Components of an Obesogenic Environment in Kuwait

Sara D. Garduño-Diaz[a,*] and Philippe Y. Garduño-Diaz[b]

[a]*American University of the Middle East, P.O. Box 220 Dasman, 15453 Kuwait*

[b]*Independent consultant in Sustainable Development, Khalid Tower 63 Mahboula, 51008 Kuwait*

Abstract: *Objective*: To analyze the physical, economic, political and sociocultural components of the environment in Kuwait and determine if the country classifies as an obesogenic environment.

Design: Observational, cross-sectional study following the ANGELO framework. Data from a popular online food delivery system was accessed and the nutrient composition for these foods was calculated.

Setting: Kuwait

Results: Meeting the majority of the characteristics required to be identified as such, Kuwait is found to have an obesogenic environment. Availability and accessibility to an almost unlimited amount of food, energy, trans fats and sugars are likely to be significant contributors to obesity and diet-related diseases.

Conclusions: In tandem to the diet, harsh climate conditions, sociocultural practices and a lifestyle designed for decreased energy expenditure contribute to the creation of an obesogenic environment.

Keywords: ANGELO, obesity, fast food, home delivery, food composition.

INTRODUCTION

Residents in countries undergoing economic development are increasingly exposed to obesogenic environments. Rapid lifestyle changes leave little room for adjustment in levels of physical activity, energy intake and diet quality. Kuwait, one of the richest countries in the world, is rapidly becoming one of the fattest. In 2010, the World Health Organization (WHO) estimated a 30% obesity prevalence for men and a 55% obesity prevalence for women in Kuwait, ranking it the most obese among Arabic-speaking countries [1]. Previously a country dominated by a nomadic lifestyle and the trading of pearls, Kuwait has experienced rapid economic growth since the discovery of oil in 1938 [2]. Following the brief occupation by Iraq in 1990 and the intervention of the United States of America, changes in the lifestyle and eating habits within Kuwaiti society resulted in a rapid increase in obesity prevalence.

An increase in obesity prevalence usually parallels industrial development, which in the Gulf region is linked to significant growth in income resulting largely from rich hydrocarbon deposits. Urbanization and modernization, from a health-perspective, are negatively affecting the life quality in the Gulf region. Expanding road networks, increased availability of cars, greater use of mechanized home appliances, widespread use of computers, televisions and electronic gaming devices encourage a more sedentary lifestyle [3]. Settings that promote decreased energy expenditure and sedentary behavior add to the creation of obesogenic environments by facilitating energy intake from easily accessible food supplies including restaurants and take away services. On the other hand, people living in isolated rural areas in countries like the United Arab Emirates maintain a Bedouin-like lifestyle, consuming traditional foods and being more physically active than their urban counterparts [4].

By making use of online ordering systems, the time previously spent on ingredient acquisition and food preparation is being reduced through having almost immediate access to energy (calories). Further, the portion size and nutrient compositions of foods ordered online must be considered. It has been reported that out-of-home meals are relatively large compared to home-prepared meals [5]. Foods purchased from fast-food outlets and restaurants are becoming a growing part of people's diet and, more recently, the convenience of ordering these foods online is increasing their consumption even more. Such foods have been found to be up to 65% more energy dense than the average American diet and intakes of certain micronutrients are lower in populations consuming more fast-food [6, 7]. As many of the fast food chains operating in Kuwait are the same as those in the USA the situation is likely to be similar in terms of energy density and limited nutrient consumption. According to the WHO, Kuwait is classified as a country in an advanced nutritional transition stage, with high levels of overweight and obesity, and moderate under nutrition

*Address correspondence to this author at the American University of the Middle East, P.O. Box 220 Dasman, 15453, Kuwait; Tel: +(965) 975 69 147; E-mail: sara.gardunodiaz@aum.edu.kw

E-ISSN: 1929-5634/14

and micronutrient deficiencies in some population subgroups. In Kuwait most of the food commodities are imported and traditional foods and eating practices are being rapidly replaced by energy-dense high-fat foods [8].

Aside from a physiological need for food, people eat for several different reasons. People eat when they are bored, when thirsty, when around food, when in company, when alone and when it is "time" to eat. Most people also eat because of hedonic hunger, that is, simply because it feels good. In Kuwait, as in most Arabic-speaking countries, food intake is part of the socializing process, based on large gatherings where traditional meals consisting of rice (high-carbohydrate) and meat (high-fat) are shared [9]. Western style fast food restaurants are abundant in Kuwait. Similarly, ordering food to be delivered to the place of residence or work is a common practice. Studies looking into the association between takeaway food outlets, which are being ordered online with increasing frequency, found that greater access to food is associated with greater body-mass index and prevalence of overweight and obesity [10]. On the other hand, in Bahrain, frequent consumption of fast food has been reported alongside more favorable eating practices such as fresh fruit consumption [11]. In tandem with the food selection in the Gulf region, harsh climate, sociocultural practices and a lifestyle designed for increased comfort contribute to the creation of an obesogenic environment.

Defining an obesogenic environment is in itself a complex endeavor as the factors that influence individual weight gain are many and varied. A comprehensive framework for conceptualizing an obesogenic environment, called the Analysis Grid for Environments Linked to Obesity (ANGELO), has been developed. This framework dissects the environment on two dimensions, size (micro or macro) and type (physical, economic, political and sociocultural), for measures related to obesity including dietary behavior, physical activity or weight [12]. While the physical dimension has been most commonly studied in terms of urban design, land use and transportation; the natural environment tends to be less extensively explored, including climate, terrain and air quality. The economic dimension includes factors such as food insecurity, income and education. In the political dimension rules and policies can be found. As for the sociocultural dimensions the focus includes social support, traditions and socially acceptable behavior.

The aim of this study was twofold. First, to identify the most frequently consumed home-delivered foods and their nutrient contribution to the diet of Kuwaiti residents compared to data from Bahrain and the United Arab Emirates (UAE). Second, to theorize on how, in addition to this continuous access to food, other aspects of the local surroundings create an obesogenic environment in Kuwait following an environmental assessment based on the ANGELO framework.

EXPERIMENTAL METHODS

Data from a popular online food delivery system [13] was accessed and evaluated for the ten most frequently ordered foods in Kuwait. Nutrient composition was calculated using food composition data from the USDA; this food composition database was selected as most of the food in Kuwait is imported and a large amount of restaurants in the country are of American origin. Where composition data of a specific item was available directly from the restaurant or manufacturer this composition was used. Composition data is presented per portion; portion sizes were obtained directly from the producers of each food. The most frequently ordered foods from the same online system in neighboring countries (Bahrain and the UAE) were also identified and compared.

The online food delivery system has been operating since 2004, currently serving the State of Kuwait, the Kingdom of Saudi Arabia, the Kingdom of Bahrain, the United Arab Emirates, the Sultanate of Oman and the State of Qatar. It is considered a pioneer system in its field and one of the first of its kind in the Middle East. The system includes more than 1000 restaurants of various cuisines and reports to have had more than 5 million orders to date. This online food delivery system has over 250, 000 registered members (a requirement for using their services) and claims to receive more than 20, 000 visits per day. The system received the "Kuwait e-Award" in 2008-2009 and again in 2011-2012 for the e-business category from the Kuwait Foundation for the Advancement of Science (KFAS).

In addition to this continuous access to food using the online delivery system, other aspects of the local surroundings that may create an obesogenic environment in Kuwait were explored following an environmental assessment based on the ANGELO framework. ANGELO is a conceptual model for understanding the obesogenicity of environments and a practical tool for prioritizing environmental elements for research and intervention [14]. The basic framework is

a 2 x 4 grid, which divides the environment into environmental size (micro and macro) by type: physical (what is available), economic (what are the costs), political (what are the "rules"), and sociocultural (what are the attitudes and beliefs). Within this grid, the elements which influence food intake and physical activity are characterized as obesogenic or "leptogenic" (promoting leanness). Based on existing literature 9 indicators were identified for the physical factors, 3 for the economic, 3 for the political and 6 for the sociocultural. The specific indicators are listed on Table **1**. Each indicator was assessed individually based on observations of the local environment obtained from a yearlong stay of the researchers in Kuwait, from the literature and from consultation with local residents regarding lifestyle and practices.

RESULTS

Food Data

The database consulted is a web-based multi-restaurant ordering system wherein the costumer accesses the online menu, places an online order, pays for the food and service and has the order delivered to the location of their choice. While the website service runs continuously some restaurants have a closing time for delivery, while others deliver 24 hours a day. The system monitors the order to ensure that no order is lost as well as for delivery and tracking. It is possible to obtain a list of the most frequently ordered foods at any given time on any given day. A description of the dishes as well as a photograph is available from the website.

Table 1: Indicators for Physical, Economic, Political and Sociocultural Determinants of an Obesogenic Environment in Kuwait

Factor	Indicator	Obesogenic	Leptogenic	Example
Physical	Accessibility/availability	X		Close to unlimited access to food
	Walkability	X		Weather and long distances hinder walking
	Sedentary activities	X		Limited options due to climate and culture
	Exposure to food advertisements	X		Continuous, omnipresent and tailored to the local community
	Automotive use	X		Frequent and almost exclusive means of transportation
	Poor sidewalk quality	X		Obstructed and often non-existent
	Lack of interesting sites	X		Limited choices for leisure time activities
	Climate	X		Extreme temperatures and desertification
	Air quality	X		Polluted from oil industry and sandstorms
Economic	Socioeconomic status	X		High socioeconomic status with ample percentage designated to food
	Food security	X		Food supply dependent almost exclusively on imports
	Education	X		Nutritional education limited to non-existent
Political	Religious law		X	Fasting practices and other quranic teachings regarding food
	Pork meat and alcohol ban		X	Restricted consumption of foods liked to excessive caloric intake
	Food imports	X	X	Diverse and fresh products available year round. Elimination of seasonal eating.
Sociocultural	Gender roles	X		Restriction in female physical activities, multiple pregnancies
	Traditional foods	X		High in carbohydrates and fats
	Patterns of meal consumption	X	X	Family oriented but irregular eating hours and constant food intake
	Television viewing hours	X		Popular form of sedentary entertainment
	Family structure	X	X	Large extended families to socialize with during meal times
	Attitude towards obesity	X		Desirability of some degree of obesity

Table 2: Most Frequently Ordered Food Items for Home-Delivery in Kuwait, Bahrain and the United Arab Emirates

Kuwait		Bahrain		United Arab Emirates	
Food item and ranking of popularity	**Description**	**Food item and ranking of popularity**	**Description**	**Food item and ranking of popularity**	**Description**
1 The Original (burger)	Beef burger meat in white burger bread with mayonnaise and ketchup, pickles and onions	1 The Original (burger)	Beef burger meat in white burger bread with mayonnaise and ketchup, pickles and onions	1 Chicken crisps	Salted, battered and fried chicken strips
2 Cookie	Chocolate chip cookies (2 per pack)	2 Chicken pasta	Boiled wheat pasta cooked with chicken topping	2 Texas chicken	Battered and fried chicken pieces
3 American fries	Salted and sliced fried potatoes	3 Greek salad	Lettuce based with feta cheese, olives, tomatoes and olive oil dressing	3 American fries	Salted and sliced fried potatoes
4 Cheese fries	Salted and sliced fried potatoes covered in melted American style cheese	4 Cheese burger	Beef burger meat in white burger bread with American style processed cheese, mayonnaise, ketchup, pickles and onions	4 Elevation burger	Beef burger meat in white burger bread with mayonnaise and ketchup, pickles and onions
5 Rocket double (burger)	Double layered beef burger meat in white burger bread with mayonnaise, ketchup, pickles and onions	5 Fancy fries	American style French fries topped with melted cheese and fried onions	5 Cheese burger	Beef burger meat in white burger bread with American style processed cheese, mayonnaise, ketchup, pickles and onions
6 Chili cheese fries	Salted and sliced fried potatoes covered in melted American style cheese and topped with minced meat cooked in spicy tomato sauce	6 Shawarma (lamb)	Mixed lamb cuts, thinly sliced and roasted	6 Chicken teriyaki (sub)	Teriyaki glazed chicken strips, sweet onion sauce served with vegetables and dressing on bread
7 Half rings & half fries	Salted, battered and fried onion slices served with sliced fried potatoes	7 Smoke house burger	Beef burger meat in white burger bread with American style processed cheese, onion rings, bacon, mayonnaise, dressing, ketchup, pickles and onions	7 Whopper (burger)	Beef burger meat in white burger bread with American style processed cheese, mayonnaise, ketchup, pickles and onions
8 Chicken fries	Salted, battered and fried chicken strips 5 pieces	8 Soda (cola) drink	Cola flavored carbonated sweetened drink	8 The original (burger)	Beef burger meat in white burger bread with mayonnaise and ketchup, pickles and onions
9 Twelve (burger)	Beef burger meat in white burger bread with mayonnaise, ketchup, pickles and onions	9 Fatoush (salad)	Lettuce based salad with chopped radishes, cucumber, fried pitta bread, coriander and lemon dressing	9 Frozen yogurt	Yogurt based frozen dessert. Plain version, without toppings
10 Chicken Royale	Battered and fried chicken in white sandwich bread with mayonnaise, ketchup, pickles and onions	10 Rocket double (burger)	Double layered beef burger meat in white burger bread with mayonnaise, ketchup, pickles and onions	10 Italian BMT (sub)	Genoa salami, spicy pepperoni, and Black Forest Ham served with vegetables and dressing on bread

Commonly Consumed Foods

Out of the 100 most commonly consumed food (CCF) items ordered for home-delivery in Kuwait only three (*tabouleh, issa mame maki*[1] and chicken club salad) were not high-fat/high-sugar foods. *Hummus* was also very popular, and while this is a high-fat food it contains mostly unsaturated fatty acids. Another popular dish was *fatoush*, a salad; however, as one of the main components of this salad is fried bread it was also considered high-fat. The most popular food items ordered included burgers (and their variations), cookies and fries (and their variations) listed in Table **2**. Variations of the burgers and fries included larger versions of original items found on the menu or the addition of extra toppings such as added cheese or chili.

Ordered foods common to all three countries considered in this study included burgers and fries. Together, these two food types represented 70% of the most CCF ordered online in Kuwait, while for both Bahrain and the UAE burgers and fries made up 50% of the most CCF orders. There were no vegetable-based foods among the most popular choices neither in Kuwait nor in the UAE, while two salads (Greek salad and *fatoush*) were among the top ten most CCF in Bahrain. Dessert-type foods, including cookies and frozen yogurt, were found to be popular in Kuwait and the UAE, while drinks (soda) made the list only in Bahrain.

As it can be observed from the list of most CCF items ordered online, traditional foods are not to be found. While it is possible that traditional foods are more likely to be cooked at home rather than ordered online, it has been reported that the consumption of traditional foods such as *kofta, qouzi, marga laham, jereesh, balalett* and *elba* [15] is being replaced by more westernized fast food choices as part of the daily diet.

The most common cooking and preparation methods employed on the most CCF ordered on the online system include deep frying and grilling. Due to the nature of the fast food industry most foods are assembled from frozen ingredients and hence little-to-no fresh products tend to form part of the menu of most of the restaurants found on the online ordering system. Further, portion sizes of foods ordered online tend to be larger than household portion sizes [16]; in addition it is generally possible to request a larger version of any order.

Food Composition

The composition of the most CCF was calculated. On average, commonly consumed foods in Kuwait contributed 783 calories, 14.4g of saturated fat, 1271mg of sodium and 10.2g of sugar per portion of food item to the diet. In comparison, commonly consumed foods in Bahrain contributed 480.7 calories, 8.1g of saturated fat, 614.7mg of sodium and 12.2g of sugar per portion of food item to the diet. These figures compare to 464.4 calories, 6.3g of saturated fat, 623.1mg of sodium and 7.9g of sugar per portion of food item in the diet of the UAE. Macronutrient composition as well as selected micronutrient composition of these foods is presented in Table **3**.

Compared to neighboring countries, Kuwait has a higher number of high-fat/high-sugar foods among its most CCF. Three single foods in Kuwait and two single foods in Bahrain were found to contain more saturated fat per portion than the total daily maximum intake recommendation of approximately 20g[2] [17]. The recommendation for sugar intake is to limit this component to 5-15% of the total energy intake per day, approximately 10-25g per day. A single food in Kuwait was found to contain more than the recommended daily maximum level of sugar per day (cookie with 29g), while several of the most CCF surpassed the 10g limit (Table **3**).

Although the food composition data presented in this article includes mostly macronutrients, it is likely that only a limited micronutrient intake is achieved from these foods. Micronutrient composition of these foods was not investigated in the present study. Further, for a complete analysis of nutrient intake a full dietary assessment of the users of the online ordering system would be necessary; a detailed dietary assessment has not been performed at this time and only nutrient sources of single foods are presented in this paper.

Application of the ANGELO Framework

Physical Component

Environment-related non-modifiable risk factors in the Gulf region include extreme outdoor temperatures,

[1]*tabouleh,* Arab salad traditionally made of bulgur or cuscus, tomatoes, finely chopped parsley, mint, onion and garlic, and seasoned with olive oil, lemon juice and salt; *issa mame maki,* Japanese crabsticks, prawn tempura and cucumber with a sweet and spicy sauce.

[2]20g for a person following a 2000 calorie diet as the recommendation is to limit saturated fats to an intake of <10% of the daily energy intake.

Table 3: Macro Nutrient Composition of the Top Ten Most Frequently Online Ordered Foods in Kuwait, Bahrain and the United Arab Emirates

Food	Portion size (g)	Energy (calories)	Total fat (g)	SFA (g)	TFA(g)	Cholesterol(mg)	Carbohydrates (g)	Sugars(g)	Fiber(g)	Protein(g)	Sodium(mg)
Kuwait											
The original	349	870	55	16	0	115	58	15	3	34	1410
Cookie	76	330	15	8	0	20	47	29	1	3	250
American fries	198	480	19	3	0	0	69	2	4	8	40
Cheese fries	340	740	37	14	0	30	82	6	4	17	1260
Rocket double	479	1420	97	42	0	265	56	15	3	90	1510
Chili cheese fries	482	1000	56	22	0	67	93	8	6	26	1760
Halfrings/ half fries	227	660	29	5	0	0	79	4	4	23	1020
Chicken strips(5p)	225	610	32	6	0.5	50	57	1	1	23	2340
Twelve burger	370	970	61	20	0	135	60	14	3	40	1560
Chicken Royale	264	750	45	8	0.5	70	58	8	3	30	1560
Average		783	44.6	14.4	0.1	75.2	65.9	10.2	3.2	29.4	1271
Food	**Portion size (g)**	**Energy (calories)**	**Total fat (g)**	**SFA (g)**	**TFA(g)**	**Cholesterol(mg)**	**Carbohydrates (g)**	**Sugars(g)**	**Fiber(g)**	**Protein(g)**	**Sodium(mg)**
Bahrain											
The Original	349	870	55	16	0	115	58	15	3	34	1410
Chicken pasta	258	440	4.5	0.4	0	30	75	2	4	27	501
Greek salad	175	80	4.5	3	0.1	5	7	4	2	4	250
Cheese burger	400	420	21	11	0	65	29	4	1	29	670
Fancy fries	175	520	26	4.5	0	0	64	3	5	8	135
Shawarma (lamb)	139	416	16.8	6	NA	194	0	0	0	61.6	148
Smoke house burger	400	1100	66	24	0	150	70	15	3	53	1900
Soda (cola) drink	200	240	0	0	0	0	67	67	0	0	67
9 Fatoosh (salad)	60	240	2	NA	NA	0	49	0	6	10	451
10 Rocket double	479	1420	97	42	0	265	56	15	3	90	1510
Average		480.7	21.8	8.1	0.0	62.1	46.6	12.2	2.7	25.2	614.7

(Table 3). Continued.

Food	Portion size (g)	Energy (calories)	Total fat (g)	SFA (g)	TFA(g)	Cholesterol(mg)	Carbohydrates (g)	Sugars(g)	Fiber(g)	Protein(g)	Sodium(mg)
UAE											
Chicken crisps	145	440	28	4.5	0	30	35	4	2	12	790
Texas chicken	NA	400	29	0	0	NA	20	NA	NA	56	NA
American fries	198	480	19	3	0	0	69	2	4	8	40
Elevation burger	370	510	26	12	0	80	29	4	1	41	710
Cheese burger	400	420	21	11	0	65	29	4	1	29	670
Chicken teriyaki (sub)	269	370	4.5	1	0	49	57	16	5	25	770
Whopper (burger)	275	610	34	9	1.5	60	50	12	2	20	540
The original	349	870	55	16	0	115	58	15	3	34	1410
Frozen yogurt	142	80	0	0	0	0	6	6	0	15	55
Italian BMT (sub)	226	410	16	6	0	45	46	12	8	20	1260
Average		464.4	24.1	6.3	0.2	49.9	39.2	7.9	2.3	26.7	623.1

Nutrient composition calculated from the USDA's on-line food composition database and restaurant nutrient composition databases when available [32, 33].

desertification and the lack of forestation. These conditions force people to remain indoors throughout most of the year and resort to using cars to travel even relatively short distances [3]. Reduced opportunities for outdoor social interactions, limited vegetated spaces as well as a lack of sidewalks prevent people in Kuwait from living an active outdoor life. Outdoor activities are limited to a few spaces along the coast often integrated within large shopping malls or private health clubs. Only one neighborhood in Kuwait (Mishref) boasts a well maintained sports park, which is however located beside an intersection of two well-frequented highways. In addition, due to the climatic conditions, many social activities tend to take place at night reducing both the time available for energy expenditure and the number of night-time sleeping hours. With less nocturnal sleeping time there is simply more time and more opportunities to eat, including late-night snacking. The resulting fatigue may also lead to additional reduction in physical activity. The overall outdoor development of the country has been designed for automobiles and not for pedestrians. While it has been reported that traffic lights can both improve and inhibit pedestrian activity, in the case of Kuwait they are mostly timed to improve traffic speeds and less so to improve pedestrian safety. Bus shelters and public transportation are underdeveloped and in dire conditions, making them an extremely limited transportation option.

Economic Component

The prosperity of a country, commonly measured in terms of its annual per capita Gross Domestic Product (GDP), has different relationships with population levels of body weight. Findings have shown that a GDP between $US5,000 and $US15,000 is associated with greater population happiness and environmental stability. Within a group of wealthy countries (GDP > $US30,000), those with lower income inequalities and more regulated (less liberal) market systems had lower mean BMI [18]. While in most developed countries researchers have found that living in low-income or deprived areas is associated with higher prevalence of obesity and poorer diets, this might not be the case in developing countries where a higher income may translate into sufficient means to consume more already made meals both at home and away in demonstration of higher socio-economic status. In Kuwait, high-income families tend to consume more meat, eggs and milk than families with lower income [19] and may be likely to consume more food away from home in restaurant or in the form of take-away.

Political Component

Kuwait is a member of the Gulf Cooperation Council (GCC) along with Bahrain, Oman, Qatar, the United Arab Emirates and Saudi Arabia. With the exception of Saudi Arabia, the United States Department of Agriculture (USDA)'s Office of Agricultural Affairs covers the rest of the countries collectively known as the GCC-5. Within the USDA, the Gulf Standards Organization (GSO) is responsible for developing standards in the GCC. The GSO food standards committee, which is chaired by Qatar, regularly updates GCC food standards. Over the past few years, the committee has been working to harmonize existing standards within the guidelines of the *Codex Alimentarius*, ISO and other international organizations. The first GSO shelf life and labeling standards were issued in the nineties. In 2007, the first review of both standards was completed and approved. In 2011, another review of the standards was completed. The current standards brought the GCC into closer compliance with the guidelines of *Codex Alimentarius* [20].

Concerning food regulations the development of guidelines is still at an initial stage, as regulations focus mostly on safety and less so on health aspects. The Kuwait Municipality Ministerial Resolution 21/92 defined "nutritions" as whatever is eaten by human beings in [the] form of food and drinks, excluding pharmaceutical preparations. Further, this document states that, "all "nutritions" should be nutritive, good for human consumption, in accordance with Islamic Shariyah, meet the technical and health requirements of the Ministry of Commerce and Industry and the Ministry of Public Health, meet the requirements of the Kuwait Standard Specification and should not directly or indirectly, fastly or slowly be harmful to health" [21]. In tandem with these regulations, requirements and standards for food and agricultural imports are modeled after US standards set out by the USDA. The specific regulations are summarized in Table **4**.

Sociocultural Component

In certain cultures, among them some Arabic countries, there is a perception that being overweight is a sign of high social status, beauty, fertility and prosperity [4]. According to statistics from the WHO, Kuwait ranks 9th in the World and 1st among Arabic-speaking countries in female obesity. The ranking in Arabic-speaking countries for female obesity is Kuwait (55.2%), Egypt (48%) and the UAE (42%) [1]. The cultural desirability of some degree of obesity may contribute to the higher incidence of obesity in these countries.

Traditional restrictions in the lifestyle of women in Arabic-speaking countries are one of the factors for the elevated prevalence of female obesity; women have limited access to sports and exercise activities as well as significant help with domestic labor. Nearly all families in Kuwait and Saudi Arabia employ one or multiple cooks and maids, adding to the sedentary lifestyle of indigenous women [9].

Other sociocultural components contributing to the creation of an obesogenic environment include leisure time sedentary activities, with television viewing reported as the main leisure activity for Bahraini women [11], and multiple pregnancies with the associated gestational weight gain, increased food intake and further reduced physical activity [22]. Further, in relation to work-related activities, only 2.7% of the Kuwait labor forces works as craftsmen, 44% are employed in activities such as writing, firefighting or the police force, 16% as managers and supervisors and 12.2% as physicians, engineers, economists, teachers and lawyers. Thus it can be safely assumed that Kuwaitis mostly work in offices, further contributing to a sedentary lifestyle [23].

DISCUSSION

Obesity is a relatively new phenomenon on a mass-scale in human evolutionary history, having become possible at the population level with increased food security. Across the past 60 years, social, economic, and technological changes have altered patterns of life almost everywhere on Earth [24]. Given the rapid rise in overweight and obesity among populations of developing countries, many health practitioners and health researchers have proposed that the environment, rather than factors at an individual level, may be driving the increase in obesity prevalence.

In a study from the United States, weight status was associated with the food environment; greater accessibility to supermarkets or less access to takeaway outlets were associated with lower BMI [10]. A similar relationship seems to occur in Kuwait, were tradition, financial means, food subsidies and living conditions seem to promote frequent consumption of ready-made meals, both at restaurants and at home from online delivery systems. In a study from New Zealand [25] residents in neighborhoods with the furthest access to a multinational fast-food outlet were

Table 4: Requirements and Standards for Food and Agricultural Imports into Kuwait

Requirement	Specifications
Certification and preparation	
Pre-registration	-With nutrition unit of Ministry of Public Health -For all special food products, such as diet, health and infant foods and artificial sweeteners
Islamic (Halal) slaughter certificate	-Issued by an approved Islamic center in the country of origin for all meat and poultry products -To be notarized by Kuwait Embassy/Consulate (or any other Arab Embassy/Consulate) in exporting country
Phytosanitary certificate	-For dry pea, lentil, rice, seeds, fresh fruits and vegetables, live plants and cut flowers -To certify that they have been inspected and free from pests and conform with phytosanitary regulation of importing country
Health certification	-Issued by the appropriate government agency in the country of origin -Required by all products to certify goods are fit for human consumption -For meat and poultry products to indicate that animals are slaughtered and processed according to health regulation
Certificate of origin	-Must be notarized by a local or a national Arab Chamber of Commerce as well as Kuwaiti diplomatic mission in the exporting country
Other required documentation	-Commercial invoice, packing list and bill of landing
Import procedures	-Health clearance: 7-10 days (2-4 weeks for laboratory testing). Fresh products are usually cleared within 24 hours of arrival
Not permissible for import	-Alcoholic beverages, pork and products containing alcohol and pork, as well as products with labels containing pictures of alcohol or pork, or a recipe requiring these products
Labeling	
Standard declaration	-Brand and product name -Name and address of manufacturer/ producer/ distributor/ importer/ exporter/ vendor -Country of origin -Ingredients in descending order -Additives, if any -Origin of animal fat, if applicable (must be sourced from Halal slaughtered animals) -Net content in metric units -Production and expiry dates (English digits only permitted as well as Arabic/English) -Special storage, transportation and preparation instructions, if any
Language	-Bilingual labels are permitted, provided one of the languages is Arabic
Production/expiry date	-These dates must be printed only in English, Arabic only or English/Arabic. May not be printed on sticker. -Not required for products with long shelf-life such as salt and sugar, and fresh items such as fruits, vegetables and fresh bakery items
Format of production/expiry date	-Dates are in digit, no text is allowed -DD/MM/YY for 6 months or less shelf life or MM/YY for 6 months or longer shelf life
Shelf life	-Minimum 50% minimum remaining upon arrival in Kuwait
Food colors	-Common name and index number must be noted on the product label. E number is permitted
Others	-Label must contain detailed information about ingredients (vitamins, minerals, supplements, food colors, preservatives) -Nutritive value per 100g. US nutritional panel is permitted -Health warnings if any -Instructions for proper use and storage
Other information	
Food additives	-Governed by local regulations based on *Codex Alimentarius* standards
Sweeteners	-Allowed for use
Irradiated food products	-Permitted, but the product's label must clearly indicate that the product has been irradiated -KS 1171/1999 determines the maximum irradiation levels permitted in different food products
Pesticide and other contaminants	-Local regulations based on *Codex Alimentarius*
Alcohol products	-Alcohol levels must not exceed 0.05%

Adapted from USDA FSA GAIN report, 2010.

more likely to eat the recommended intake of vegetables but also be overweight.

Researchers in the United States of America [26] have observed that the types of food stores and restaurants influence food choices and, subsequently, diet-related health outcomes, yet little is known about the consequences of removing this accessibility barrier. In countries like Kuwait, where food is frequently delivered to the front door of the consumer, ease of access to food 24/7 may spiral weight-gain and its complications out of control. Greater access to home-delivered food may increase the ease at which people make food choices less consistent with dietary recommendations by minimizing barriers to making these choices [27]. Taking this concept a step further, by placing orders online, the individual becomes even more anonymous to criticism on his/her food choices, intake amounts and overall dietary habits. Facilitated access to food is altering current feeding behaviors by removing set meal times and structured energy distribution throughout the day. Additionally, in a media-rich food advertisement world, distraction-prone people might not be able to accurately monitor their consumption thus increasing their likelihood to overeat.

In Kuwait, as in several Gulf countries, unfavorable outdoor settings not designed to promote or facilitate physical activity are likely to be one of the main contributors to the creation of an obesogenic environment. Research focused on built environments suggests that certain features such as low population densities, poor street connectivity and a lack of sidewalks are associated with decreased physical activity and an increased risk of being overweight [28]. These observations are applicable to Kuwait, where the population tends to center around certain areas of the country with some neighborhoods consisting almost exclusively of housing, and where a vast amount of the land is uninhabited. Further, sidewalks are either obstructed by parked vehicles (unplanned parking space being a problem in Kuwait), or they are non-existent, as in some developing areas of the country. This only leaves one with the unattractive choice of walking on the hard shoulder or in the desert dust. Added to these factors, a limited number of public parks and other pedestrian amenities, high speed traffic and an almost exclusive use of automobiles for transportation increase the development of an obesogenic environment in Kuwait.

A review from Giskes *et al*. [10] looking into the environmental factors and obesogenic dietary intakes found that only two studies looked at associations with cultural factors. Gender roles and food selection, for example, have been minimally explored; especially in cultures where gender division is strong, such as in the Middle East. Excessive energy intake is archetypically perceived as masculine. Dealing with gender in joint marital food choices requires negotiations about sharing masculine and feminine foods as partner foods in joint meals. Contemporary Western “proper meals” center on meat, creating masculine marital meals that reproduce wider patterns of male dominance and generally result in excessive energy intake [29]. Further, steroids and food supplements are frequently employed to show masculinity. This creates body composition alterations as well as distortions to the dietary patterns and metabolic pathways in the body.

The data analyzed in this study showed an average of 14.4g of saturated fat coming from popular food items ordered in Kuwait. While this falls below the maximum daily intake recommendations of approximately 22g [30], several of the most popular foods were above this level. As these are figures for single foods consumed in a day it is highly probable that the maximum recommended levels of saturated fat intake are exceeded. Currently there is convincing evidence regarding the beneficial cardiovascular effects of replacing saturated fatty acids with polyunsaturated fatty acids, fruits and vegetables [31]. For that reason the qualitative, as well as the quantitative, composition of the current diet of the Middle Eastern countries warrants in-depth study.

Food composition data and food quality assurance are not strongly regulated in Kuwait. A limited amount of local foods have been analyzed yet the information is not readily available to the public nor is it sufficient for an in-depth dietary assessment of the population. While laws regarding food production and food imports do exist, these are rarely enforced. Procedures and labeling regulations are often voluntary. Further, when information regarding ingredients, expiration dates and health claims does exist it is not always accessible to the consumers and often presents language barriers. Taking into consideration the heterogeneous population of Kuwait it might be of great benefit to make this information available for both ethical and health-related reasons.

At a political level much can be improved. Government and privately sponsored programs targeted at encouraging Kuwaiti’s to follow a healthier lifestyle are limited and often unknown to the general

population. These include campaigns such as Get Healthy Kuwait, Kuwait Diabetes Epidemiology Program and several competitive sports events throughout the year. At an international level little participation is seen from the Middle East region in general and even less so by Kuwait. For example, the World Health Organization has no representation in Kuwait nor is sufficient data available in the WHO country profile. Large-scale population surveys would be of great benefit for policy development in the area of food and nutrition security for this country. Insufficient available data exists at the moment for a more detailed study on the eating habits of residents in Kuwait as well as on other contributing factors to the creation of an obesogenic environment.

CONCLUSIONS

Meeting the majority of the characteristics required to be identified as such, Kuwait is found to have an obesogenic environment. Availability and accessibility to an almost unlimited amount of food, energy, trans fats and sugars may be the main contributors to obesity by creating obesogenic environments. In addition to an unfavorable diet, limited opportunities for outdoor social interactions, limited vegetated spaces, a lack of sidewalks, and a cultural desirability of some degree of obesity have created an obesogenic environment in Kuwait. While proving a causal relationship between environmental factors and eating patterns poses a great challenge, limited evidence does not indicate the absence of causal relationships between environmental factors and diet.

REFERENCES:

[1] Ono T, Guthold R, Strong K. WHO Global Comparable Estimates 2005; Available from: http://apps.who.int/infobase/Comparisons.aspx. Accessed 09.09.2013.

[2] Kuwait Petrol Company. Kuwait Oil History 2013; Available from: http://www.kpc.com.kw/AboutKPC/KuwaitOilHistory/default.aspx. Accessed 07.10.2013.

[3] Badran M, Laher I. Obesity in Arabic-speaking countries. J Obes 2011. http://dx.doi.org/10.1155/2011/686430

[4] Malik M, Bakir A. Prevalence of overweight and obesity among children in the United Arab Emirates. Obes Rev 2007; 8: 15-20. http://dx.doi.org/10.1111/j.1467-789X.2006.00290.x

[5] Rolls BJ. The supersizing of America. Portion size and the obesity epidemic. Nutr Today 2003; 38: 42-53. http://dx.doi.org/10.1097/00017285-200303000-00004

[6] Prentice AM, Jebb SA. Fast foods, energy density and obesity: a possible mechanistic link. Obes Rev 2003; 4: 187-194. http://dx.doi.org/10.1046/j.1467-789X.2003.00117.x

[7] Burns C, Jackson M, Gibbons C, *et al*. Foods prepared outside the home: association with selected nutrients and body mass index in adult Australians. Public Health Nutr 2002; 5: 441-448. http://dx.doi.org/10.1079/PHN2001316

[8] Food and Agriculture Organization. Kuwait Nutrition Profile-Nutrition and Consumer Protection Division 2006; Available from: ftp://ftp.fao.org/ag/agn/nutrition/ncp/kwt.pdf. Accessed 15.10.2012.

[9] Al-Kanderi YY. Prevalence of obesity in Kuwait and its relation to sociocultural variables. Obes Rev 2006; 7: 147-154. http://dx.doi.org/10.1111/j.1467-789X.2006.00231.x

[10] Giskes K, van Lenthe F, Avendano-Pabon M, *et al*. A systematic review of environmental factors and obesogenic dietary intakes among adults: are we getting closer to understanding obesogenic environments? Obes Rev 2010; 12: e95-e106. http://dx.doi.org/10.1111/j.1467-789X.2010.00769.x

[11] Musaiger AO, Al-Awadi AHA, Al-Mannai MA. Lifestyle and social factors associated with obesity among the Bahraini adult population. Ecol Food Nutr 2000; 39: 121-133. http://dx.doi.org/10.1080/03670244.2000.9991610

[12] Kirk SFL, Penney TL, McHugh TLF. Characterizing the obesogenic environment: the state of the evidence with directions for future research. Obes Rev 2010; 11: 109-117. http://dx.doi.org/10.1111/j.1467-789X.2009.00611.x

[13] Talabat consumer data. Talabat 2013. Available from: http://www.talabat.com/kw/en/home. Accessed 07.10.2013.

[14] Swinburn B, Egger G, Raza F. Dissecting obesogenic environments: the development and application of a framework for identifying and prioritizing environmental interventions for obesity. Prev Med 1999; 29: 563-570. http://dx.doi.org/10.1006/pmed.1999.0585

[15] Dehghan M, Al Hamad N, Yusufali A, *et al*. Development of a semi-quantitative food frequency questionnaire for use in United Arab Emirates and Kuwait based on local foods. Nutr J 2005; 4. http://dx.doi.org/10.1186/1475-2891-4-18

[16] Gillis LJ, Bar-Or O. Food away from home, sugar-sweetened drink consumption and juvenile obesity. J Am Coll Nutr 2003; 22: 539-545. http://dx.doi.org/10.1080/07315724.2003.10719333

[17] United States Department of Agriculture. Global Agricultural Information Network 2010. Available from: http://gain.fas.usda.gov/Lists/Advanced%20Search/AllItems.aspx. Accessed 01.10.0213

[18] Egger G, Swinburn B, Amirul Islam FM. Economic growth and obesity: An interesting relationship with world-wide implications. Econ Hum Biol 2012; 10: 147-153. http://dx.doi.org/10.1016/j.ehb.2012.01.002

[19] Musaiger AO. Socio-cultural and economic factors affecting food consumption patterns in the Arab countries. J Roy Soc Health 1993; 113: 68-74. http://dx.doi.org/10.1177/146642409311300205

[20] Taha M. Kuwait - Food and Agricultural Import Regulations and Standards. GAIN Report. Available from: http://www.agrifoodgateway.com/articles/kuwait-food-and-agricultural-import-regulations-and-standards 2012. Accessed 01.10.2013.

[21] Resolution Number 3368/81. State Minister for Municipal Affairs 1992. Available from: http://www.kuwaitemb-australia.com/files/FOODREGU.pdf. Accessed 01.10.2013.

[22] Oson CM, Strawderman MS, Hinton PS, *et al*. Gestational weight gain and postpartum behaviors associated with weight change from early pregnancy to 1 y postpartum. Int J Obes Relat Metab Disord 2003; 27: 117-127. http://dx.doi.org/10.1038/sj.ijo.0802156

[23] Ministry of Planning. The basic features of population and labor force as in 2001. Kuwait 2001. Available from:

http://planipolis.iiep.unesco.org/upload/Kuwait/Kuwait%20MDG.pdf. Accessed 24.10.2013.

[24] Ulijaszek SJ, Lofink H. Obesity in Biocultural Perspective. Annu Rev Anthropol 2006; 35: 337-360. http://dx.doi.org/10.1146/annurev.anthro.35.081705.123301

[25] Pearce J, Hiscock R, Blakely T, *et al*. A national study of the association between neighborhood access to fast-food outlets and the diet and weight of local residents. Health Place 2009; 15: 193-197. http://dx.doi.org/10.1016/j.healthplace.2008.04.003

[26] Morland KB, Evenson KR. Obesity prevalence and the local food environment. Health Place 2009; 15: 491-495. http://dx.doi.org/10.1016/j.healthplace.2008.09.004

[27] Pearce J, Blakey T, Witten K, *et al*. Neighborhood deprivation and access to fast-food retailing: a national study. Am J Prev Med 2007; 32: 375-382. http://dx.doi.org/10.1016/j.amepre.2007.01.009

[28] Lopez RP, Hynes HP. Obesity, physical activity, and the urban environment: public health research needs. Environ Health 2006; 5. http://dx.doi.org/10.1186/1476-069X-5-25

[29] Sobal J. Men, meat and marriage: models of masculinity. Food Foodways 2005; 13: 135-158. http://dx.doi.org/10.1080/07409710590915409

[30] United States Department of Agriculture. Dietary guidelines for Americans, 7th Edition. US Government Printing Office 2010. Washington DC.

[31] Aranceta J, Perez-Rodrigo C. Recommended dietary reference intakes, nutritional goals and dietary guidelines for fat and fatty acids: a systemtic review. Brit J Nutr 2012; 107: 8-22. http://dx.doi.org/10.1017/S0007114512001444

[32] Burger King Nutritional Information. Available from: http://www.bk.com/cms/en/us/cms_out/digital_assets/files/pages/MenuNutritionInformation_January2013_1.pdf. Accessed 27.01.13.

[33] Johnny Rocket's Nutritional Information. Available from: http://www.johnnyrockets.com/assets/files/jr-nutritionals-071911.pdf. Accessed 27.01.13.

Received on 05-05-2014 Accepted on 25-05-2014 Published on 15-06-2014

DOI: http://dx.doi.org/10.6000/1929-5634.2014.03.02.1