Introducing a New Egyptian Version of the General Nutrition Knowledge Questionnaire (E-GNKQ) for Adults: Validity and Reliability Test

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Abstract

The present study aims to introduce a new Egyptian version of the general nutrition knowledge questionnaire (E-GNKQ) for adults by assessing its validity and reliability in an Egyptian context. The study relied on the revised version of the general nutrition knowledge questionnaire, performed by Kliemann et al. in 2016. The questionnaire was translated and adapted into a seventy-eight-item Arabic version. The questionnaire was subjected to five validation studies that were carried out for content validity; face validity; internal reliability and external reliability; construct validity between participants with nutrition knowledge and with little nutrition knowledge, and without nutrition knowledge; and convergent validity for correlation between nutrition knowledge and demographic characteristics. The study targeted two groups of students (students of the Department of Nutrition and Food Science at Menofia University (n 163), and students of the Faculty of Tourism and Hotels at the University of Sadat City (n 91). The seventy-eight-item Egyptian General Nutrition Knowledge Questionnaire had an acceptable construct, content and face validity, internal consistency, test-retest reliability, and convergent validity. So, it has been shown that the E-GNKQ is a valid and reliable way to measure how much college students in Egypt know about nutrition.

***Keywords*:** Nutrition, knowledge, validity, reliability, university students, Egypt

Introduction

Nutrition is an important element in people's growth and maintaining their performance in daily life, especially if their food contains the basic nutrients that benefit them (Desbrow *et al.,* 2014). The relationship between food and health has received great attention from those interested in nutrition, as proper nutrition based on nutrition knowledge can prevent and treat many illnesses (Peña-Romero *et al.,* 2018). Nutrition knowledge is considered one of the most important factors associated with health awareness, as it has been found that many harmful health problems are associated with a low level of health awareness among individuals. Studies show that people with a low level of health awareness are less likely to deal with chronic diseases, such as obesity (Spronk *et al.,* 2014). Some studies proposed that the deficiency of nutrition knowledge among people may be involved in the higher rates of overweight and obesity among low-income communities (Rose & Bodor, 2006; Townsend, 2006). While raising individuals' nutrition knowledge level may partly decrease the health variation that exists among low-income communities (Townsend, 2006).

Individuals' nutritional knowledge is very important. Inconvenient nutrition knowledge is considered a hurdle to fostering healthful behaviors and preserving wellness (Worsley, 2002; Nanayakkara *et al.,* 2018). Based on the integrated theory of Health Behavior Change, modification of health and nutritional behavior can be effectively enhanced through knowledge and beliefs about a certain topic, especially when used in intervention contexts. Therefore, it is assumed that exposing individuals to intervention or knowledge means (i.e., nutrition education)

that improved nutrition knowledge may contribute to enhancing their nutritional behavior and eating habits (Sharma *et al.,* 2008; Ryan, 2009). Adequate nutritional knowledge is associated with improving dietary behaviors and decreasing the rates of malnutrition diseases (Bonaccio *et al.,* 2013; Grosso *et al.,* 2013).

Studies have shown that people with higher levels of nutrition knowledge tend to have higher self-efficacy about nutrition. This is significant when considering that increasing a person's self-efficacy can enhance the ability of a person to overcome obstacles and can be a significant predictor of changing nutritional behavior (Boulanger *et al.,* 2002; Fitzgerald *et al.,* 2008). Recently, many questionnaires have been developed to measure the level of nutrition knowledge in the population. Among these questionnaires, the General Nutrition Knowledge Questionnaire (GNKQ), developed by Parmenter and Wardle in the 1990s, is the most prominent. The GNKQ has been adopted and validated in many studies in different countries with some adjustments for each country. By reviewing previous studies conducted in this field, it was found that some studies (i.e., Kliemann *et al.,* 2016; Mo'ath & Attlee, 2020) did not clarify how content validity and face validity were tested. Additionally, the expert panel that participated in these studies consisted of more than 10 persons, which contradicts the desirable number (6-10 persons) of the expert panel, as Yusoff (2019) clarified that it is undesirable to include more than 10 people in the expert panel so that they have sufficient control over the chance agreement.

It was indicated that it is a necessity to develop a nutrition knowledge questionnaire for each country individually. This is because each country has its own food culture and dietary habits (Parmenter & Wardle, 1999). Dietary habits and food culture vary from country to country. This difference is attributed to many factors, such as folk customs and traditions, religion, economic conditions, and natural resources (Mintz & Du Bois, 2002). Egyptian culture, the population's eating habits, and dietary recommendations are different from those of European countries (Hassan-Wassef, 2004; Da Silva *et al.,* 2009: Abdel-Hady *et al.,* 2014; Aljefree & Ahmed, 2015; Ali, 2018; Muhammad, 2019). To the best of the authors' knowledge, no one has measured the validity and reliability of GNKQ in the Egyptian context until now. Subsequently, the present research aims to develop a general questionnaire on nutrition knowledge for Egyptian adults. So, this study aims to validate an Arabic version of a general nutrition knowledge questionnaire on university students in Egypt.

Review of Literature

Nutrition Knowledge

Over time, nutrition knowledge has developed to comprise everything from the preparation of foods, one's skills, and the evolution of knowledge and behaviors that enhance a healthy diet and well-being (Vidgen & Gallegos, 2014; Nanayakkara *et al.,* 2018). It has been found that nutritional knowledge has a remarkable role in following optimum nutrition behaviors (Alaunyte *et al.,* 2015). Nutrition knowledge is the comprehension and capability that are required to enable individuals to meet their nutritional needs, including nutritional knowledge that fosters a healthy diet besides food purchasing and preparation skills (Fordyce-Voorham, 2011; Nanayakkara *et al.,* 2018). Nutrition knowledge may also be known as the comprehension of fundamental facts about diets and nutrition (Alaunyte *et al.,* 2015). Nutrition knowledge refers to "knowledge of concepts and processes related to nutrition and health including knowledge of diet and health, diet and disease, foods representing major sources of nutrients, and dietary guidelines and recommendations" (Miller & Cassady, 2015, p 209). At the practical level, nutrition knowledge must comprise two of the following concepts at least during evaluation; food groups, balanced diets, current dietary

guidelines, sources of nutrients, storage, and preparation of food, use of food labels, and the relationship between nutrition and disease (Parmenter & Wardle, 2000; Alaunyte *et al.*, 2015).

Assessment of Nutrition Knowledge

Various questionnaires were developed or modified to evaluate individuals' general nutritional knowledge (Zinn *et al.,* 2005). These nutritional knowledge assessment questionnaires have also been used to explore the possibility of deeming good nutritional knowledge as a cognitive factor in improving individuals' eating habits (Spronk *et al.,* 2014; Bradette-Laplante *et al.,* 2017). There was a need for a valid tool to assess nutrition knowledge among individuals, which is considered critical for developing nutrition education interventions (Mo'ath & Attlee, 2020). Community-based organizations advanced many forms of evaluations to determine nutrition knowledge in adults, which act as guidelines for the review. Popular questionnaires that were developed to measure individuals' nutrition knowledge comprise the General Nutrition Knowledge Questionnaire (GNKQ), the Consumer Nutrition Knowledge Scale (CoNKS), and the Dietary Knowledge Test (NKT) (Kliemann *et al.,* 2016). Parmenter and Wardle developed the GNKQ in Europe during the 1990s to evaluate general nutrition knowledge among populations and the questionnaire was lately updated by Kliemann *et al*. in 2016 (Mo'ath & Attlee, 2020). The GNKO consisted of 75 questions divided into 5 main sections: "the understanding of terms; awareness of dietary recommendations; knowledge of food sources related to the advice (practical food choice); and awareness of diet-disease associations" (Parmenter & Wardle, 1999, p299). The validity and reliability of the GNKQ questionnaire for evaluating nutrition knowledge in adults were proved in many studies in different countries, with different questions about dietary guidelines and recommendations from those in the GNKQ of the UK population, like Australia (Hendrie *et al.,* 2008; Thompson *et al.,* 2021), Turkey (Alsaffar, 2012), United Kingdom (Kliemann *et al.,* 2016), Japan (Matsumoto *et al.,* 2017), Canada (Bradette-Laplante *et al.,* 2017), Uganda (Bukenya *et al.,* 2017), Romania (Putnoky *et al.,* 2020), and the United Arab Emirates and Jordan (Mo'ath & Attlee, 2020).

Methodology

Participants

Participants in this study were a convenient sample of senior students. The participants are enrolled in the fourth year of the Department of Nutrition and Food Science at Menofia University, who studied nutrition (n 163), and students in the fourth year of the Faculty of Tourism and Hotels at the University of Sadat City (n 91). The students of the Faculty of Tourism and Hotels were selected as a group that was supposed to have little (studied some nutrition courses) or no nutritional education (have not any nutrition courses). The questionnaire was distributed to all participants in two delivery styles: online (through Google forms) and in hard copies, from December 2020 to March 2021.

Instrument

The study relied on the revised version of the general nutrition knowledge questionnaire performed by Kliemann *et al*. in 2016. GNKQ-R was designed to assess nutrition knowledge through four parts. Part one of the questionnaire relates to nutrition advice or recommendations from health/nutrition experts, part two is about groups of food and their content of nutrients, part three is about distinguishing and choosing healthy foods, and part four is about health issues related to diet and weight.

The original English questionnaire was translated into Arabic and linguistically revised to avoid any mistakes in terminology errors after translation. Then, it was back translated into English. The first draft of the Egyptian general nutrition knowledge questionnaire (E-GNKQ) consisted of 48 questions; the questions were in the form of multiple-choice, dichotomous, and checkmarks. Based on the evaluation of the expert committee, two questions were excluded during assessing content validity qualitatively, because they did not fit with Egyptian dietary habits or the Islamic religion. One of these questions in section one (Approximately how many alcoholic drinks is the maximum recommended per day "The exact number depends on the size and strength of the drink"?), the other one in section three (Traffic lights are often used on nutrition labeling, what would amber mean for the fat content of food?). There are also some food and ingredients that are excluded based on the same reasons, such as Yorkshire pudding, ham, plantains, and rapeseed oil, and replaced with other common ingredients in Egypt.

The final version of the E-GNKQ distributed to participants consisted of 45 questions representing 78 points and was divided into four parts after omitting three questions in the content validity stage in addition to the part about demographic characteristics. The first part (recommendations from health/nutrition experts) consists of 7 questions with a total of 9 points. The second part (food groups and nutrients) consists of 10 questions with a total of 36 points. The third part (distinguishing and choosing healthy foods) consists of 12 questions with a total of 12 points, while the fourth part (health issues related to diet and weight) consists of 16 questions with a total of 21 points. Students' answers were scored by giving 1 to the correct answer and zero to the wrong or not sure answers for each question of the questionnaire. Subsequently, the scores of the four parts of the questionnaire were calculated together to obtain the overall score of general nutrition knowledge score of the students.

Data Analysis

The IBM SPSS software version 26 was used to analyze the study data due to the lack of some tests such as Fleiss' Kappa in the lower versions of the program. Data were displayed in the form of means and standard deviations to ensure that differences between groups were easy to identify. The Content Validity Index (CVI) approach was used to determine the level of agreement between the expert panel, whether at the element level (I-CVI) or the scale level (S-CVI), in addition to the Fleiss' Kappa coefficient to measure inter-rater reliability beyond the chance agreement. Face validity was estimated using the CVI approach using the method of average agreement (CVI/Ave) and universal agreement (CVI/UA) for each part of the questionnaire and the questionnaire. Cronbach's alpha coefficient was employed to determine the level of internal reliability, while the paired sample t-test and the intra-class correlation to determine the degree of external reliability.

For construct validity, the independent t-test and one-way ANOVA were used to determine the differences between groups in nutritional knowledge scores. In addition, using Cohen's d coefficient and Eta squared to determine the effect size. The independent t-test and one-way ANOVA were used to determine the convergent validity by analyzing the relationship between the nutritional knowledge scores of the groups and the demographic characteristics (gender, age, college, section, and nutritional background). In addition, Tukeys' post-hoc test was used to determine the differences between groups and Cohen's d and Eta squared coefficient to measure the effect size. To verify the validity of the Egyptian General Nutritional Knowledge Questionnaire (E-GNKQ), a process of five studies was carried out, namely: Content Validity, Face Validity, Internal and External Reliability, Construct Validity, and Convergent Validity respectively.

Study 1: Assessment of Content Validity

Content Validity Index (CVI)

The content validity index is one of the most widely used methods for assessing the content validity of a measurement tool. The content validity index is evaluated in two ways; the first is at the element level, which is called the item content validity index (I-CVI), while the second method is at the scale level, and is known as the scale validity index (S-CVI) (Polit & Beck, 2006). To guarantee that the tool has sufficient content validity, it has to be reviewed by a panel of experts. This panel should include experts specialized in the field of research, such as nutritionists or dietitians. It is preferable to engage experts who work in the academic, governmental, or private sectors (MacKenzie *et al*., 2011). For the appropriate number of experts on the panel, it was suggested to use six people as a minimum number of experts to have adequate control over chance agreement. Although a maximum number of experts has not been set, it is unlikely to engage more than 10 persons in the panel (Yusoff, 2019).

Kappa coefficient

Most researchers use the CVI to measure the validity of the content for its ease of performing and understanding, although the CVI does not consider the probability of inflated values due to chance agreement between the raters. The Kappa weight ranges from -1 to one. If the value is negative, it indicates less than chance agreement. But if the value is zero, then it shows agreement was no better than chance. While if the value is positive, it means better than chance agreement. For interpreting the value of Kappa, 0.40 to 0.59 are deemed fair, between 0.60 to 0.74 is good, and more than 0.74 is considered excellent (Polit & Beck, 2006; Rodrigues *et al.*, 2017).

A group of experts, consisting of 10 individuals specialized in the field of nutrition, was selected based on their field of work, whether academically or professionally. Three academic professors specialized in nutrition and food science working at the Faculty of home economics, three academic professors specialized in nutrition and food science working at the faculty of Agriculture (3) three working as private dietitians (3), and one dietitian working at one of the government hospitals were invited to engage in the expert panel. A hard copy of the questionnaire containing the questions and its answers options was submitted to the expert committee for review and evaluation in terms of relevance, simplicity, and clarity. A four-point Likert scale was used to evaluate the questions, with approval ratings ranging from 1 (very irrelevant) to 4 (very relevant). The experts' answers regarding relevancy were used to create the content validity index for each item, section, and the whole questionnaire (see Table 1). The experts' answers were dichotomized into 0 and 1, where zero refers to degrees of rejection (1,2) and 1 indicates degrees of agreement (3,4). This process took two weeks from the time of distribution until obtaining the experts' responses.

Study 2: Assessment of Face Validity

The term face validity refers to the extent to which the test/questionnaire covers the concepts that it aims to measure at face value. Does the scale contain all the required questions? and use the appropriate vocabulary? (Fink, 2010). In this step, a small group of the target study population ranging from 10 to 20 individuals is usually used to fill out the questionnaire before applying it to the final research sample. This step aims to ensure the ease of completing the questionnaire and the clarity of the instructions to answer the questions, with the absence of technical problems when answering the questionnaire electronically. (Mokkink *et al.*, 2010; MacKenzie *et al.*, 2011). An electronic version of the questionnaire was distributed to 20 students to ensure the clarity of the

questions and the ease of the instructions to answer the questionnaire. After the students completed the answer to the questionnaire, they were interviewed to know their opinions about the questions. The students indicated that all the questions are clear and there are no ambiguous terms, whether they know the correct answer or not, in addition to the fact that the instructions for answering the questionnaire are also clear and understandable.

Study 3: Test-Retest Reliability (Internal and External Reliability).

In the field of nutritional knowledge, temporal stability is known as external reliability. The test-retest approach is regarded as the most widely used method for evaluating external reliability. The temporal stability is carried out by implementing the test in two separate times, separated by a period not less than two weeks, and then evaluating the difference between the scores of individuals at both times. The correlation must achieve a ratio greater than or equal to 0.7 to be of acceptable external reliability (Parmenter & Wardle, 2000; Zinn *et al.,* 2005). The values of intra-class correlation are ICC= < 0.5 point out to a poor reliability, ICC= 0.5 and < 0.75 declare a moderate reliability, ICC= 0.75 and < 0.9 indicates a good reliability and ICC ≥ 0.90 refer to an excellent reliability (Koo & Li, 2016). The term internal consistency refers to the degree of coherence between the components of the scale so that all the items are consistent with each other and measure the same point. Coefficient Alpha is the most widely used test for measuring internal consistency (McCrae *et al.,* 2011). The Cronbach's alpha coefficient (α) is used to discover the degree of internal consistency between the items that make up the measurement tool. Cronbach's alpha has a single value for any specific collection of data, so it is considered the most preferable and usable test for estimating internal reliability among researchers. The value of Cronbach's alpha (α) ranges from 0 to 1, if the value of Cronbach's alpha is close to 1, it indicates the robustness of the reliability and validity of the measuring tool and vice versa. The measuring tool must achieve a ratio greater than or equal to 0.7 to be reliable and valid (Weiner *et al.,* 2017).
A general sample of 254 participants from the Faculty of Home Economics and the Faculty of Tourism and Hotels was used to determine the level of internal reliability using Cronbach's alpha coefficient. This is after adopting the final version of the questionnaire based on the experts' panel reviews. Three weeks after the first response time, the questionnaire was sent to the students to answer again to determine the level of external reliability using the test-retest approach. 104 responses were obtained from the participants for the second time.

Study 4: Construct Validity

Construct validity refers to the ability of the questionnaire or measuring tool to measure the variable or subject that is intended to be validated. To determine the construct validity, a comparison based on participants' nutritional knowledge scores was made between final-year students. The Department of Nutrition and Food Science (99 students) at the Faculty of Home Economics - Menofia University, and students of the Faculty of Tourism and Hotels (Hotel Studies (28 students), Tourism Studies (32 students), and Tourist Guidance (24 students)), University of Sadat City. The students of the Faculty of Tourism and Hotels were selected as a group who are supposed to have little or no nutritional education.

Study 5: Convergent Validity

Convergent validity is regarded as a subordinate category of construct validity. It indicates the degree of correlation between the scale and other variables of the same construct (Krabbe, 2017).

Convergent validity was assessed by analyzing the relationship between participants' nutrition knowledge scores and sociodemographic factors (gender, age, education).
To determine the convergent validity, the data of all participants in the third study (n 254) and the fourth study (n 183) were used and combined. In this study, it was verified whether there is a relationship between nutritional knowledge scores and demographic characteristics, as indicated by previous studies.

Results

Study 1: Assessment of Content Validity

The CVI indicator as shown in Table 1, reveals that all the items had an acceptable I-CVI that was ≥ 0,79 except question number one in section one which achieved I-CVI= 0,5 Therefore, this item was deleted. The I-CVI of acceptable items ranged from 0,8 to 1. All sections of the questionnaire achieved an excellent CVI/Ave ranging between 0,91 to 0,97. Section 4 (health issues related to diet and weight) obtained the highest percentage of CVI/Ave (0,97) among all sections. Based on CVI/UA method, the CVI value ranged from 0,50 to 0,75. Sections 1 and 3 had a moderate CVI/UA= 0,62 and 0,66 respectively, section four had a good CVI/UA= 0,75 while section 2 had a fair CVI/UA= 0,50. At the level of the scale, the questionnaire had an excellent S-CVI/Ave= 0,97. It had a moderate S-CVI/UA= 0,63. Based on the Kappa coefficient, the questionnaire had excellent validity, where it achieved k= 0,802. The Kappa value differed between the sections. Among all sections, sections 1 and 2 had the lowest Kappa values k= 0,022 and = 0,081 respectively, while section 4 had the highest value k=0,920 followed by section three k= 0,867.

Table 1: Content validity index I-CVI, and S-CVI of the expert panel

Items		I-CVI	Interpretation	CVI/Ave	CVI/UA	Kappa	Sig.
Section 1 (7,3/8)	Q.1	0,5	Eliminated	0,91	0,62	0,022	0,312
	Q.2	0,9	Appropriate				
	Q.3	1	Appropriate				
	Q.4	1	Appropriate				
	Q.5	0,9	Appropriate				
	Q.6	1	Appropriate				
	Q.7	0,9	Appropriate				
	Q.8	1	Appropriate				
Section 2 (9,4/10)	Q.9	0,8	Appropriate	0,94	0.50	0,081	0,000
	Q.10	1	Appropriate				
	Q.11	0,9	Appropriate				
	Q.12	1	Appropriate				
	Q.13	0,9	Appropriate				
	Q.14	0,9	Appropriate				
	Q.15	1	Appropriate				
	Q.16	1	Appropriate				
	Q.17	1	Appropriate				
	Q.18	0,9	Appropriate				
	Q.19	0,9	Appropriate				
	Q.20	0,9	Appropriate				
	Q.21	1	Appropriate				

Section 3 (11,6/12)	Q.22	0,9	Appropriate	0,96	0,66	0,867	0,000
	Q.23	1	Appropriate				
	Q.24	1	Appropriate				
	Q.25	0,9	Appropriate				
	Q.26	1	Appropriate				
	Q.27	1	Appropriate				
	Q.28	1	Appropriate				
	Q.29	1	Appropriate				
	Q.30	1	Appropriate				
Section 4 (15,6/16)	Q.31	1	Appropriate	0,97	0,75	0,920	0,000
	Q.32	1	Appropriate				
	Q.33	1	Appropriate				
	Q.34	0,9	Appropriate				
	Q.35	1	Appropriate				
	Q.36	0,9	Appropriate				
	Q.37	0,9	Appropriate				
	Q.38	0,9	Appropriate				
	Q.39	1	Appropriate				
	Q.40	1	Appropriate				
	Q.41	1	Appropriate				
	Q.42	1	Appropriate				
	Q.43	1	Appropriate				
	Q.44	1	Appropriate				
	Q.45	1	Appropriate				
	Q.46	1	Appropriate				
Overall (44,9/46) S-CVI/Ave S-CVI/UA			High Moderate	0,97	 0,63	0,802	0,000

Study 2: Assessment of Face Validity

Based on the participants' point of view, the CVI of item clarity, as displayed in Table 2, demonstrates that all sections had an excellent CVI/Ave and CVI/UA ranging from 0,98 to 1 and 0,83 to 1 respectively. Section 1 and 4 had the highest value (CVI/Ave=1; CVI/UA=1) among all sections followed by section 2 and 3 (CVI/Ave=0,99 - CVI/Ave=0,98; CVI/UA=0,99 - CVI/UA=0,83) respectively. At the scale level, the questionnaire had an excellent S-CVI/Ave and S-CVI/UA equal to 0,99 and 0,93 respectively. At the item level, all items had an excellent I-CVI value that was higher than the recommended criteria. Where the I-CVI value ranged between 0,99 to 1.

Table 2: CVI of item clarity based on participants' viewpoint

Items	CVI/Ave	CVI/UA	Interpretation
Section 1 (7/7)	1	1	Clear
Section 2 (9,9/10)	0,99	0,99	Clear
Section 3 (11,8/12)	0,98	0,83	Clear
Section 4 (16/16)	1	1	Clear
Overall (44,7/45) S-CVI/Ave S-CVI/UA	0,99	0,93	Excellent

Study 3: Assessment of Internal and External Reliability

The demographic characteristics of participants in this study are shown in Table 6. Most participants in the internal reliability study were female representing 53,5% (136 students) of the total sample (254 students), while males represented 46,5% of the participants. Although in the external reliability study most participants were men (68,3%) and females (31,7). As the study relied on final-year students, most of the participants (68,5%) in the internal reliability study were 21 years old and 20,9% were 22 years old. A little percentage of participants (7,1%- 3,5%) were 23 and 24 years old, respectively. While in the external reliability study most participants (71,2) were 21 years old, and the rest (28,8) were 22 years old. The percentage of participants based on their main topic of the study were 64,2% - 39,4% (Nutrition and Food Science), 10,2% - zero (Hotel Studies), 12,2% - 27,9% (Tourist Guidance), and 13,4% - 32,7% (Tourism studies) in internal and external reliability study respectively. The participants were divided based on their nutrition background and it was found that most participants (74,4%) specialized in nutrition or studied some nutrition curriculums. While in the external reliability study most participants (60,6%) had no nutritional background.

Data in Table 3, illustrate that the questionnaire had excellent internal reliability. Where it produced Cronbach's α= 0,97 for the whole questionnaire. The sections of the questionnaire also obtained a higher Cronbach's α value than recommended standards. Sections four and two had excellent internal reliability, as Cronbach's α value for these sections ranged from 0,91 to 0,93 respectively. While sections one and three had good internal reliability, as their Cronbach's α values were 0,87 and 0,89 respectively.

The paired sample t-test analysis was used to detect the reliability of the test and the retest, which was deemed as good external reliability for the whole questionnaire and single sections. Differences between groups' nutritional knowledge scores were found not significant for the whole questionnaire and single sections. Based on the comparison between the participant's scores in the first and second rounds, it was found that the t-value was equal to -0,649 and the sig-value was equal to 0,518 for an overall questionnaire that is higher than the 5% level of significance. All sections of the questionnaire also had a t-value ranged from -0,906 to 0,271and sig-value from 0,367 to 0,787 (higher than the 5% level of significance). Furthermore, the questionnaire achieved a high value in an intra-class correlation coefficient of 0,859 overall between the first and second rounds. At the level of the section, Section 2 attained the highest value of 0,817 among sections followed by Section Four at 0,795 then 0,746 - 0,700 for Sections Three and one respectively.

Table 3: Internal and external reliability

Section of Nutrition Knowledge (maximum score)					
Test	Overall (78)	Section 1(9)	Section 2(36)	Section 3(12)	Section 4(21)
Internal Reliability Cronbach's α	0,973	0,870	0,931	0,890	0,913
External Reliability Time 1					
Mean	44,85	4,90	23,15	6,21	10,58
SD	22,957	3,00	9.22	4,33	7,85
Time 2					
Mean	45,88	4,83	23,43	6,46	11,15
SD	22,953	2,89	9,08	4,65	7.87
T value	-0,649	0,271	-0,393	-0,628	-0,906
Sig.	0,518	0,787	0,695	0,531	0,367
95% CI	-4,173 2.115	-0,486 0,640	-1,864 1,127	-1,039 0,539	-1,840 0,686
ICC	0,859	0,700	0,817	0,746	0,795
P value of ICC	0,000	0,000	0,000	0,000	0,000
* Note: ICC= < 0.5 indicates poor reliability, ICC= 0.5 and < 0.75 indicates a moderate reliability, ICC= 0.75 and < 0.9 indicates a good reliability, and ICC ≥ 0.90 indicate an excellent reliability (Koo & Li, 2016).					

Study 4: Assessment of construct validity

The demographic characteristics of participants in the fourth study are presented in Table 6. Most of the participants (62,2%) in this study were male. Although females represent 37,8% of the total number, they were more than males at the level of participants from the nutrition and food science department. The greater part of the participants (61,1%) was 21 years old followed by 36,7% of the participants who were 22 years old and then a very small percentage (2,2%) who were 23 years old. Most of the sample (69,4%) had a nutritional background while the rest had not. Based on the statistics presented in Table 4, it is explicit that students of the nutrition and food science department achieved higher nutrition knowledge scores than students of the faculty of tourism and hotels in overall scores and single sections. An Independent sample t-test was used to detect the difference between the two groups. The difference in total scores mean was 28,43 with a t-value of 39,44 and sig= 0,000 between the two groups. At the level section, the highest difference in mean (of 12,35) was in section two, while the lowest (3,75) difference was in section 1 between the two groups. Cohen's effect size for the overall score was 0,89 which means a large effect size. Section four attained the highest value of Cohens'd' of 0,83. Although sections 1 and three had a medium effect size since Cohen's values were 0,65 and 0,72 respectively.

The one-way ANOVA was used to generate the difference in nutrition knowledge scores between students of all departments. The lowest mean difference in nutrition knowledge (22,24) was between participants studying nutrition and food science and participants studying hotel studies. Although the highest mean difference in nutrition knowledge (31,65 - 31,44) was between

participants studying nutrition and food science and participants studying tourist guidance and tourism studies, respectively. The Eta (η2) effect size was high with the overall score and in single sections. For the overall score, it was 0,93 and for single sections, the value ranged from 0,75 to 0,85 which means a large effect size.

Table 4: Comparison between two different groups of students based on their nutrition knowledge scores

Nutrition Knowledge section					
Test	Overall (78)	Section 1(9)	Section 2(36)	Section 3(12)	Section 4(21)
Food Science (n= 99)					
Mean	71,28	7,99	32,16	10,76	20,37
SD	3,28	1,04	2,05	1,13	0,67
Max score	76	9	36	12	21
Mini score	63	5	28	6	18
T&h (n= 84)					
Mean	42,85	4,29	19,81	6,49	12,31
SD	6,22	1,66	3,86	1,48	2,55
Max score	53	8	29	10	17
Mini score	28	1	12	2	7
T	39,44	18,55	27,57	22,02	30,23
Df	181	181	181	181	181
Sig.	0,000	0,000	0,000	0,000	0,000
D	0,89	0,65	0,80	0,72	0,83
Mean Difference	28,43	3,75	12,35	4,26	8,06
Hotel Studies (n= 28)					
Mean	49,04	5,93	22,96	7,11	13,04
SD	3,04	0,85	3,13	1,66	2,80
Max score	53	8	29	10	17
Min score	41	4	15	5	8
Tourism Studies (n= 32)					
Mean	39,84	3,56	17,59	6,59	12,09
SD	4,82	1,50	2,69	0,79	2,27
Max score	51	7	24	9	17
Mini score	29	1	12	5	9
Tourist Guidance (n= 24)					
Mean	39,63	3,17	19,08	5,63	11,75
SD	5,24	0,86	3,59	1,61	2,48
Max score	48	4	24	8	17
Mini score	28	1	12	2	7
F	858,86	212,35	366,45	182,55	316,63
Sig.	0,000	0,000	0,000	0,000	0,000
Eta (η^2)	0,93	0,78	0,85	0,75	0,84

* Cohen's d: d= 0.01 indicates a very small effect; d= 0.20 indicates a small effect; d= 0.50 a medium effect; d= 0.80 a large effect; and d= 1.20 indicates a very large effect (Sawilowsky, 2009).
* Eta (η^2): η2 = 0.01 indicates a small effect; η2 = 0.06 a medium effect; and η2 = 0.14 a large effect (Pituch & Stevens, 2016).

Study 5: Assessment of Convergent validity

The demographic characteristics of the participants in the fifth study are presented in Table 6. Most of the participants (53%) in this study were male, while the female (47%) formed the rest of the

percentage with a difference of 6% less than males. Most of the participants (65%) were 21 years old followed by 27% of the participants who were 22 years old then a small percentage (5% - 3%) of participants who were 23 and 24 years old, respectively. The main part of the sample (72%) had a nutritional background while the rest had not. As shown in Table 5, results revealed that there is a significant relationship between nutrition knowledge scores and demographic characteristics. Independent-sample t-test analysis indicates that women achieved high nutrition knowledge scores than males scores at the level of total scores and single sections scores. Cohen's effect size for overall scores was 0,10 and for single sections ranged from 0,05 to 0,16 which means a very little effect size. Students who were 21 years old obtained higher scores than older students who were 22 to 24 years old as revealed by one-way ANOVA and Tukeys' post hoc analysis. The Eta (η2) effect size for the overall scores was 0,14 which indicates a large effect size. At the level of single sections, sections one (η2= 0,09) and three (η2= 0,06) had a medium effect size, while sections two (η2= 0,15) and four (η2= 0,16) their effect size was large. The nutrition knowledge scores of students who studied nutrition and food science were higher than the scores of students who study in the faculty of tourism and hotels as revealed by the one-way ANOVA and Tukeys' post-hoc analysis. The Eta (η2) effect size for the overall scores was 0,91 and at the level of single sections, it ranges from 0, 77 to 0,87 which indicates a large effect size. Furthermore, the nutrition knowledge scores of hotel studies were higher than the scores of nutrition knowledge of tourism studies and tourist guidance. Independent-sample-test analysis indicated that students with a nutritional background gained higher scores than students without nutritional backgrounds in the total scores and every single section. Cohen's d-effect size for overall scores was 0,76 and for individual sections ranged from 0,60 to 0,73 which implies a medium effect size.

Table 5: Correlations of the mean nutrition knowledge scores with the demographic characteristics

Nutrition Knowledge section (maximum score)					
Test	Overall (78)	Section 1(9)	Section 2(36)	Section 3(12)	Section 4(21)
Gender					
Male					
Mean	50,17	4,75	24,75	7,03	13,65
SD	22,00	3,05	9,15	4,40	6,48
Female					
Mean	63,20	7,06	28,77	9,61	17,76
SD	15,66	1,99	6,65	2,79	5,53
T	-6,38	-8,36	-4,70	- 6,54	-6,42
Df	356	356	356	356	356
Sig.	0,000	0,000	0,000	0,000	0,000
D	0,10	0,16	0,05	0,10	0,10
Age					
21 years					
Mean	60,85	6,39	28,46	8,87	17,14
SD	19,19	2,74	7,67	3,90	5,45
22 years					
Mean	48,90	4,83	23,82	7,11	13,14
SD	19,87	2,86	8,26	3,81	7,21
23 years					
Mean	31,61	3,50	15,17	5,39	7,56
SD	8,42	1,54	3,79	3,01	4,64
24 years					

Mean	49,33	4,78	25,78	7,22	11,56
SD	14,68	2,43	7,01	2,81	4,53
Sig.	0,000	0,000	0,000	0,000	0,000
F	19,70	12,01	21,91	8,20	23,26
Eta (η^2)	0,14	0,09	0,15	0,06	0,16
Departments					
Home Economics					
Mean	73,09	8,01	33,35	11,24	20,49
SD	3,48	,97	2,31	1,03	,69
Tourism & Hotels					
Mean	34,12	2,97	17,77	4,29	9,10
SD	8,72	1,75	3,81	2,66	4,48
T	57,97	34,61	47,86	33,98	35,75
Df	356	356	356	356	356
Sig.	0,000	0,000	0,000	0,000	0,000
D	0,90	0,77	0,86	0,76	0,78
Mean Difference	38,97	5,04	15,58	6,95	11,39
Hotels Studies					
Mean	42,19	3,42	21,08	6,00	11,69
SD	6,66	1,36	4,72	1,38	2,37
Tourism Studies					
Mean	32,18	2,82	17,00	3,72	8,63
SD	7,93	1,82	3,15	2,70	4,33
Tourist Guidance					
Mean	32,82	2,93	17,20	4,18	8,50
SD	8,50	1,82	3,32	2,76	4,98
Sig.	0,000	0,000	0,000	0,000	0,000
F	1323,77	402,59	861,27	423,86	462,27
Eta (η^2)	0,91	0,77	0,87	0,78	0,79
Nutrition Background					
Yes					
Mean	69,60	7,49	31,97	10,64	19,50
SD	10,57	1,77	4,73	1,98	2,97
No					
Mean	32,48	2,88	17,09	3,94	8,57
SD	8,17	1,81	3,22	2,73	4,63
T	34,39	23,37	31,69	26,70	27,13
Df	356	356	356	356	356
Sig.	0,000	0,000	0,000	0,000	0,000
D	0,76	0,60	0,73	0,66	0,67

Table 6: Demographic characteristics of participants in the studies

	Study 3				**Study 4**								**Study 5**	
	Internal reliability		**External reliability**		**Food Science**		**Hotel Studies**		**Tourism Studies**		**Tourist Guidance**		**Convergent Validity**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Number (N)	**254**		**104**		**99**		**28**		**32**		**24**		**437**	
Gender														
Male	118	46,5	71	68,3	46	25,2	24	13,1	25	13,6	19	10,5	232	53
					114				62,2					

Female	136	53,5	33	31,7	53	28,9	4	2,2	7	3,8	5	2,7	205	47
					69					37,8				
Age														
21 years	174	68,5	74	71,2	67	36,6	8	4,3	21	11,3	16	8,9	286	65
					112					61,1				
22 years	53	20,9	30	28,8	28	15,3	20	11	11	6,1	8	4,3	120	27
					67					36,7				
23 years	18	7,1	-	-	4	2,2	-	-	-	-	-	-	22	5
24 years	9	3,5	-	-	-	-	-	-	-	-	-	-	9	3
Faculty														
Home Economics	163	64,2	41	39,4	99	54,1	-	-	-	-	-	-	262	60
Tourism & Hotels	91	35,8	63	60,6	-	-	28	15,3	32	17,4	24	13,2	175	40
Department														
Food Science	163	64,2	41	39,4	99	54,1	-	-	-	-	-	-	262	60
Hotel Studies	26	10,2	-	-	-	-	28	15,3	-	-	-	-	26	12
Tourism Studies	34	13,4	34	32,7	-	-	-	-	32	17,4	-	-	68	15
Tourist Guidance	31	12,2	29	27,9	-	-	-	-	-	-	24	13,2	60	13
Nutrition Background														
Yes	189	74,4	41	39,4	99	54,1	28	15,3	0	0	0	0	316	72
No	65	25,6	63	60,6	0	0	0	0	32	17,4	24	13,2	121	28

Discussion

The present study aimed to assess the validity and reliability of the E-GNKQ in a sample of Egyptian university students. Both two approaches of CVI (CVI/Ave & CVI/UA) were used to assess content validity quantitatively, besides Fleiss's Kappa analysis. The E-GNKQ was found to have excellent content validity at the items and scale level based on the average agreement approach (CVI/Ave). Where all items of the questionnaire achieved a higher I-CVI than the recommended standards. Which stipulated the acceptance of any item that gets the approval of the experts' panel with a percentage equal to 79% or more (Zamanzadeh *et al.*, 2015). At the level of the scale, the questionnaire had an excellent S-CVI/Ave= 0,97. It had a moderate S-CVI/UA= 0,63. The difference in the value of each method is due to the different systems of their calculation. This is because the universal agreement (UA) approach counts only those elements that have been unanimously approved by the expert panel. Furthermore, the questionnaire had excellent inter-rater agreement reliability among the panel members, as the overall Kappa was 0,802 which complies with recommended standards (Rodrigues *et al.*, 2017).

Most of the previous studies conducted in this field, including the most recent study that was conducted in Australia by (Thompson *et al.*, 2021) did not indicate how to assess the content validity, except for the study that was carried out by (Bukenya *et al.*, 2017) in Uganda. Bukenya *et al.* (2017) used the content validity index but did not specify the type of approach they followed, whether the average agreement (Ave) or the universal agreement (UA) approach. Additionally, they used Gwet's AC1 analysis to estimate the inter-rater reliability.

The E-GNKQ was found to have excellent face validity at the item and scale level based on both approaches of CVI. Where S-CVI/Ave was 0,99 and S-CVI/UA was 0,93, which is considered, an

excellent value based on reference criteria. It was noted that previous studies did not perform quantitative analysis for face validity.

Based on Cronbach's α analysis, E-GNKQ was proven to have excellent internal reliability and good external reliability, which is consistent with other versions of the general nutrition knowledge questionnaire (see Table 7). The Canadian study is considered the least studied in terms of both internal and external reliability, followed by the Romanian study in terms of internal reliability. While the latest Australian study accomplished the highest degree of external reliability. Compared to other relevant studies, the overall internal reliability was 0,97 which is the highest percentage achieved in all studies. Besides, the external reliability was also high and equivalent to other related studies. Moreover, every single section of the E-GNKQ registered good internal reliability besides external reliability, which means that E-GNKQ is consistent in measuring nutrition knowledge over time.

The E-GNKQ showed high construct validity, comparable to all GNKQ versions that were validated in various countries with a large effect size of d=0,89. The differences in nutrition knowledge scores between groups of students with (nutrition and food science majors) and students (with tourism, hotels, and tourist guidance major) were highly significant. These significant differences certainly support the assumption that E-GNKQ has good construct validity like other validated versions.

The significant correlation between students' Nutrition knowledge scores and their demographic characteristics (gender, age, education major, and nutrition background) with an effect size coefficient ranging from very little to large proves that the E-GNKQ has good convergent validity. Along the lines of other previous studies, female participants achieved the highest scores in nutritional knowledge at the overall score and individual sections (Kliemann *et al.,* 2016; Putnoky *et al.,* 2020; Mo'ath & Attlee, 2020). Although the high nutrition scores of females, the effect size was very small (d= 0,10). While Kliemann *et al.* (2016) revealed a large effect size (d=0,9) and Mo'ath & Attlee (2020) indicated that the effect size was small (d=0,45).

The study revealed a large effect size association between participants' nutrition knowledge scores and their ages. As the 21-year-old participants achieved higher nutrition knowledge scores in the overall score and in every single section than the older participants who were 22 to 24 years old with a large effect size of η2=0,14. This result is consistent with (Kliemann *et al.,* 2016; Mo'ath & Attlee, 2020) in the presence of an association between age and nutritional knowledge scores, but differs from them in the size of the effect. As they had reported a small effect size of d= 0,10 - d= 0,34 respectively.

There is also a large effect size association between participants' nutrition knowledge scores and their study majors. Since participants who are studying nutrition & food science major achieved higher nutrition knowledge scores in the overall score and in every section than the participants who study other majors (hotel studies, tourism studies, and tourist guidance) with a large effect size of η2=0,91. It is notable also that participants' nutrition knowledge scores in the hotel studies department were higher than the scores of their colleagues in other departments (tourism studies, and tourist guidance). This difference is because the students of the hotel studies have studied some of the nutrition curriculums. This means that there is a relationship between nutritional knowledge and education, as indicated by Sharma *et al.* (2008) and Ryan (2009).

In the same context, the study also reported a significant effect size association between participants' nutrition knowledge scores and their nutritional background. Meanwhile, participants with a nutritional background achieved higher nutrition knowledge scores than participants

without a nutritional background on the overall scores and individual sections. Cohen's coefficient for this relationship was about 0,76 which means that the effect size of the correlation is large.

Table 7: Comparison of internal and external reliability in some related studies

Studies	**Internal reliability**	**External reliability**
Egypt (Current study)	0,97	0,85
Australia (Hendrie *et al.,* 2008)	0,92	0,87
Turkey (Alsaffar, 2012)	0,89	0,87
United Kingdom (Kliemann *et al.,* 2016)	0,93	0,89
Japan (Matsumoto *et al.,* 2017)	0,95	0,75
Canada (Bradette-Laplante *et al.,* 2017)	0,73	0,59
Uganda (Bukenya *et al.,* 2017)	0,95	0,89
Romania (Putnoky *et al.,* 2020)	,87	0,88
United Arab Emirates & Jordan (Mo'ath & Attlee, 2020)	0,91	0,84
Australia (Thompson *et al.,* 2021)	0,92	0,96

Conclusion and Implication

Findings revealed that the seventy-eight-item Egyptian General Nutrition Knowledge Questionnaire had acceptable construct, content and face validity, internal consistency, test-retest reliability, and convergent validity. Therefore, it has been proven that the E-GNKQ can be considered a valid and reliable tool for assessing nutrition knowledge among college students in Egypt. Additionally, each section demonstrated a sufficient degree of validity and reliability that qualifies them to measure nutritional knowledge in specific areas. Further research is needed to examine the possibility of applying and generalizing the E-GNKQ to different groups of society like children, adolescents, the elderly, athletes, nonathletic, and so on. Although the questionnaire is not expected to increase the nutrition knowledge of the population, it can be used as a measurement tool to identify the level of nutrition knowledge adults have. The resulting E-GNKQ can be used as a measurement tool to assess the proficiency of specialists working in the nutrition field. It can also be used to promote or change the dietary habits of people and in turn control nutrition-related problems in the Egyptian context.

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الملخص العربي

تقديم نسخة مصرية جديدة من استبانة المعرفة التغذوية العامة (E-GNKQ) للبالغين: اختبار الصدق والثبات

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تهدف الدراسة الحالية إلى تقديم نسخة مصرية جديدة من استبانة المعرفة التغذوية العامة (E-GNKQ) للبالغين من خلال تقييم صدق وثبات الاستبانة في سياق مصري .اعتمدت الدراسة على النسخة المنقحة من استبانة المعرفة التغذوية العامة التي أجراها كليمان وآخرون، في عام 2016. تمت ترجمة الاستبانة إلى النسخة العربية وتكونت من ثمانية وسبعين بندًا كي تلائم السياق المصري. خضعت الاستبانة لخمسة اختبارات للتحقق من صدق المحتوى؛ الصدق الظاهري؛ الثبات الداخلي والثبات الخارجي؛ والصدق البنائي بين المشاركين من ذوي المعرفة التغذوية، وذوي المعرفة التغذوية المحدودة، وبدون معرفة تغذوية؛ وكذلك اجراء اختبار الصدق التقاربي للعلاقة بين المعرفة التغذوية والخصائص الديموغرافية. استهدفت الدراسة مجموعتين من الطلاب (طلاب قسم التغذية وعلوم الأطعمة-جامعة المنوفية (ن 163)، وطلاب كلية السياحة والفنادق-جامعة مدينة السادات (ن 91). أوضحت النتائج أن استبانة المعرفة التغذوية المكونة من ثمانية وسبعين بندًا يمكن قبولها كمقياس للمعرفة التغذوية في السياق المصري من حيث البنية والمحتوى والصدق الظاهري والاتساق الداخلي والثبات والصدق التقاربي. وبناء علي هذه النتائج، يمكن اعتبار مقياس E-GNKQ أداة صالحة يمكن الاعتماد عليها في تقييم المعرفة التغذوية بين طلاب الجامعات في مصر.

الكلمات المفتاحية: التغذية، المعرفة، الصدق، الثبات، طلاب الجامعات، مصر.

استبانة المعرفة الغذائية العامة

عزيزي/ المشارك

هذه استبانة دراسة مسحيه وليست اختبار. تهدف الى التعرف على النصائح الغذائية التي يعتبرها الافراد محيرة من وجهة نظركم، ومن المهم أن تكملها بنفسك. مع التأكيد ان إجاباتك ستبقى مجهولة ولن تستخدم الا في أغراض البحث العلمي. من فضلك إذا كنت لا تعرف الإجابة الصحية، فاختر "غير متأكد" بدلاً من التخمين.

شكرا لك على وقتك.

من فضلك أجب على الأسئلة التالية بوضع علامة ╱ داخل مربع واحد فقط أمام الإجابة التي تم اختيارها.

القسم الاول: متعلق بالنصائح التي يقدمها خبراء الصحة والتغذية

1- كم عدد حصص الفاكهة والخضروات التي ينصح الخبراء الناس بتناولها يوميًا كحد أدنى؟ (يمكن أن تكون الحصة، على سبيل المثال، تفاحة أو حفنة من الجزر المفروم)؟ (ضع علامة واحده)

أ- 2 ☐

ب- 3 ☐

ج- 4 ■

د- 5 او اكثر ☐

ه- غير متأكد

2- أي من أنواع الدهون التالية يوصي الخبراء الناس بضرورة تقليل تناولها؟ (ضع علامة واحده لكل عنصر)

	تناول اقل	لا تتناول اقل	غير متأكد
أ- الدهون غير المشبعة	☐	■	☐
ب- الدهون المتحولة	■	☐	☐
ج- الدهون المشبعة	■	☐	☐

3- اى من منتجات الحليب الأتية يوصى الخبراء الافراد بتناوله؟ (ضع علامة واحده)

أ- الحليب كامل الدسم ☐

ب- الحليب منخفض الدسم ■

ج- خليط من الحليب كامل الدسم والحليب منخفض الدسم ☐

د- يجب تجنب كل منتجات الحليب

ه- غير متأكد

4- كم مرة في الأسبوع يوصي الخبراء بتناول الأسماك الزيتية (مثل السلمون والماكريل)؟ (ضع علامة واحده)

أ- 1-2 مره فى الاسبوع

ب- 3-4 مره فى الاسبوع

ج- كل يوم

د- غير متأكد

5- كم مرة في الأسبوع يوصي الخبراء بتناول وجبة الإفطار؟ (ضع علامة واحده)

أ- 3 مرات فى الاسبوع

ب- 4 مرات فى الاسبوع

ج- كل يوم

د- غير متأكد

6- إذا تناول الشخص كوبين من عصير الفاكهة في اليوم، فكم تعادل هذه الكمية من حصص الخضروات والفاكهة اليومية؟ (ضع علامة واحده)

أ- لا تعادل

ب- حصة واحدة

ج- حصتين

د- 3 حصص

ه- غير متأكد

7- وفقًا لـ "دليل الأكل الجيد" (Eatwell guide)، كم يجب أن تشكل الأطعمة النشوية من النظام الغذائي؟ (ضع علامة واحده)

أ- الربع

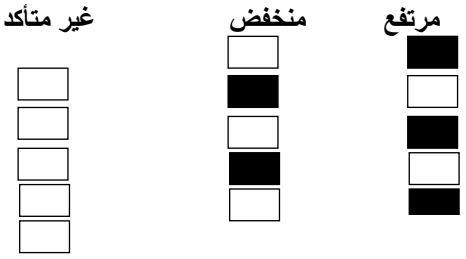
ب- الثلث

ج- النصف

د- غير متأكد

القسم الثاني: يصنف الخبراء الأغذية الى مجموعات· يهتم هذا الجزء بمعرفة اذا كان الأفراد يدركون ماهية هذه المجموعات و ما هي العناصر الغذائية التي تحتويها.

1- ما هو محتوى الاطعمة والمشروبات التالية من السكر المضاف؟ (ضع علامة واحده لكل طعام)



أ- الكاتشب

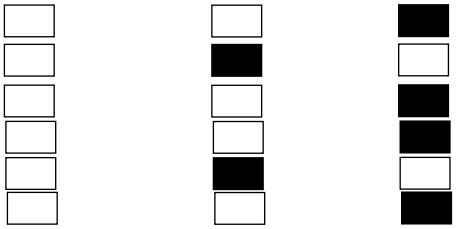
ب- المشروبات الغازية منخفضة السعرات (دايت)

ج- الايس كريم

د- الزبادي الطبيعية

ه- مشروبات الطاقة

2- ما هو محتوى الأطعمة والمشروبات التالية من الملح؟ (ضع علامة واحده لكل طعام)



أ- حبوب الافطار

ب- الخضراوات المجمدة

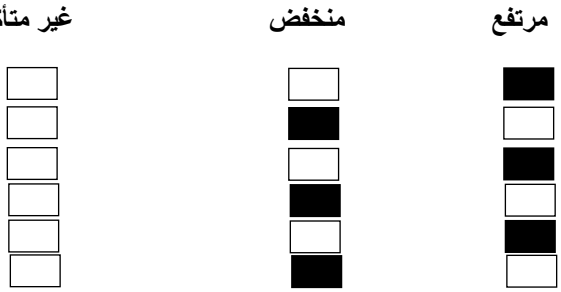
ج- الخبز

د- الشوربة المعلبة

ه- اللحوم الحمراء

و- اللحوم المصنعة والمعلبة

3- ما محتوى الاطعمة التالية من الالياف الغذائية؟ (ضع علامة واحده لكل طعام)



أ- الشوفان

ب- الارز الابيض

ج- الموز

د- البيض

هـ- البطاطس مع القشرة

و- المكرونة

4- هل تعتقد أن الأطعمة التالية مصادر جيدة للبروتين؟ (ضع علامة واحده لكل عنصر)

	مصدر جيد	مصدر غير جيد	غير متأكد
أ- الدواجن	■	□	□
ب- الجبن	■	□	□
ج- الفاكهة	□	■	□
د- البقوليات المطبوخة	■	□	□
هـ- الزبد	□	■	□
و- المكسرات	■	□	□

5- في اعتقادك اى من الاطعمة التالية يصنفها الخبراء ضمن الاغذية النشوية؟ (ضع علامة واحده لكل عنصر)

	طعام نشوى	طعام غير نشوى	غير متأكد
أ- المكرونة	■	□	□
ب- الجبن	□	■	□
ج- البطاطس	■	□	□
د- المكسرات	□	■	□
هـ- الموز	■	□	□

6- ما هو نوع الدهن الرئيسي الموجود في الاطعمة التالية؟ (ضع علامة واحده لكل عنصر)

	دهن عديد عدم التشبع	دهن أحادي عدم التشبع	دهن مشبع	كوليسترول	غير متأكد
أ- زيت الزيتون	□	■	□	□	□
ب- الزبدة	□	□	■	□	□
ج- زيت عباد الشمس	■	□	□	□	□
د- البيض	□	□	□	■	□

7- اى من هذه الاطعمة يحتوى اكبر كمية من الدهون المتحولة؟ (ضع علامة واحده)

أ- البسكويت، الكعك، المخبوزات	■
ب- السمك	□
	□
	□
	□

ج- زيت الزيتون

د- البيض

هـ- غير متأكد

8- عند مقارنة كمية الكالسيوم في كوب من الحليب كامل الدسم بكمية الكالسيوم في كوب من الحليب منزوع الدسم تكون: (ضع علامة واحده)

أ- نفس الكمية تقريبا

ب- اعلى بكثير

ج- اقل بكثير

د- غير متأكد

9- عند مقارنة نفس الوزن (100 جرام) من العناصر الغذائية التالية فأي منها يحتوي اكبر عدد من السعرات الحرارية ؟ (ضع علامة واحده)

أ- السكر

ب- النشا

ج- الالياف الغذائية

د- الدهون

هـ- غير متأكد

10- عند مقارنة الأغذية المصنعة مع الأغذية الطازجة فإنها تعتبر.....: (ضع علامة واحده)

أ- اعلى فى محتواها من السعرات الحرارية

ب- اعلى فى محتواها من الالياف الغذائية

ج- اقل فى محتواها من الملح

د- غير متأكد

القسم 3: يتعلق هذا القسم باختيار الأطعمة

1- إذا أراد شخص ما شراء زبادي من السوبر ماركت، فأي نوع يحتوي على أقل قدر من السكر/المحليات؟ (ضع علامة واحد)

أ- زبادي بالفراولة خالي من الدهن ☐

ب- زبادي طبيعي ■

ج- زبادي فواكه كريمي ☐

د- غير متأكد ☐

2- إذا اراد شخص طلب شوربة في مطعم أو مقهى، فما هو الخيار الذى يحتوى اقل كمية من الدهن؟ (ضع علامة واحد)

أ- شوربة مشروم "عيش الغراب" (مشروم مع خضروات مقطعه، زبدة، كريمة) ☐

ب- شوربة الخضار (خضروات مقطعه مع التوابل والليمون) ■

ج- شوربة كريمة الدجاج (دجاج مع خضروات مقطعه، ودبل كريمة) ☐

د- غير متأكد ☐

3- أي من الخيارات التالية يعتبر الخيار الصحي والاكثر توازناً كوجبة رئيسية في مطعم؟ (ضع علامة واحده)

أ- صدر الديك الرومي المشوي مع البطاطس المهروسة والخضروات ■

ب- لحم البقر مع بطاطس مقلية وصلصة الكريمة ☐

ج- السمك مع شرائح البطاطس المقلية والبازلاء وصوص التارتار ☐

د- غير متأكد ☐

4- أي من الخيارات التالية يعتبر أكثر ساندويتش صحي ومتوازن كوجبة غداء؟ (ضع علامة واحده)

أ- ساندويش لحم البقر المشوي مع الفاكهة وكيكة الفراولة والعصير ☐

ب- ساندويش تونا وخضار مع الفاكهة وزبادي منخفض الدسم والماء ■

ج- ساندويتش شرائح دجاج مقلية مع بطاطس مقلية وزبادي منخفض الدسم والماء ☐

د- غير متأكد ☐

5- أي من الأطعمة التالية يعتبر الخيار الصحي كتحلية؟ (ضع علامة واحده)

أ- عصير برتقال طبيعى ■

ب- فطيرة التفاح والتوت الاسود □

ج- كوب من المشروبات الغازية □

د- كيك الجزر المغطى بالجبن الكريمى □

هـ- غير متأكد

6- أي من أنواع السلطة التالية تحتوي على أكبر تنوع في الفيتامينات ومضادات الأكسدة؟ (ضع علامة واحده)

أ- خس و فلفل أخضر وكرنب □

ب- بروكلي و جزر وطماطم وفلفل ■

ج- فلفل أحمر وطماطم وخس □

د- غير متأكد □

7- إذا أراد الشخص تقليل كمية الدهون في نظامه الغذائي ، لكنه لا يريد التخلي عن البطاطس ، فأي الأطعمة التالية سيكون الخيار الأفضل؟ (ضع علامة واحده)

أ- البطاطس المقلية السميكة ■

ب- البطاطس المقلية الرفيعة □

ج- البطاطس المقلية المتموجة □

د- غير متأكد □

8- إحدى الطرق الصحية لإضافة النكهة إلى الطعام دون إضافة المزيد من الدهون أو الملح هي إضافة: (ضع علامة واحده)

أ- حليب جوز الهند □

ب- التوابل ■

ج- صلصة الصويا □

د- غير متأكد □

9- أي من طرق الطهي التالية تتطلب إضافة الدهون؟ (ضع علامة واحده)

أ- الشواء ☐

ب- الطهى بالبخار ☐

ج- السلق ■

د- الطهى السريع بالمقلاه "سوتيه" ☐

هـ- غير متأكد

10- تعتبر الأطعمة "الخفيفة" (أو أطعمة الدايت) دائمًا خيارات جيدة لأنها منخفضة السعرات الحرارية. (ضع علامة واحده)

أ- اوافق ☐

ب- لا اوافق ■

ج- غير متأكد ☐

الأسئلة التالية تتعلق بالبطاقة التعريفية الغذائية للطعام:

المنتج ١ "بسكويت حلو"

كل قطعه (٩,٥جرام) تحتوى:

الملح	دهون مشبعة	الدهن	السكر	الطاقة
٠,١ج	١ج	١ج	٢ج	٤٣
%٢	%٣	%٢	%٢	%٢

القيمة النموذجية (كما تباع) لكل ١٠٠جرام: ٤٥٠كالورى

المكونات: رقائق الشوفان، سكر، زيت النخيل، دقيق قمح مدعم، دقيق قمح كامل، فركتوز، شراب الشعير، ملح، مواد رافعه، بيكربونات الصوديوم، بيكربونات الامونيوم، مواد نكهة

المنتج ٢ "بسكويت مالح"

كل قطعه (١٦جرام) تحتوى:

الملح	دهون مشبعة	الدهن	السكر	الطاقة
٠,٣ج	ضئيلة	٣ج	١ج	٦٦
%٤	%١	%٤	%١	%٣

القيمة النموذجية (كما تباع) لكل ١٠٠جرام: ٤١٢كالورى

المكونات: دقيق قمح، زيت النخيل، شراب الذرة، شعير، ملح، خميرة، عوامل تخمر(بيكربونات الصوديوم، بيكربونات الامونيوم، بيروفوسفات)، نشا ذرة، ليسيثين، عامل خبز

11- عند النظر إلى المنتجين 1 و 2 ، أيهما يحتوي على أكبر عدد من السعرات الحرارية لكل 100 جرام. (ضع علامة واحده)

أ- المنتج 1 ■

ب- المنتج 2 ☐

ج- كلاهما يحتوى نفس المقدار ☐

د- غير متأكد

12- بالنظر إلى المنتج 1 ، ما هي مصادر السكر في قائمة المكونات؟ (ضع علامة واحده)

أ- سكر وشراب الشعير ☐

ب- السكر والفركتوز والليسيثين ■

ج- السكر والفركتوز وشراب الشعير ☐

د- غير متأكد

القسم 4: يتناول هذا القسم المشاكل الصحية أو الأمراض المتعلقة بالنظام الغذائي وإدارة الوزن

1- أي من هذه الأمراض مرتبط بقلة تناول الألياف؟ (ضع علامة واحده)

أ- اضطرابات الأمعاء ■

ب- فقر الدم "الانيميا" ☐

ج- تسوس الأسنان ☐

د- غير متأكد ☐

2- أي من هذه الأمراض مرتبط بكمية السكر التي يتناولها الشخص؟ (ضع علامة واحده)

أ- ارتفاع ضغط الدم ☐

ب- فقر الدم "الانيميا" ■

ج- تسوس الأسنان ☐

د- غير متأكد ☐

3- أي من هذه الأمراض مرتبط بكمية الملح "الصوديوم" التي يتناولها الشخص؟ (ضع علامة واحده)

أ- انخفاض نشاط الغدة الدرقية ☐

ب- السكري ■

ج- ارتفاع ضغط الدم ☐

د- غير متأكد ☐

4- أي من الخيارات التالية يوصي بها الخبراء لتقليل فرص الإصابة بالسرطان؟ (ضع علامة واحده)

أ- تعاطي الخمور ☐

ب- تناول كميات أقل من اللحوم الحمراء ■

ج- تناول اطعمة تحتوى المضافات الغذائية ☐

د- غير متأكد ☐

5- أي من الخيارات التالية يوصي بها الخبراء لتجنب الاصابة بأمراض القلب؟ (ضع علامة واحده)

أ- تناول المكملات الغذائية ☐

☐

■

☐

ب- تناول كميات أقل من الأسماك الدهنية

ج- تناول كميات أقل من الدهون المتحولة

د- غير متأكد

6- أي من الخيارات التالية يوصي بها الخبراء لتجنب الاصابة بمرض السكري؟ (ضع علامة واحده)

أ- تناول كميات أقل من الأغذية المكررة (المعالجة) ■

ب- شرب مزيد من عصير الفاكهة □

ج- تناول كميات أكبر من اللحوم المصنعة □

د- غير متأكد □

7- أي من الأطعمة التالية من المحتمل أن ترفع نسبة الكوليسترول في الدم لدى الاشخاص؟ (ضع علامة واحده)

أ- البيض □

ب- الزيت النباتي ■

ج- الدهن الحيواني □

د- غير متأكد □

8- أي من الأطعمة التالية يؤدى الى ارتفاع نسبة السكر في الدم بدرجة كبيرة بعد تناوله (ضع علامة واحده)

أ- الحبوب الكاملة □

ب- الخبز الأبيض ■

ج- الفاكهة و الخضروات □

د- غير متأكد □

9- للحفاظ على وزن صحي، يجب على الاشخاص الامتناع عن تناول الدهون تمامًا. (ضع علامة واحده)·

أ- اوافق □

ب- لا اوافق ■

ج- غير متأكد □

10- للحفاظ على وزن صحي، يجب على الاشخاص اتباع نظام غذائي غني بالبروتين. (ضع علامة واحده)

أ- اوافق □

ب- لا اوافق ■

ج- غير متأكد □

11- يؤدي تناول الخبز دائمًا إلى زيادة الوزن. (ضع علامة واحده)

أ- اوافق

ب- لا اوافق

ج- غير متأكد

12- يمكن أن تقلل الألياف الغذائية من احتمالية زيادة الوزن. (ضع علامة واحده)

أ- اوافق

ب- لا اوافق

ج- غير متأكد

13- أي من الخيارات التالية يمكن أن يساعد الاشخاص في الحفاظ على وزن صحي؟ (ضع علامة واحده لكل عنصر)

	نعم	لا	غير متأكد
أ- عدم الأكل أثناء مشاهدة التلفاز	■	☐	☐
ب- قراءة البطاقة الغذائية	■	☐	☐
ج- تناول المكملات الغذائية	☐	■	☐
د- مراقبة ما يتم تناوله	■	☐	☐
هـ- مراقبة الوزن	■	☐	☐
و- تناول الطعام طيلة اليوم	☐	■	☐

14- ما هو تصنيف وزن شخص مؤشر كتلة جسمه يساوى 23 كجم/م^2؟ (ضع علامة واحده)

أ- أقل من الوزن الطبيعي

ب- وزن طبيعي

ج- وزن زائد

د- سمين

هـ- غير متأكد

15- ما هو تصنيف وزن شخص مؤشر كتلة جسمه يساوى 31 كجم/م^2؟ (ضع علامة واحده)

أ- أقل من الوزن الطبيعي ☐

ب- وزن طبيعي ☐

ج- وزن زائد ■

د- سمين ☐

هـ- غير متأكد

أنظر إلى أشكال الجسم الآتية:

شكل الكمثرى شكل التفاحة

16- أي من أشكال الجسم أعلاه يرفع من احتمالية الإصابة بأمراض القلب؟ (ضع علامة واحده)

أ- شكل التفاحة ■

ب- شكل الكمثرى ☐

ج- غير متأكد ☐

شكرا لحسن تعــاونكم