Int. J. Food, Nutrition and Public Health, Vol. 7, No. 2, 2015

EATING PATTERNS AND NUTRITIONAL BEHAVIOURS OF SAUDI YOUNG GIRLS: INFLUENCES AND CONTRIBUTING FACTORS

Elham Aljaaly

Head of the Clinical Nutrition Department,
Faculty of Applied Medical Sciences, King Abdulaziz University,
P.O. Box 54539, Jeddah 21524, Saudi Arabia
Fax: +0096626863932

E-mail: ealjaaly@kau.edu.sa
E-mail: aljaalydiet@gmail.com

ABSTRACT

Purpose: To explore factors affecting eating behaviours of adolescent girls in Jeddah City, Saudi Arabia, using a theoretical framework (USA based), which used and modified with permission from the main author.

Design/methods: Cross-sectional survey conducted in 18 schools and included 1519 female students (13 to 18 years old). A self-reported questionnaire used to tackle three-level factors influencing eating behaviours include individual, social and physical environment and macro-systems influences.

Findings: Factors included skipping breakfast (75%, $n = 1140$), consumptions of snacks (90%, $n = 1367$), sugar-carbonated drinks (87%, $n = 1321$) and fruits/vegetable (22%, $n = 334$). About 37.5% had dieting attempts and 84% had positive perceptions about health and fitness. The media is the most important source of nutrition information. Peers/families influencing participants' meal sizes (53%), 87% buy food from school and 42% eat outside their homes. The model supported the impact of the macro-systems (media and school meals' systems).

Social Implications: The study revealed that all aspects of the girls' environment, including home, schools and community combined to promote unhealthy eating behaviours and lifestyle. This could influence their food choice and long-term health outcomes, which consequently, requires further evaluation.

Originality/value: This is the first in-depth study of factors affecting eating behaviours of adolescent girls, which was guided by a theoretical framework.

Keywords: theoretical framework; adolescent girls; eating behaviours; personal and environmental influences; Jeddah; Saudi Arabia.

Reference to this paper should be made as follows: Aljaaly, E. (2015) 'Eating Patterns and Nutritional Behaviours of Saudi Young Girls: Influences and Contributing Factors', *Int. J. Food, Nutrition and Public Health,* Vol. 7, No. 2, pp.71–80.

BACKGROUND AND AIMS

Food choices of adolescents have attracted the interest of many professionals, including nutritionists, dieticians and food marketers. Many countries have considered eating behaviours and dietary choices of adolescents in their programmes when promoting healthy eating (BMA, 2003). The food choice and behaviours of adolescents are influenced by different factors, including food availability, peer and parental influences, cost, convenience, individual beliefs, mass media and body size satisfaction (Story et al., 2002).

Theories and models that are relevant to understanding food choices and eating behaviours of adolescents could potentially have implications for attempts at dietary change (Shepherd and Raats, 2006). They are also important to understand what obstacles, there might be to affect such changes. The importance of using a theory to make dietary recommendations to adolescents has been recognised by previous research.

Genetic predispositions such as the preferences for a particular type of food and its taste and the tendency to reject new foods were referred to as social contexts of eating such as eating food with friends and families (Woodruff et al., 2010). Food preferences are learned via people's experience with food and eating, and this depends on the food that is made available and accessible and emphasises the critical role played by the food environment in determining the adequacy of diets (Birch, 1999).

The increased emphasis of research on the significance of environmental and structural factors when explaining food choice and eating behaviours of children and adolescents has initiated actions on more than one level (Larson and Story, 2009). Factors related to environmental levels such as social, physical and macro-systems and factors related to personal behaviours were identified as important for food choices and eating behaviours of adolescents. Neumark-Sztainer et al. (1999), Story et al. (2002) and Livingstone and Helsper (2004) concluded that some of these influences food choices throughout the life. In addition, other influences that include developmental, for example, rapid physical growth are exclusively associated with this age group. The same authors suggested that other researchers when conducting prospective research consider the possibility that these factors interact with each other, thereby indirectly affecting young people's food preferences and behaviours. They also recommended researchers should not study factors at each level separately.

Models of eating behaviours have been developed because of the increased awareness of researchers that the aetiology of many health problems facing adolescents are influenced by a myriad of diverse causative or associated factors existing at multiple levels of analysis. Story et al. (2002) developed a conceptual model of multiple factors that influence eating behaviours of adolescents. The model depicts three interacting levels of influences that affect adolescent eating behaviours: personal or individual, environmental and macro-systems.

Investigating dietary habits and behaviours during the adolescent years offers challenges depending on the multilevel factors that influence the food choice of adolescents (Story et al., 2002). For adolescents, a number of individual factors may influence food choice such as psychosocial (e.g. food preferences, taste and sensory perceptions of food, health and nutrition, meanings of food, self-efficacy and knowledge), biological and lifestyle factors. According to Story et al. (2002), the most influential social environmental influences are the family and peers. The physical environment (e.g. schools and fast-food restaurants) in the community has a major impact on the dietary behaviour of adolescents, influencing, for instance, food availability and perceived norms. Some of the major macro system influences in society as a whole includes the media, cultural and social norms and food production systems.

The development of effective strategies for improving the dietary behaviours of young people requires an understanding of the multiple factors that influence these behaviours (Story et al., 2002).

Theories and models that are relevant to understanding food choice behaviour of adolescents could potentially have implications for attempts at dietary change (Shepherd and Raats, 2006).

Therefore, the study has used a conceptual model of multiple factors influencing eating behaviours of adolescents to systematically understand and study eating behaviours of Saudi adolescent girls.

Overview of the study's model

According to Story et al. (2008), the achievement of eating habits and behaviours is a complex process that involves many factors across different backgrounds. A theoretical framework can be used to understand the multiple factors related to personal behaviours and environments that influence eating behaviours of adolescents (Story et al., 2002). As described by Story et al. (2008), the proposed model is based on Social Cognitive Theory and an ecological perspective. The basic principle of the ecological systems theory is that individuals, and their environment have a dynamic interaction and relational nature (Davison and Birch, 2001; Laustsen, 2006). Ecological models of health behaviour in general focus on individual influences such as physical activity and sedentary activity, as well as on social such as family meals and environmental factors (such as access to food). These factors may affect individual behaviour either positively or negatively (Sallis and Owen, 1996). Story and her colleagues have also recommended the model to be used when guiding interventions (Story et al., 2008). The model also highlights factors at different levels that influence health and nutrition, adolescents and their environments (Story et al., 2008). According to the same authors, individual-level factors include cognitions, behaviour, biological and demographic factors. As described by the same authors, environmental factors include the immediate social environment such as family, friends and peer networks, and other factors such as school, fast-food outlets and social and cultural norms are related to the physical environment. Food production and marketing, mass media and advertising in addition to food distribution systems, policies and laws that regulate food-related issues, such as pricing are factors that are related to macro-level environments. The same model also includes other factors that related to social norms, agriculture policies and economic price structures. According to Story's model, although macro-systems or societal influences play a more distal and indirect role in determining eating behaviours, they are considered as one of the multiple factors that have been identified as important for young people's food choices.

The aim of using a theoretical framework in this study was to make a trial to explain and predict some behaviour related to Saudi girls, particularly eating behaviours of adolescents. The current study has chosen the social ecological model of Story et al. (2008) because it incorporates a multilevel approach. In addition, some factors and variables that are related to the major food providers to the group of adolescents have not been studied together in previous or recent Saudi research. These variables include schools, restaurants or advertisers, which were considered in the present study using the same model.

METHODS

A cross-sectional survey carried out in 18 schools, 1519 female students participated in the survey. Their ages' range was 13 to 18 years (Al-Jaaly et al., 2011). A face-to-face interviews and a self-reported questionnaire used to tackle three-level factors influencing eating behaviours of adolescents, individual influences (psychosocial, biological and lifestyle), micro-systems include the social environmental influences (family and peers) and the physical environment influences (schools and fast-food restaurants) and macro-systems influences (media and school polices and systems). The study adapted the model of Story et al. (2008) and modified it for Saudi population with permission from the main author (Al-Jaaly et al., 2011).

Data analyses

Data management and descriptive analysis for eating behaviours and influencing factors were performed using SPSS 18.0.

RESULTS

Characteristics of Jeddah adolescents' girls

Individual behaviours

The survey included 1519 female students. Their ages' range was 13 to 18 years with a mean age of 15.5 years. The household monthly income for 64% of the sample ranged between (1500 to >7500 Saudi Riyals) or (£250 to >1250). About 77% of adolescents' mothers in the survey were not working compared to only 2% of non-working fathers. Average age at menarche for participants (n = 1343) was 12.59 year and 15.9% had started

their menarche before the age of 2 years. Different medical problems reported by 32% of participants in which 22.5% of them were consuming vitamin and/or mineral supplements, mainly iron supplements.

Mostly, Jeddah girls seem able to perceive average (normal) body size as 74% of them thought that they were on their right weight and more than half ($n = 851$) of the girls (56.4%) were watching their weight regularly. Positive perceptions about health was reported by 84% of the participants and 46.8% thought that they were consuming healthy foods. Of the whole sample, 33% were reading books and/or magazines and 43% of these readers thought that reading influenced their food choice.

The influence was more likely to be related to advertisements (50.3%) and (57.5%) felt that TV watching may influence their food choice, 63% of the girls reported that they would like to have physical education classes at school. Girls tended to think that they were performing (43.2%) enough physical activities and most of them (74%) rated themselves as performing an average level of physical activity in comparison with their peers, although only 32% linked the importance of physical activities to their health (Table 1). Frequency of food consumption in the

Table 1 Knowledge, attitudes and perceived health and figures

Variables name (number of respondents)	*No (%)*
Perceptions of body figure	
Do you watch your figure? (1510)*	851 (56.4)
How do feel about your figure? (1506)	
Too thin	153 (10.2)
About the right weight	1117 (74.2)
Too fat	236 (15.7)
Perceptions of healthy eating	
Do you consider yourself healthy compared to others your age (1506)*	1253 (83.7)
In your opinion, do you think that you eat healthy food? (1507)*	706 (46.8)
Perceptions of media influence on food choice	
Do you read books, magazines or comics daily? (1518)*	545 (36)
Do you think that your readings has an Influence on your food choices (1463)*	631 (43)
Do you read or follow media concerning diet issues (1499)*	649 (43.3)
Do you think that TV watching has an influence on your eating behaviours (1505)*	866 (57.5)
Do you think that TV advertisements have an influence on your eating behaviours (1498)*	628 (41.9)
Perceptions of physical activity at school and after school	
During holidays, how active are you in comparison to school days? (1511)	
Less active	534 (35.3)
About the same	325 (21.5)
More active	652 (43.2)
In general speaking, do you think that you perform enough exercise to keep healthy (1504)*	477 (31.7)
Would you prefer to have physical education classes at school? (1510)*	953 (63)

*Data reflects positive response

total sample and the number of portions within each food group (vegetable, fruit, fat, milk, meat and cereal and grains) in addition to frequency of extra food and drink items that were high in saturated fats, sugar and salt (Table 2). Looking at the consumption rate in a week, fruit and vegetables were the least to be consumed, some of the girls reported either no intake of fruits

Table 2 Food and drink consumptions

Variables name (number of respondents)	*No (%)*
Consumption of vegetables/week (1478)	
None	414 (27.3)
Once or twice	749 (49.3)
Three times or more	315 (20.7)
Consumption of green salads with meals/week (1685)	
None	294 (19.4)
Once or twice	686 (45.2)
Three times or more	505 (33.2)
Consumption of fruits/week (1497)	
None	337 (22.2)
Once or twice	707 (46.5)
Three times or more	453 (29.8)
Consumption of meats/week (1499)	
None	199 (13.1)
Once or twice	702 (46.2)
Three times or more	598 (39.4)
Consumption of dairy products/week (1504)	
None	236 (15.5)
Once or twice	742 (48.8)
Three times or more	526 (34.6)
Consumption of cereals and grains/week (1507)	
None	25 (1.6)
Once or twice	459 (30.2)
Three times or more	1023 (99.2)
Consumption of desserts for example, pudding, cake or chocolate cereals/week (1589)	
None	118 (7.8)
Once or twice	702 (46.2)
Three times or more	669 (44.0)
Consumption of oils and fats/week (1500)	
None	272 (17.9)
Once or twice	608 (40.5)
Three times or more	620 (41.3)

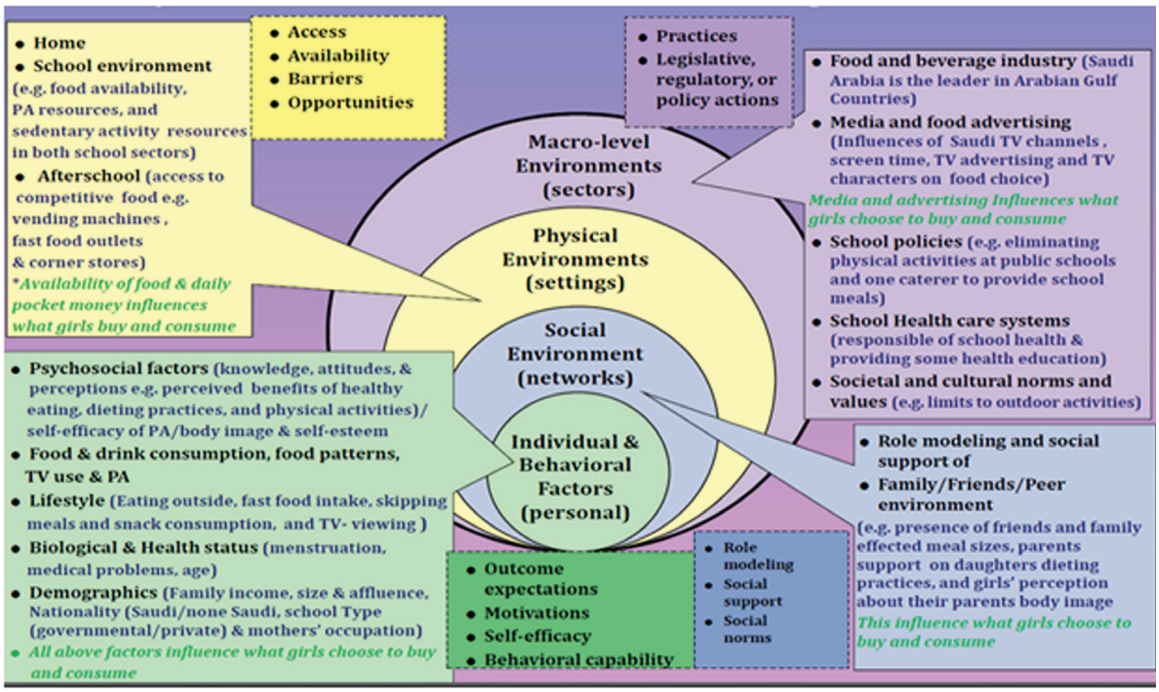
*Data reflects positive response

(22%) or vegetables (27%) or an intake of one to two portions of fruit (46.5%) and 49% of vegetables in the previous week. On a daily basis, more than 77% of the girls were consuming carbonated beverages, and most of the cited beverages were full sugar beverages (87%). More than half (55%) of the girls were adding sugar to their beverages (hot or cold beverages). On the other hand, 22% of the girls were using artificial sweeteners. Of the whole sample, 75% of the girls reported skipping meals particularly breakfast. About 90% of the girls were consuming snacks that are high in saturated fat, salt and sugars (HFSS) for example, pastries, sandwiches, chocolates or other confectionaries, donuts, which were usually morning snacks. Most of the students (94%) had daily pocket money to buy snacks from schools. About 49% of the food consumed by girls was homemade and 72% of the meals consumed outside home were fast food meals. The prevalence of smoking (cigarette or Shisha) among girls was only 3.2%. Of these smokers, (54%) reported themselves as regular smokers, and 46% were smoking on some occasions. Looking at the dieting practices, 53% of girls reported previous diets for weight reduction and 56% failed to lose weight or their attempts for weight reduction were not successful. Only 20% of the participants had attempted to gain weight.

Reports on physical activities showed that cars are main transportation methods to and from school (87%), only 8% were walking to school, 59.2% were performing some physical activities such as walking and running at school. Other activities outside school, for example, walking, shopping, bowling, horse riding and table tennis reported by 48% of the participants, swimming, cycling and dancing reported by 70% of the respondents. Only 13% afforded to join fitness centres (once a week).

Social environment

Jeddah girls appear to be confident about their parents' body size, which based on the surveyed personal rating without using a body image visual tool. Most (80%) of the girls approximated their



Source: Story et al. (2008)

Figure 1 A theoretical framework depicting the multiple influences on Jeddah Girls' eating behaviours in Saudi Araibia based on the model

mothers and fathers' weights 'about the right', 47% reported they were usually encouraged by their parents when they tried to change their weights, and 53% reported that the size of their meals might be influenced by the presence of their peers and/or families.

Physical environment

Description of places where participants had access to food such as home, schools and outside homes (restaurants) reported as follows at home, 38% of girls had meals in a group with their families in the dining room or in the kitchen. Only 4% ate alone in their rooms and 54% were eating either alone or in a group with their families in front of the TV. At school, about 87% of students reported buying food from school while eating outside home reported by 42% of participants.

DISCUSSION

The findings of the study show that more than half of the participants' families have a relatively high monthly income (>7500 SR). This is in accordance with results of previous studies conducted in the Eastern Province and central region of Saudi Arabia (Al-Disi, 2008; Al-Saeed et al., 2006).

The majority of mothers were unemployed, and mother's employment status was reported only by 23% (n = 332) of the participants. This indicate an increase in mothers' employment in Jeddah (Abalkhail et al., 2002) and a higher rate of employment than other regions like Riyadh (Al-Disi, 2008).

Average age at menarche among participants was 12.6 year, which is earlier than that reported 17 years ago by El-Dosoky and Al-Amoudi (1997) between Jeddah adolescents of the same age group. These differences might be due to environmental variations between both populations. The present and past nutritional status could affect the age at menarche. However, this data may only reflects the present nutritional status of the girls due to the cross-sectional nature of the study. In addition, the methodology used with self-reported age at menarche could submit to various biases.

About one-third of participants reported having medical problems and consumption of vitamin and mineral supplements is common among Jeddah adolescents. The previous report for use of some of these supplements (e.g. multivitamin tablets, vitamin C and iron tablets) by adolescents aged 11 to 18 years is for reasons such as health, prevention of illness, sports performance, parental control, energy and poor diet (O'Dea, 2003).

Concerning participants' knowledge, more than one-third of participants reported reading books, magazines and comics; these media sources influences the food choice of more than 40% of them. This is in agreement with results of Al-Almaie (2005).

Previous studies confirmed that adolescent girls' perceptions of body weight affect their nutritional status (Ojala et al., 2007). The majority of Jeddah adolescent girls had positive perceptions of their body image (74%) and health status (84%) in comparison to their friends and more than half of participants reported watching their figures regularly. The present study thus did not support previous research suggesting that adolescents under the age of 18 are unhappy with their body size.

The present survey demonstrated results concerning the family's attitude towards girls' weight change. In addition, it showed other family influences that could influence girls' body dissatisfactions such as girls' thoughts about their parents' body figure.

The present study intended to document the prevalence of changing weight behaviour in Jeddah young girls, which could affect the nutritional status (Aljaaly et al., 2011). Dieting practices, particularly 'weight control behaviours' are highly prevalent among girls in developed countries, compared to their male counterparts. They are driving forces that significantly affect young girls' nutritional status. The behaviour could include different techniques such as fasting for long hours, taking diet pills, vomiting and the use of laxatives. In addition, adolescents practice other healthful behaviours (Story et al., 2002). The study has showed that some girls [15% (n = 229 out of 1494)] solicit the help of health professional when they plan to change their weight. The desire to lose weight among Jeddah girls may be related to peering competition and dieting to fit into fashionable dresses. The peer competition is chiefly in social events and parties where girls

congregate or where female family members are present at social events, and looking for wives for their sons. In addition, a slim body shape is very important in preparation for marriage and a slim bride can reflect her attractiveness, which is the same as in Western countries. This could also refer to media influence, and the present sample has demonstrated a high exposure to media.

Concerns about media influences on food choice, particularly TV advertising were highly observed among participants and the study verified that Saudi adolescents are living in a media saturated environment of all kinds, which regarded as one of the important sources of health information. Unregulated media expose adolescent girls to a plethora of non-regulated food advertising that promotes unhealthy eating (Aljaaly, 2012).

Although physical activities are not permitted in public girls' schools and irregular in private schools, participants reported concerns related to physical activities. For example, a high proportion of Jeddah girls thought that they were more active in comparison to peers and friends. Commonly, they reflected the same levels of physical activities in holidays, in comparison to school days, and most of the participants considered they perform enough exercise to keep them healthy.

In common with other national and international adolescent girls, Jeddah girls' eating patterns were characterised by skipping breakfast by 3/4th of Jeddah teen girls and a high frequency of soft drink consumption (mainly sugar-sweetened) by 90% of girls. This prove a much higher prevalence of skipping breakfast among adolescents in Saudi Arabia, compared to the Western countries (Sigulem et al., 2000).

Consumption of snacks was high (90%) and mostly consumed at school and categorised as HFSS food. A high frequency of meals consumption was outside the home and mainly in the form of fast food. Additionally, inconsistent eating times noted among half of the Jeddah girls (e.g. eating before going to bed). These observations tend to substantiate results of other studies, which shows that the quality of children's and adolescents' diets in Saudi Arabia in common with most parts of the world decrease over time, possibly due to a socio or physical environmental influences (Story et al., 2002).

Frequency of fast food use reported to positively, correlate with the overall quality of diet and barriers to healthy choice, and frequency of eating at fast-food restaurants, could affect consumption of fruit and vegetables (French et al., 2001). The current study indicated that fast food was consumed by Jeddah schoolgirls at the level of one-two times, three times, or more a week. This frequency of consumption agrees with data from a similar urban population in the capital of Saudi Arabia (Collison et al., 2010).

Study's findings and the theoretical framework

Discussing of findings in the context of the guiding model and debating each component of the individual, micro- and macro-systems separately, could enhance the understanding of the implications of factors influencing eating behaviours of Jeddah adolescents and the addressing of the problems among these group (Figure 1).

At the individual level, factors include SES, age and general health status. Other factors include irregular breakfast intake, fast food and snack consumption and dieting practices. Moreover, nutrition knowledge, perceptions of body image and healthy eating, TV use, physical activity, and sedentary activity are included. These factors were consistent with the elements of the theoretical framework provided at the individual level.

At the micro-system levels, factors comprise immediate social and physical environments that include variables specific to family/peers (influence on meals size), parents (parents' body size, parents' attempts to change weight, parents' concern about their daughter weight status, and parents' work status). Other factors related to the home environment (places where girls eat), outside homes (restaurants), school food and environment and outside school (competitive food).

At the macro-system levels, the model also supports the broader impact of the macro systems such as media and food advertising; school meals and snacks, regulations in excluding physical activities from public schools, cultural norms that prevent girls from performing a healthy lifestyle such as outdoor physical activity and non-regulated food advertisements on Jeddah

adolescent girls. Societal characteristics play important roles in the development of some eating behaviours and weight status of the girls (Aljaaly et al., 2011; Aljaaly, 2014).

Figure 1 presents a conceptual framework that illustrates the main factors influencing Jeddah adolescent girls (individual and multiple layers of environmental factors, which in combination, may affect the eating behaviours of Jeddah adolescents and consequently, affect their nutritional status).

The conceptual model posits that the environment in which these girls live might affect their eating behaviours and nutritional status. In addition, these various influential factors within the environment may vary based on different factors such as SES, knowledge, attitude, health status, eating patterns, screen time and other lifestyles.

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

The study revealed that findings have some public health implications. This was evident by the findings that the majority (75%) of adolescent girls, who skipped breakfast, also eat a low number of vegetables and fruits with a high consumption of HFSS snacks (90%), full-sugared carbonated beverages (87%) and fast food (72%). The media, which was an important source of nutrition information to these adolescents, influenced these eating behaviours. Participants were also concerned with the media influence on their food choice; they were insightful about their body image (74%) and had appropriate negative perceptions of their healthy eating (47%). Added to this, media regulations directed to young groups in Saudi Arabia are lacking (Aljaaly, 2012). Therefore, public health problems such as obesity or underweight status will result as a consequence of these multiple factors that work at the individual, micro and macro-system levels.

The majority of participants were physically inactive at school and outside school. This behaviour supports the absence of any source of physical education or activity in the governmental sponsored schools (limited physical activities in private schools). This reflects the role of the macro-system in contributing to the negative behaviours and lack of availability of physical activities for adolescents. The type of school meals and snacks (HFSS food and beverages) also added to the negative environment available in the schools.

Moreover, Saudi culture and socioeconomic profile are characterised by the sedentary lifestyle and high economic level allowing pocket money to facilitate and encourage unhealthy food choice and lifestyle.

The model used to guide this study helps to enhance the understanding of the implications of factors influencing eating behaviours of adolescents and the addressing of the problems among them. It could also help in developing interventions for correcting unhealthy eating behaviours.

Prevention should start from the early age of girls at the kindergarten stage by educating and modifying the behaviour of girls and their parents about healthy food choices. In addition, educational classes should be included in adolescent girls' schools, to enhance their knowledge and perceptions about body image, healthy eating and the importance of physical activities in their life. These preventive efforts should take into consideration the influence of culture and societal norms in order to develop culturally sensitive programmes when tackling these issues.

REFERENCES

Abalkhail, B., Shawky, S. and Soliman, N. (2002) 'Validity of self-reported weight and height among Saudi school children and adolescents', *Saudi Medical Journal*, Vol. 23, No. 7, pp.831–837.

Al-Almaie, S. (2005) 'Knowledge of healthy diets among adolescents in eastern Saudi Arabia', *Annals of Saudi Medicine*, Vol. 25, No. 4, pp.294–298.

Al-Disi, D.A. (2008) *Serum Adipocytokines and Ghrelin concentration in Saudi Adolescent Females: Effect of Calorie Intake and Sleeping Pattern*, Scientific Repository King Saud Univesity, Available at: http://hdl.handle.net/123456789/8820.

Al-Jaaly, E. (2012) 'Advertising watched by adolescent girls in Saudi Arabia', *International Journal of Food, Nutrition and Public Health (IJFNPH)*, Vol. 5, No. 4, pp.249–263.

Aljaaly, E. (2014) 'Centralized fat status of adolescent girls in Saudi Arabia in comparison to the United Kingdom Reference Data', *British Journal of Medical and Health Research*, Vol. 1, No. 3, pp.19–24.

Al-Jaaly, E., Lawson, M. and Hesketh, T. (2011) 'Overweight and its determinants in adolescent girls in Jeddah City, Saudi Arabia', *International Journal*

of Food, Nutrition and Public Health, Vol. 4, No. 2, pp.95–108.

Al-Saeed, W.Y., Al-Dawood, K.M., Bukhari, A. and Bahnassy, A. (2006). 'Prevalence and socioeconomic risk factors of obesity among urban female students in Al-Khobar city, Eastern Saudi Arabia, 2003', *Obesity Reviews*, Vol. 8, No. 2, March 2007, pp.93–99.

Birch, L.L. (1999) 'Developmet of food prefrences', *Annual Review of Nutrition*, Vol. 19, No. 1, pp.41–62.

British Medical Association, L. (2003) *Adolescent Health*, British Medical Association, London: BMA.

Collison, K., Zaidi, M., Subhani, S., Al-Rubeaan, K., Shoukri, M. and Al-Mohanna, F. (2010) 'Sugar-sweetened carbonated beverage consumption correlates with BMI, waist circumference, and poor dietary choices in school children', *BMC Public Health*, Vol. 10, No. 234.

Davison, K. and Birch, L. (2001) 'Childhood overweight: a contextual model and recommendations for future research', *Obesity Reviews*, Vol. 2, No. 3, pp.159–71.

EL-Dosoky, M. and AL-Amoudi, F. (1997). 'Menarcheal age of school girls in the city of Jeddah, Saudia Arabia', *Journal of Obstetrics and Gynaecology*, Vol. 7, No. 2, pp.95–198.

French, S., Story, M., Neumark-Sztainer, D., Fulkerson, J. and Hannan, P. (2001). 'Fast food restaurant use among adolescents: associations with nutrient intake, food choices and behavioral and psychosocial variables', *International Journal of Obesity and Related Metabolic Disorders*, Vol. 25, No. 12, pp.1823–1833.

Larson, N. and Story, M. (2009) 'A review of environmental influences on food choices', *Annals of Behavioral Medicine : A Publication of the Society of Behavioral Medicine*, Vol. 38, Suppl 1, pp.S56–S73.

Laustsen, G. (2006) 'Environment, ecosystems, and ecological behavior: a dialogue toward developing nursing ecological theory', *Advances in Nursing Science*, Vol. 29, No. 1, pp.43–54.

Livingstone, S. and Helsper, E. (2004) *Advertising Foods to Children: Understanding Promotion in the Context of Children's Daily Lives. A Review of the Literature prepared for the Research Department of the Office of Communications (OFCOM)*, London, UK: Media@LSE, (Unpublished).

Neumark-Sztainer, D., Story, M. and Falkner, N.H. (1999) 'Sociodemographic and personal characteristics of adolescents engaged in weight loss and weight/ muscle gain behaviors: Who is doing what?' *Preventive Medicine*, Vol. 28, pp.40–50.

O'Dea, J. (2003) 'Why do kids eat healthful food? Perceived benefits of and barriers to healthful eating and physical activity among children and adolescents', *Journal of the American Dietetic Association*, Vol. 103, pp.497–501.

Ojala, K., Vereecken, C., Valimaa, R., Currie, C., Villberg, J., Tynjala, J. and Kannas, L. (2007) 'Attempts to lose weight among overweight and non-overweight adolescents: a cross-national survey', *International Journal of Behavioral Nutrition and Physical Activity*, Vol. 4, No. 1, p.50.

Sallis, J. and Owen, N. (1996) *Ecological Models*, in K. Glanz, F.M. Lewis and B.K. Rimer (Eds.). San Francisco: Jossey-Bass, pp.403–424.

Shepherd, R. and Raats, M. (2006) *The Psychology of food. Frontiers in Nutritional Science*, City.

Sigulem, D., Devincenzi, M. and Lessa, A. (2000) 'Diagnosis of the nutritional status of children and adolescents', *Journal of Paediatrics*, Vol. 76, No. 3, pp.S275–S284.

Story, M., Kaphingst, K.M., Robinson, R., O'Brien, R.R. and Glanz, K. (2008) 'Creating healthy food and eating environments: policy and environmental approaches', *Annual Review Public Health*, Vol. 29, pp.253–272.

Story, M., Neumark-Sztainer, D. and French, S. (2002) 'Individual and environmental influences on adolescent eating behaviors', *Journal of the American Dietetic Association*, Vol. 102, No. 1–3, pp.40–51.

Woodruff, S., Hanning, R. and McGoldrick, K. (2010) 'The influence of physical and social contexts of eating on lunch-time food intake among southern Ontario, Canada, middle school students', *Journal of School Health*, Vol. 80, No. 9, pp.421–428.

BIOGRAPHICAL NOTES

Elham Aljaaly is Saudi national. She is an Assistant Professor and the head of the Clinical Nutrition Department at Medical Applied College, King Abdulaziz University in Jeddah, Saudi Arabia. She is the first graduate Saudi Dietician from the Clinical Nutrition Programme in SA. Holding a MSc in Human Nutrition from University of Sheffield and PhD in Community Nutrition and Environmental Health from UCL, London. Two Post-Doctoral programmes in UK. She is a Member of different committees in the Saudi Council for Health Specialist. She has published articles on nutritional status of adolescents and food advertising. Been an invited speaker at many national, regional and international conferences since 1986 to present.