status and exercise level. Arithmetic means of frequency of daily fruit and vegetable consumption were calculated and differences by age and survey year were tested using ANOVA with *post hoc* least significant difference test (alpha). The percentage of participants complying with the 2005 US dietary guidelines for fruit and vegetables consumption [10] was described. $P < 0.05$ was considered statistically significant.

Results

Sample description

The mean age of the participants was 38.9 (SD 12.2) years. Women represented 52.4% of the sample of all survey years combined. Almost one-quarter of the sample reported attaining less than high school education while 30.8% had a bachelor degree or more. The proportion of participants employed was 61.6%. A total of 29.1% reported taking physical exercise and 27.2% reported that they were smokers.

Frequency of fruit and vegetable intake

Only 10.8% of the sample consumed ≥ 5 fruits and vegetables daily (Figure 1), 14.7% consumed ≥ 3 vegetables and 24.9% consumed ≥ 2 fruits per day. In addition, the percentage consuming ≥ 5 fruits and vegetables increased from 2006 to 2008 by almost 2%, and the consumption of ≥ 2 fruits per day significantly increased from 2006 to 2008 by 6.6% ($P < 0.05$). The percentage consuming vegetables ≥ 3 times decreased almost 2%

The characteristics of the participants by frequency of fruit and vegetable consumption and changes in consumption between 2006 and 2008 are shown in Table 1. Men differed significantly from women in the amounts of fruit and vegetables consumed only in 2008. More men consumed ≤ 2 fruits and vegetables per day while fewer consumed 3–4 fruits and vegetables daily. In contrast, more women consumed ≥ 5 fruits and vegetables while fewer consumed 1–2 and 3–4 per day.

There was a significant linear relationship between age category and adequacy of fruit and vegetable intake in each survey year. A higher percentage of younger age groups fell in the lowest fruit and vegetable consumption categories ($\chi^2 = 24.2$, $P = 0.06$ in 2006; $\chi^2 = 33.9$, $P = 0.05$ in 2007; $\chi^2 = 34.9$, $P = 0.003$ in 2008). Participants 60 years and older, however, were more likely to be in the highest category of intake in each survey year.

Education level was not significantly associated with frequency of fruit and vegetables consumption; however a slightly higher percentage of college graduates were in the highest 2 categories for fruit and vegetable consumption in all 3 survey years. Surprisingly, unemployed participants were significantly more likely to meet the 5 per day of fruit and vegetable consumption ($\chi^2 = 8.5$ $P = 0.04$ in 2006; $\chi^2 = 8.9$ and $P = 0.03$ in 2008). Exercisers were also more likely to fall into the 2 highest fruit and vegetables in all 3 survey years ($\chi^2 = 54.6$,

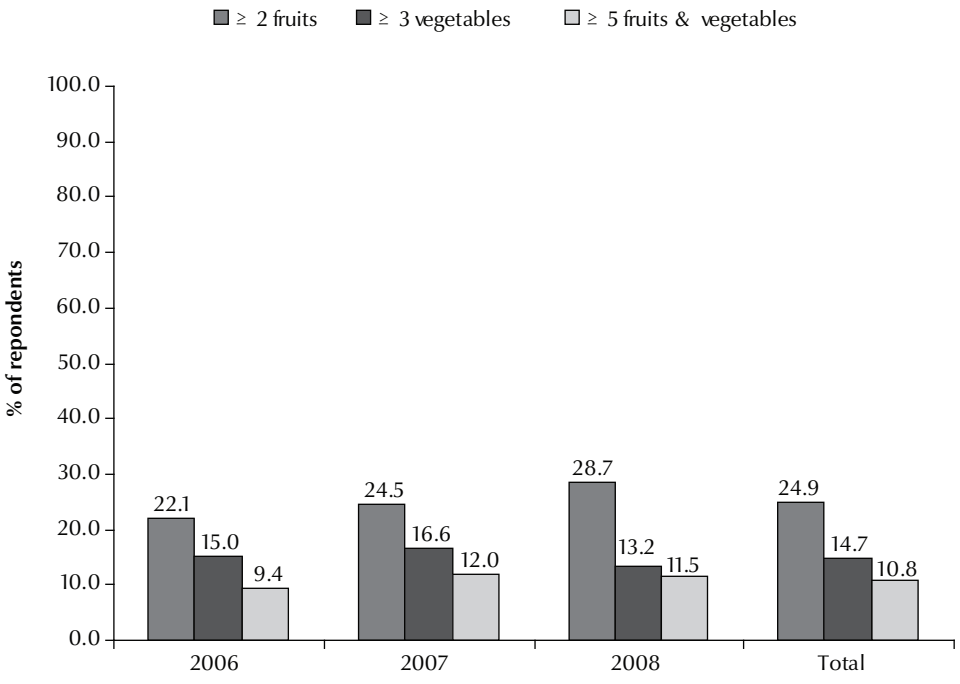

Figure 1 Daily frequency of fruit and vegetable consumption among Kuwaiti adults, 2006–2008 (*n* = 9350)

Table 1 Daily frequency of fruit and vegetable consumption by Kuwaiti adults (n = 9350) by demographic and lifestyle characteristics, 2006–2008

Variable	Total	2006					2007					2008				
			< 1 time	1–2 times	3–4 times	≥ 5 times		< 1 time	1–2 times	3–4 times	≥ 5 times		< 1 time	1–2 times	3–4 times	≥ 5 times
	No.	No.	%	%	%	%	No.	%	%	%	%	No.	%	%	%	%
Sex [a]																
Women	4888	1560	5.0	46.7	39.0	9.3	1653	3.7	45.1	38.6	12.6	1675	7.5	44.1	36.4	12.1
Men	4462	1227	4.6	48.0	37.4	10.0	1649	4.1	48.2	35.8	11.9	1586	5.7	49.2	33.8	11.3
Age (years) [b]																
18–29	2414	737	3.7	49.5	37.3	9.5	749	4.3	47.7	34.7	13.4	928	7.5	49.2	32.2	11.0
30–39	2496	704	5.7	48.9	36.5	8.9	895	3.7	50.4	34.2	11.7	897	7.8	49.3	32.7	10.3
40–49	2482	795	5.8	48.6	37.0	8.7	879	4.6	48.1	37.0	10.4	808	5.4	44.9	36.1	13.5
50–59	1406	410	3.7	40.2	44.6	11.5	541	2.6	39.9	44.2	13.3	455	5.1	39.6	42.9	12.5
> 60	552	141	4.3	41.1	41.1	13.5	238	4.2	39.1	41.6	15.1	173	4.6	44.5	38.2	12.7
Education																
Below high school	2279	653	4.9	46.2	38.9	10.0	865	5.3	48.0	35.1	11.6	761	5.4	50.3	33.4	10.9
High school	1825	502	6.4	49.0	35.9	8.8	656	3.7	46.0	37.5	12.8	667	5.8	46.9	35.1	12.1
Diploma	2347	676	5.0	48.8	37.9	8.3	796	4.1	48.5	36.6	10.8	875	7.7	46.9	35.0	10.5
Above college education	2899	956	3.8	46.0	39.4	10.8	985	2.6	44.4	39.4	13.6	958	7.1	43.1	36.6	13.2
Employment [c]																
No	3557	1146	6.0	46.5	37.0	10.5	1278	4.4	46.6	36.1	12.9	1133	6.9	43.1	37.2	12.9
Yes	5693	1541	4.0	47.8	39.2	9.0	2024	3.6	46.6	37.9	11.8	2128	6.4	48.4	34.0	11.1
Exercise [d]																
No	6590	1938	5.6	50.9	35.4	8.1	2279	4.2	50.3	35.0	10.6	2373	7.1	49.4	33.4	10.1
Yes	2760	849	3.1	39.0	44.9	13.1	1023	3.3	38.5	42.2	15.9	888	5.3	39.0	39.6	16.1
BMI (kg/m²)																
≤ 25	2030	603	4.0	49.1	38.8	8.1	677	4.7	47.8	35.3	12.1	750	6.9	48.4	34.1	10.7
25–30	3442	998	5.1	47.4	37.3	10.2	1204	4.1	46.3	37.1	12.5	1240	6.5	45.8	35.2	12.5
≤ 30	3869	1184	5.0	46.3	38.9	9.9	1417	3.4	46.4	38.2	12.1	1268	6.6	46.3	35.6	11.5
Smoking [e]																
No	4753	1217	3.6	48.1	38.8	9.5	1458	4.3	47.7	36.8	11.2	2078	7.2	45.0	35.4	12.4
Yes	1775	486	6.8	48.1	35.0	10.1	635	4.6	48.3	34.6	12.4	654	6.3	48.5	33.9	11.3

$P < 0.05$, chi-squared tests: [a]Between men and women (2008); [b]Between age groups (2007 and 2008); [c]Between employed and unemployed (2006 and 2008); [d]Between exercisers and non-exercisers (2006, 2007 and 2008); [e]Between smokers and non-smokers (2006).
BMI = body mass index.

$P = 0.001$ in 2006; $\chi^2 = 48.8$, $P = 0.001$ in 2007; $\chi^2 = 45.5$, $P = 0.001$ in 2008). Participants with BMI < 25 kg/m^2 tended to be in the lowest 2 categories of fruit and vegetable consumption although this relationship was not statistically significant.

Smokers were significantly different from non-smokers and were more likely to have lower intakes of fruit and vegetables ($\chi^2 = 9.2$, $P = 0.03$ in 2006); 55% of smokers compared to 52% of non-smokers consumed ≤ 2 fruit and vegetable in 2006.

Changes in intake of fruits and vegetables over time

Table 2 shows the average frequency of consumption of fruit and vegetable items between 2006 and 2008. The total fruit intake showed a significant increase mainly due to an increase in fruit juice intake. Total vegetable intake decreased significantly in spite of an increase in cooked and fried potato consumption ($P < 0.05$). There was a marked decline in consumption of green salads and other vegetables ($P < 0.05$). Furthermore significant sex differences were detected. The total fruit intake increased significantly among women but insignificantly among men ($P < 0.05$). Both fresh fruit and fruit juice intakes increased markedly among women while in men intake of fruit juice increased but intake of fresh fruits decreased ($P < 0.05$).

Discussion

The recommended 5 per day fruit and vegetable consumption was practised by only 10.8% of Kuwaiti adults, with no differences between the sexes and little change between 2006 and 2008. The frequency of fruit and vegetable consumption was lower than the recommended WHO and US dietary guidelines [1,5] and was less than that of adults in the US, Britain and France [7–9].

In Kuwait, the percentage of adults who consumed fruit ≥ 2 times daily was 24.9% and vegetables ≥ 3 times daily was 14.7%, while in the US it was 33% and 27%, respectively [19]. Moreover, a regional comparison showed that 22.2% of Emirati men and 25.5% of Emirati women consumed ≥ 5 portions of fruits and vegetables per day, again far more than their Kuwaiti counterparts [6].

The current study showed that men did not differ from women in daily fruit and vegetable consumption. US reports showed more men (36.4%) than women (28.7%) consumed fruit ≥ 2 times per day [20].

In addition to determining the extent to which Kuwaiti adults adhere to dietary guidelines for fruit and vegetable consumption, this study described those who did not comply with the guidelines. Unlike other studies from Europe and the US, there was no significant association between educational attainment and fruit and vegetable consumption and there was a negative association with being employed. Similar to other countries, non-exercisers and smokers consumed fewer total fruit and vegetables and < 2 fruits and < 3 vegetables daily [6,7,9,20] and, as in the US, older adults consumed more fruit and vegetables.

Kuwaiti adults consumed fruit and vegetables an average of 3.04 times per day compared with 3.24 times for Americans [7], 3.6 portions for French [9] and 2.8 portions for British [21] adults for similar years. Fruit and vegetable consumption among American adults decreased over time, from 1994 through 2005, for all food items except for green salad [7]. It is

Table 2 Mean frequency of daily fruit and vegetable consumption among Kuwaiti men and women, 2006–08

Type of fruit and vegetable	Mean no. of times per day								
	Both sexes			Women			Men		
	2006	2007	2008	2006	2007	2008	2006	2007	2008
Fruit									
Fruit juice	0.53[b]	0.57[b]	0.63[a]	0.52[b]	0.56[b]	0.65[a]	0.54[b]	0.57[b]	0.61[a]
Fresh fruit	0.63	0.64	0.64	0.58[a]	0.62[a,b]	0.66[b]	0.68	0.66	0.63
Total fruit	1.15[b]	1.18[b]	1.25[a]	1.09[b]	1.16[b]	1.29[a]	1.21	1.21	1.22
Vegetables									
Green salad	0.74[b]	0.77[b]	0.69[a]	0.74[b]	0.80[a]	0.73[b]	0.73[b]	0.74[b]	0.65[a]
Fried potatoes	0.22[b]	0.25[b]	0.33[a]	0.23[b]	0.25[b]	0.32[a]	0.20[b]	0.24[b]	0.33[a]
Other potatoes[c]	0.28[b]	0.28[b]	0.33[a]	0.28[b]	0.27[b]	0.34[a]	0.28[b]	0.29[b]	0.33[a]
Carrots	0.36	0.41	0.35	0.41[b]	0.44[b]	0.35[a]	0.29[a]	0.37[b]	0.35[b]
Other	0.39[b]	0.40[b]	0.37[a]	0.37[b]	0.39[b]	0.33[a]	0.42	0.40	0.40
Total vegetables	1.90[b]	1.99[b]	1.78[a]	1.94[b]	2.05[b]	1.78[a]	1.85[b]	1.93[a]	1.79[b]
Total fruit & vegetable	3.04[b]	3.18[a]	3.04[b]	3.03[b]	3.21[a]	3.07[b]	3.06	3.14	3.01

[a]P < 0.05; [b]P > 0.05 versus values marked with the same letter.
[c]Baked, boiled or mashed.

worth noting that within the 3 survey years of the current study, the total fruit and vegetable consumption did not change, but a major increase took place in fruit juice and cooked and fried potato intakes, accompanied by a marked reduction in consumption of green salads and other vegetables, indicating a distinct deviation from the recommendation to increase dark green and orange vegetables. As the current study did not differentiate between types of juice products—whether fresh fruit juice, packaged drinks or nectar—it is not possible to conclude whether the increase in fruit products actually helped to meet the 5-per-day recommendation or if it only reflects the expansion of the Kuwaiti market for sweetened beverages. As pointed out by Caswell, increased consumer understanding, knowledge and proper interpretation when selecting juice products in the market is required to satisfy fruit intake recommendations [22].

Another limitation of this study was that traditional Kuwaiti foods are composite dishes that include vegetables that may not be included in the estimation of vegetable consumption. This may explain the higher estimates of 6.1 servings per day reported previously for Kuwaitis using a 152-item food frequency questionnaire [23]. Furthermore, participants were not asked about serving sizes or amounts consumed, which may have distorted the true frequency of intake. Dietary data from 1999–2000 in the National Health and Nutrition Examination Survey estimated that 45.6% of adults aged 18 years and older had 5 or more serving of fruit and vegetables [24], while almost half that percentage (22.5%) was reported when analysing the 2003 CDC-BRFSS data [9]. Different dietary data instruments and food frequency estimates between these studies explain the large discrepancies.

The strength of the current study was the large sample size and the standardized protocol for collection of data over time, which was able to reveal significant trends. Nevertheless, more research is needed to develop a reliable, valid instrument for accurate identification and estimation of fruit and vegetable consumption for the Gulf region. Additionally, determination of the population's knowledge and awareness of dietary patterns that prevent and control chronic diseases is necessary to develop and implement comprehensive programmes aimed at increasing fruit and vegetable consumption.

Assessment of Kuwaiti adults' compliance with dietary guidelines for fruit and vegetable consumption warrants public health action to identify opportunities for improvement through environmental, policy and system approaches. The Kuwait surveillance system is an important tool for monitoring progress, revealing trends in consumption frequencies and evaluating the country's efforts in promoting healthy lifestyles.

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