Assessment of Nutrition Knowledge of a University Community in Sharjah, United Arab Emirates

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ABSTRACT

Introduction: The aim of the present study was to assess the nutrition knowledge of the University of Sharjah community. **Methods:** A 50-item self-administered nutrition knowledge questionnaire validated for adults in UK was adapted to assess knowledge on current dietary recommendations, sources of nutrients, everyday food choices and diet-disease relationships. A cut-off score of 70% correct response was used to indicate 'adequate' knowledge level. All faculty, staff and students with UOS website accessibility were included. **Results:** The online questionnaire was filled by 265 respondents. The majority were 18-24-year-old students. Most respondents were aware of dietary recommendations but knowledge level was inadequate in terms of starchy foods (47.1%) to be eaten in lesser amounts; consumption of saturated fats (59.5%) to be reduced; and consumption of low fat dairy products (64.8%). Knowledge of common food sources of nutrients was adequate. Knowledge on specific sources of low salt or low fibre foods, cholesterol, healthy and not healthy alternatives to red meat was inadequate. Similarly, application of dietary recommendations in choosing everyday foods depicted inadequate knowledge. Knowledge of diet-disease relationships was also low. Females were significantly better-informed than males, with higher knowledge scores in each section of the questionnaire. **Conclusion:** A university community constitutes the informed section of a society. However, inadequate nutrition knowledge in this population reinforces the need for broad spectrum interventions to raise awareness on applying dietary recommendations and diet-disease relationships so as to make an informed choice in selecting everyday foods.

Key words: Nutrition knowledge, United Arab Emirates, university faculty and students

INTRODUCTION

Nutrition is considered as the most convenient threat affecting long-standing health (Schaller & James, 2005). As such, it is a critical constituent of health promotion, disease prevention and treatment. Therefore, it is important that the university community, considered as a well-informed section of the society, possesses adequate knowledge in nutrition.

The United Arab Emirates (UAE) is a rapidly developing country composed of a multinational population with varying educational backgrounds, religious beliefs, and cultural practices, which pose a challenge for population-based public

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health strategies. A number of public health issues contribute significantly to morbidity and mortality in the UAE(Loney et al., 2013). In addition to the natives, UAE has been flooded by a large number of migrants from all over the world. Due to this migration and recent developments, there has been a change in the food consumption patterns (Loney et al., 2013).

Nutrition is an important component for disease prevention and cure but the increasing incidence of chronic life style diseases calls for nutrition education (Gibbs & Novakofski, 2013). However, nutrition information is complex and may require high levels of cognitive skills (King et al., 2012). Basic nutrition knowledge is important so as to help individuals make healthy dietary choices and improve dietary health behaviour (Worsley, 2002). Many college and university students experience changes in their life patterns and a weakening of dietary habits during their study years. Very often, they have inappropriate eating habits such as skipping meals (breakfast, in particular) and choosing unhealthy, high energy foods that are low in essential nutrients (Sajwani et al., 2009). The lifestyle patterns students acquire during their college years can predispose them to future health problems and physiological consequences (Racette et al., 2005; Tirosh et al., 2010; Tirosh et al., 2011).

Similarly, health and nutrition are neglected domains amongst university faculties and other staff. This may be attributed either to inadequate nutrition awareness or work pressure, and academic commitments and responsibilities. This not only affects their health but also their professional and academic outputs. Thus, there is an urgent need to assess nutrition knowledge among all these individuals so that their overall health is not compromised (Melby & Takeda, 2013).

There is a dearth of documented information on nutrition knowledge among the population in Middle Eastern countries.

Therefore, it is imperative to assess nutrition knowledge among the different sections of the population for the development of need-based strategic planning to combat life style diseases in these countries. For this purpose, it is logical to explore the level of nutrition knowledge among the university population that constitutes one of the "most informed" sections of society. Understanding the gaps in their knowledge could provide a direction for formulating an appropriate plan of action for nutrition and dietary intervention programmes. Therefore, the present study aimed to assess the level of nutrition knowledge of the university community including faculty, staff and students.

METHODS

This was a descriptive cross-sectional study intended to assess the nutritional knowledge of faculty, staff and students at University of Sharjah (UOS) in the United Arab Emirates (UAE). The study population consisted of faculty, staff and students from thirteen colleges of the UOS with participation being voluntary. All subjects who responded to the online questionnaire posted on the UOS website constituted the study sample. A total of 265 subjects participated in this study. Confidentiality was maintained and anonymity of the participants was ensured. The study protocol was approved by the research committee at the Department of Clinical Nutrition and Dietetics, College of Health Sciences, UOS.

A 50-item, self-administered nutrition knowledge questionnaire, validated by Parmenter & Wardle (1999) on adult population of the UK was adopted. Accordingly, the questionnaire contained four major sections as specified in the tables and figures: dietary recommendations, sources of various nutrients, choosing everyday foods; and diet-disease relationships. Basic demographic information such as age, gender and nationality were part of the questionnaire. A pilot study

was conducted before the final version of the questionnaire was presented to the university community in the English language. The pilot study found that the content of the original questionnaire related well with the cultural-mix of the participants.

The questionnaire was made accessible on the website to all university staff and students of Sharjah community for a period of three months (September to November) in the fall semester of the academic year 2012/2013. The participants took approximately 10 – 15 minutes to complete the questionnaire. Respondents' accessibility to filling the questionnaire was limited to one time only and did not include any information pertaining to the identification of the respondents. A brief instruction for completion of the questionnaire was displayed before "log-in" to minimise missing or incomplete information. A panel of six nutrition experts was constituted for answering all the questions independently. Thereafter, a master key was developed with the consensus on the correct answer of each question.

For purposes of analysis, a score of less than 70% correct response to each question was considered as 'low' or 'inadequate' level of knowledge for the specific component of the questionnaire. On the other hand, a correct response of 70% score and above indicated a 'high' or an 'adequate' level of knowledge. In the absence of a unified cut-off for adequate level of nutrition knowledge, the standard cut-off used in the education system for 'passing' was adopted (Biddle, 1993).

The data was coded and analysed using the IBM SPSS Statistics 17.0 Software (SPSS Inc., Chicago, IL, USA). Descriptive statistics were run to summarise the data collected. Frequencies and percentages of correct responses for all components of the questionnaire were generated. In addition, significance of difference using chi-square was tested at $p< 0.05$ between the correct responses reported by males and females.

RESULTS

The demographic characteristics of the university community who participated in the study are shown in Table 1. Of the total participants in the present study, 228 were students, 13 faculty and 12 staff members at the UOS. The majority of participants were females (76%). Most of the respondents, 223 (86.8%) were between the ages of 18 – 24 years; 23 (8.9%) 25-34 years; and 11 (4.3%) ≥ 35 years. A little less than one-fifth of the participants were Emirati nationals. Nearly one-third of the total participants belonged to medical and health sciences colleges, while the rest were from non-medical specialties/other colleges. Almost 16% (41 participants) reported that they had a health and nutrition related qualification at the college. Thirty-eight participants (14.8%) reported being on a special diet for therapeutic purposes.

The frequency distribution of university participants with correct responses to the nutrition knowledge questions in the section pertaining to dietary recommendations by experts as well as sources of nutrients is shown in Table 2. The level of knowledge on dietary recommendations by experts on different food items was not evenly distributed. Most participants were aware of the need for higher consumption of fruits, vegetables and high fibre foods as well as lesser consumption of sugary, salty and high fatty foods but less than half of them were aware of the expert recommendation on less consumption of starchy foods. The correct responses to expert recommendations on foods to be increased or decreased in the diet ranged from 47.1% to 93.9%. Moreover, awareness of the participants about cutting down saturated fat and consuming low fat versions of dairy foods was found to be 59.5% and 64.8%, respectively. In comparison to males, a significantly higher number of females were aware of expert recommendations to consume greater amounts of vegetables and fewer amounts of starchy foods.

Table 1. Demographic characteristics of university community participants

Variable	Sample	n (%)
University of Sharjah Status		
Faculty		13 (5.1)
Students	253	228 (90.1)
Staff		12 (4.8)
Gender		
Male	254	61 (24.0)
Female		193 (76.0)
Age		
18-24 Years		223 (86.8)
25-34 Years	257	23 (8.9)
≥ 35 Years		11 (4.3)
Nationality		
UAE National	257	48 (18.7)
Non-National		209 (81.3)
Associated Colleges		
Medical & Health Sciences	228	77 (33.8)
Other Colleges		151 (66.2)
Any health or nutrition related qualification		
Yes	258	41 (15.9)
No		217 (84.1)
On any special diet		
Yes	257	38 (14.8)
No		219 (85.2)

Results on sources of various nutrients indicated that they had adequate knowledge in the context of the most prominent nutrient found in the common foods (added sugar in ice creams, low added sugar in plain yogurt, low fat in baked beans, high starch in pasta and rice, low starch in cheese, high salt in cheese and sausages, high protein in chicken and baked beans, low protein in butter and high fibre in broccoli). However, inadequacy in the knowledge level was evident in each nutrient source category for other food items. Moreover, the response rate for the healthy alternatives to red meat as well as nutrient composition facts about different foods was markedly low. Overall, knowledge level about the sources of different nutrients in the food items ranged from 13.3% to 92.8% among participants. An inadequate level of knowledge related to the specific sources of nutrients was

evident among the participants, except that their level of knowledge was high in relation to whole wheat bread that contains most vitamins and minerals (Figure 1).

In terms of knowledge by gender, females had an adequate level of knowledge that was significantly higher compared to males as evident by chi-square tests for low added sugar food - plain yogurt (8.19; p=0.004), starchy food - porridge (8.59; p=0.003), high salt food- sausages (4.09; p=0.034), high fibre food- broccoli (5.17; p=0.016), low saturated fat food- mackerel (4.72; p=0.023), oil containing mostly MUFA - olive oil (4.11; p=0.029), a glass of unsweetened fruit juice is equivalent to a helping of fruit (3.88; p=0.033).

Figure 2 shows the percentage distribution of correct responses of the university community on choosing everyday foods. The correct responses ranged from 23.3% to 60.8% indicating

Table 2. Frequency distribution of participants with correct responses to nutrition knowledge questions on dietary recommendations and sources of nutrients

| Variable	n (%)
Dietary recommendations	
Foods to be eaten in less amount	
Sugary foods	235 (90.4)
Starchy foods	107 (47.1)
Fatty foods	238 (93.3)
Salty foods	193 (76.3)
Foods to be eaten in more amount	
Vegetables	248 (93.9)
High fibre foods	186 (75.0)
Fruits	239 (91.2)
Type of fat to be cut down	
Saturated	154 (59.5)
Version of dairy product to be eaten	
Low fat	169 (64.8)
Sources of nutrients	
Foods high in added sugar	
Ice cream	244 (92.8)
Orange squash	94 (36.0)
Tomato ketchup	172 (65.4)
Foods low in added sugar	
Bananas	110 (42.1)
Plain yogurt	230 (87.5)
Tinned fruit in natural juice	74 (28.1)
Foods high in fats	
Luncheon meat	166 (62.9)
Scotch egg	124 (47.1)
Polyunsaturated margarine	142 (54.0)
Low fat spread	204(77.3)
Nuts	157 (59.7)
Foods low in fats	
Pasta	123 (46.4)
Baked beans	200 (76.0)
Honey	182 (68.7)
Bread	169 (64.0)
Cottage cheese	55 (20.9)
High starchy foods	
Pasta	215 (82.1)
Rice	227 (86.3)
Porridge	120 (46.0)
Low starchy foods	
Cheese	197 (75.2)
Butter	178 (67.9)
Nuts	144 (54.8)
High salt foods	
Sausages	191 (72.9)
Cheese	206 (78.6)
Low salt foods	
Pasta	132 (50.2)

Table 2. Continued from previous page

Red meat (raw)	102 (38.6)
Frozen vegetables	169 (64.0)
Protein rich foods	
Chicken	244 (92.1)
Cheese	133 (50.2)
Baked beans	186 (70.2)
Low protein foods	
Fruit	179 (67.5)
Butter	190 (71.7)
Cream	177 (66.8)
Fibre rich foods	
Bananas	161 (60.8)
Broccoli	200 (76.0)
Baked potatoes with skin	172 (65.2)
Baked beans	119 (45.1)
Low fibre foods	
Cornflakes	35 (13.3)
Eggs	183 (69.3)
Red meat	163 (61.7)
Nuts	123 (46.9)
Fish	155 (58.7)
Chicken	177 (67.0)
High saturated fat foods	
Whole milk	182 (69.5)
Red meat	172 (65.6)
Chocolate	184 (71.0)
Low saturated fat foods	
Mackerel	87 (33.6)
Olive oil	185 (70.6)
Sunflower margarine	105 (40.2)
Some foods have a lot of fat but no cholesterol	57 (22.7)
Healthy alternatives to red meat	
Baked beans	149 (57.5)
Nuts	125 (48.8)
Low fat cheese	120 (46.3)
Not healthy alternatives to red meat	
Liver pate	43 (16.3)
Luncheon meat	115 (44.4)

that the level of knowledge pertaining to the selection of everyday foods was low among the participants. Females reported an adequate knowledge with significantly more correct responses than males in choosing everyday foods including healthier spaghetti Bolognese option - a large amount of pasta with a little sauce on top (4.98; p=0.018) and lower salt option in dish - mushroom omelette (9.58; p=0.001).

The correct responses of the participants in relation to the diet-disease relationships section is presented in Table 3. Awareness was adequate in terms of the relationship between diseases and high sugar, sodium/salt and fat intakes. Specifically, the participants were aware of the role of more fibre, fruits and vegetables in reducing cancer risk as compared to the role of sugar, salt
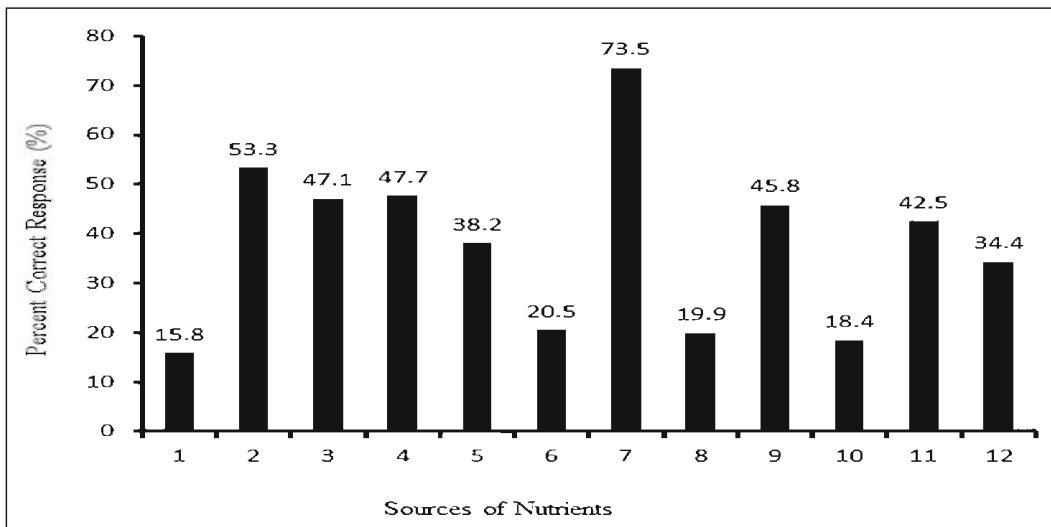
Figure 1. Correct responses of participants to nutrition knowledge questions on specific sources of nutrients: 1. Vegetable oils are main source of polyunsaturated fatty acids; 2. Harder fats contain more saturates; 3. Fat contains most calories for the same weight; 4. There is more calcium in whole milk; 5. Olive oil contains mostly monounsaturated fatty acids; 6. Butter and margarine contain the same number of calories; 7. Whole wheat contains more vitamins and minerals; 8. There is less fat in polyunsaturated fatty acids of margarine than in butter; 9. There is more protein in whole milk; 10. Brown sugar is more healthy than white sugar; 11. Saturated fats are more often found in dairy products; 12. A glass of unsweetened fruit juice is a helping of fruit
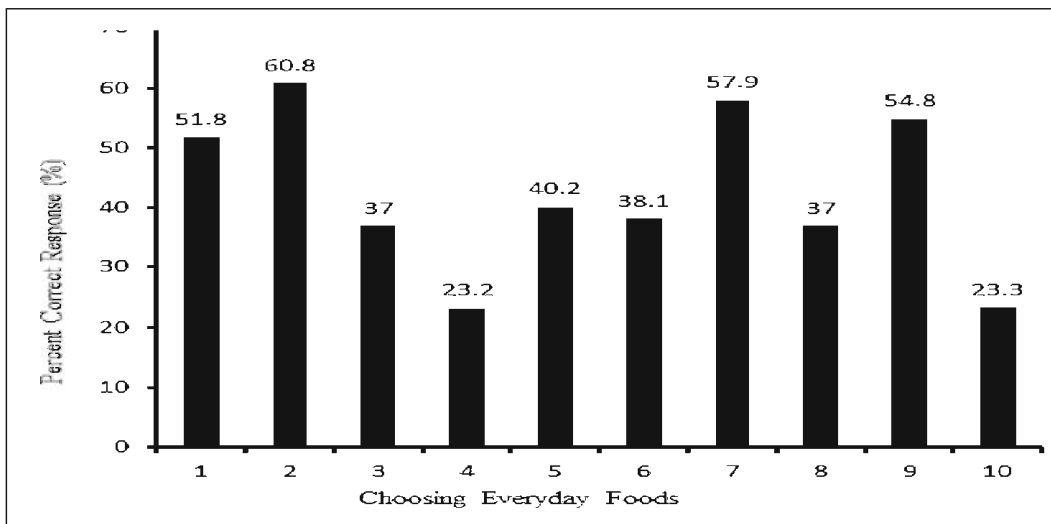
Figure 2. Correct responses of participants to nutrition knowledge questions on choosing everyday foods: 1. A healthier spaghetti Bolognese means more pasta with little sauce; 2. Grilled turkey is best choice to reduce fat in diet; 3. Mushroom omelette is a low salt option in dish; 4. Edam is a lower fat cheese option; 5. Strawberry yogurt is the healthiest pudding; 6. Banana and plain yogurt is a healthier sweet choice; 7. Thicker cuts of chips are healthier; 8. Two thick bread slices with a thin cheddar cheese slice is a healthier sandwich; 9. Beans on wholemeal toast is low fat fibre meal; 10. Muesli bar is a low fat, high fibre snack.

Table 3. Frequency distribution of participants with correct responses to nutrition knowledge questions on diet and disease relationship

Variable	n (%)
Diet for reduction of cancer risk	
High fibre diet	185 (71.7)
More fruits & vegetables	202 (78.6)
Less sugar	161 (62.4)
Less salt	145 (56.6)
Less preservatives/additives	177 (68.9)
Diet for prevention of heart disease	
High fibre diet	153 (60.2)
More fruits & vegetables	212 (83.1)
Less salt	216 (85.0)
Less preservatives/additives	160 (63.0)
Less saturated fat	219 (85.6)
Diet for reduction of cholesterol	
Less cholesterol in diet	188 (73.2)
Less saturated fatty acids	199 (77.7)
Antioxidants	146 (56.8)
Polyunsaturated fatty acids	138 (54.1)

and preservatives/additives. Similarly, respondents were mostly aware of the role of fruit and vegetables, salt, and saturated fat in the prevention of heart diseases. However, information on antioxidants, polyunsaturated fatty acids and its role in balancing cholesterol levels were low among the participants. Correct responses on oxidants ranged from 34.5% to 56%. Knowledge level was adequate in females and significantly higher than that of males with regard to diet-disease relationship for antioxidants and an increase in cholesterol - No (5.25; p=0.016) and vitamin E is an antioxidant nutrient- Yes (3.91; p=0.036).

DISCUSSION

Nutrition knowledge enables informed dietary choices (Moynihan *et al.*, 2007). The majority of the respondents at UOS community were students. Barzegari *et al.* (2011) opined that students are the future of any society. Being more curious about health and nutrition as well as being better adaptable towards change, they will subsequently result in a more food-conscious and healthy society.

The questionnaire in the current study was completed by more adult females as compared to males. This may be attributed to the fact that females are more concerned about nutrition and health and have better nutrition knowledge level (Azizi *et al.*, 2011; Tirodimos *et al.*, 2009; Vos *et al.*, 2008; Cousineau *et al.*, 2006; Matvienko, Lewis & Schafer, 2001). The results on knowledge of the respondents about dietary recommendations were encouraging. Many respondents were aware of the majority of the key dietary guidelines for healthy living as supported by other studies too (Nicklas *et al.*, 2013; Azizi *et al.*, 2011; Cousineau *et al.*, 2006; Parmenter, Waller & Wardle, 2000).

While the majority of the participants were aware of the dietary recommendations on higher consumption of fruits and vegetables and lesser consumption of high sugar and fatty foods, the conversion of this knowledge into practical aspects was low. This finding is in acordance with earlier findings (Nicklas *et al.*, 2013; Melby & Takeda, 2013; Hartman *et al.*, 2013; Vos *et al.*, 2008; Hendrie, Coveney & Cox, 2008).

An important observation was knowledge of carbohydrate consumption - less than half of the participants were aware about cutting down on starchy foods (Vos *et al.*, 2008). This finding was also evident in a study conducted by Parmenter *et al.* (2000) and is indicative of the need for greater efforts towards educating society on the quality of carbohydrates in daily diet.

Another section of the questionnaire assessed the knowledge of participants on sources of various nutrients in foods. A good number of participants responded that low fat spreads were a high fat food. A similar finding was reported by Parmenter *et al.* (2000). On the contrary, Ebneter, Latner & Nigg (2013) reported that the respondents under-estimated the calorie content of a low fat labelled chocolate candy and found it better tasting irrespective of the calorie information provided by the manufacturers. Also, the finding on knowledge about cheese being a high salt food was in contradiction to the findings of Parmenter *et al.* (2000) wherein fewer than half of the respondents realised that cheese was a high salt food.

Knowledge of foods high in saturated fats was higher as compared to knowledge of foods low in saturated fats. This finding is in accordance with reported findings (Al-Almaie, 2005; Parmenter *et al.*, 2000). Recent nutrition education efforts have been targeted towards fats and the role they play in health and disease. Internet, media and print media focus on the types of fats and their relationship with disease but very little information is available on the quantity of fats that need to be consumed (Al-Almaie, 2005). Very few participants in our study were able to report about olive oil as a rich source of mono unsaturated fatty acids (38.2%) and vegetable oils as a rich source of polyunsaturated fatty acids (15.8%). Thus, it may be possible that the participants may be consuming these specific fats under the influence of peers, media and culture, without themselves being fully aware of their details. Our

findings are also supported by the study of Biezanowska-Kopeć *et al.* (2012) which assessed the consumption of fatty foods among students. Their study revealed that the students were aware of the fat content of foods but could not apply that knowledge practically to their own selves; despite acquiring knowledge on nutrition, when it came to choosing foods for themselves, they made wrong choices.

Most respondents had higher aware-ness of high fibre foods compared to foods low in fibre. These findings indicate that nutritional knowledge about fibre rich foods has improved over a period of time; however, there is still a need to address consumer confusion and improve the understanding of sources of fibre (Mobley *et al.*, 2014).

Subjects reported having inadequate knowledge about everyday healthy food choices. This finding has been supported by another research in Chile (Rodríguez *et al.*, 2013). This indicates that people are not able to transform their nutrition knowledge into actual choices, for example, low fat, high fibre snack; healthier sweet choices; healthier pudding, low salt option in dish etc.(Nicklas *et al.*, 2013; Melby *et al.*, 2013). This may be due to the fact that despite awareness of the nutrient content of food items and broad guidelines of dietary fat and sugar, people actually do not read the nutritional information on foods to ascertain their fat, fibre or salt content (Rodríguez *et al.*, 2013). Nurliyana, Norazmir & Khairil-Anuar (2011) reported that no more than 37% of university students 'sometimes' read information on food packets before purchasing. Among those students who had high nutrition knowledge, 25% 'often' read the information on packaged foods.

Dietary behaviour is influenced by nutrition knowledge and may be improved by providing nutrition information (Rodríguez *et al.*, 2013; Worsley, 2002). Awareness regarding diet and disease relationship is especially important in view of the global increase (including UAE) in

the prevalence of diet related chronic diseases (Rodríguez *et al.*, 2013).

CONCLUSION

Assessment of nutrition knowledge and imparting nutrition education to the society are important for health promotion and reduction of morbidity and mortality rates. To identify specific areas and the population that needs nutrition education, a preliminary survey of the level of nutrition knowledge is an imperative. While there is adequate knowledge on prominent nutrients in common foods, efforts should be directed towards empowering the population with substantial nutrition information so that they are able to apply it in making healthy food choices.

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