Health professionals’ perspectives on factors needed to implement nutrition strategy: A questionnaire validation study

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ABSTRACT

Background: Noncommunicable diseases (NCDs) increasingly recognized as a serious, worldwide public health concern. According to the WHO, NCDs are currently responsible for two-thirds of global deaths annually. Nutritional food and unhealthy diet are contributing to an immense portion of NCDs. Exploring the role of nutrition in healthcare delivery with a particular focus on the United Arab Emirates (UAE) context is also aligned with the UAE Government’s Vision 2021.

Aim: To develop a reliable and valid questionnaire that helps to assess the agreement about factors needed to implement a nutrition strategy in the UAE.

Materials and Methods: One hundred and sixty-one health professionals were invited to respond to a questionnaire assessing agreement with factors needed to implement a nutrition strategy. The questionnaire consisted of 11 factors, each containing four items that made a total of 44 items assessed on a 7-point Likert scale (1 strongly disagree to 7 strongly agree). The questionnaire was evaluated using factor analysis, and Cronbach’s alpha was used to test the internal consistency of the responses of participants. Ethical approval was given by the Chair of Humanities and Health Sciences Research Ethics Panel (UAE).

Results: The questionnaire was validated by an expert panel. A factor analysis was carried out through responses of the health professional and revealed that the 11 factors are included in the questionnaire; only one item from the factor of resources and enablement was excluded: the exclusion of the item “hospital uses the lifespan approach in nutrition interventions” due to singularity and insufficient load of the variance extracted.

Conclusion: The study concluded that the questionnaire was valid and reliable on its form of 43 items divided into 11 factors to assess the agreement toward factors needed to implement a nutrition strategy in the UAE.

Keywords: Factor analysis, health, nutrition strategy, questionnaire, United Arab Emirates

Introduction

Noncommunicable diseases (NCDs) are rising to epidemic proportions, worldwide.[1-3] These diseases, which include cardiovascular conditions, some cancers, chronic respiratory conditions, and type 2 diabetes, affect people of all ages, nationalities, and classes. The role of nutrition in the combat of NCDs has been established by a number of studies.[4,5] Various governments and health ministries have recently increased their attention on NCDs.[6,7] Countries worldwide understand the impact of diseases such as coronary heart diseases, diabetes, and

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In the Eastern Mediterranean region, cardiovascular disease, type 2 diabetes, metabolic syndrome, obesity, cancer, and osteoporosis have become the main causes of morbidity and mortality. The estimated mortality rate due to cardiovascular disease and diabetes ranged from 179.8 to 765.2 per 100,000 populations, with the highest rates in developing countries. The prevalence of overweight and obesity (body mass index ≥25 kg/m²) has reached an alarming level in most countries of the region, ranging from 25% to 82%, with a higher prevalence among women. The estimated mortality rate for cancer ranged from 61.9 to 151 per 100,000 populations.[5,11,12]

In the United Arab Emirates (UAE), more than three-quarters of mortality (76%) is attributable to NCDs. The total number of NCD deaths in a total population of 9,154,000 is 11,000 and the risk of premature death from target NCDs is 17%. Exploring the role of nutrition in healthcare delivery in general and with a special focus on combating NCDs in the UAE is aligned with the UAE Government’s Vision 2021. This entails health improvement focusing on the decrease of NCDs, specifically cardiovascular diseases by 25%, diabetes by 14%, cancers by 18%, and respiratory diseases by decreasing tobacco users by 15% of the current levels.[13]

The execution of a strategy depends on the involvement of healthcare professionals in establishing a strategic nutrition plan that necessitates soliciting their agreement on stipulated factors. The primary aim of this study was to develop a valid and reliable questionnaire for healthcare professionals to assess the agreement about factors needed to implement a nutrition strategy in the UAE.

**Materials and Methods**

**Study population**

The study was carried out in private and public hospitals in the UAE, during 2014 as part of a Ph.D. thesis. The focus of the study was to assess the factors needed to implement a nutrition strategy according to the level of agreement. Hospitals invited to participate in the study are known to liaise with nutrition program across sector and had nutrition departments in operation. The questionnaires were distributed to various management hospitals in the UAE. Hospitals were informed that additional questionnaires can be provided if need be, none of the hospitals asked for additional questionnaires.

The type of questionnaire used was a self-administered questionnaire. They were given sufficient time to respond to the questionnaire without promoting. The data collection was supervised completely by the investigator of the study. The healthcare professionals included into the sample are physicians, nurses, nutritionists and laboratory technicians, and other quality assurances.

Out of the 200 questionnaires distributed, 161 were received by the research team. This is equal to an 80.5% response rate; this was due to the different types of follow-up used. Telephone appointments were made to ensure the personnel designated by the management; based on their experience in nutrition, interventions were available on the drop-off day for the questionnaires. The designated personnel were individuals deem most experience in identification and implementation of nutrition strategies.

**The questionnaire**

The questionnaire was constructed from the themes deduced from the systematic literature review. First, the questionnaire was validated by a team of international experts. Five experts on questionnaire design in the Middle East were asked to validate the questionnaire via e-mail, of whom four of which responded with feedback and one had no comments. The reviewers’ feedback on the questionnaire design and content was then analyzed and divided into 11 factors, as shown in Table 1: strategy development, people and competencies, resources and enablement, process and activity, patient orientation, quality, people and competencies, values and care design, measurement and impact, innovation and best practice, teamwork and culture and diversity. Each of these factors consisted of four items with a level of agreement assessed on a 7-point Likert scale from 1 as strongly disagree to 7 strongly agree [Table 1]. In addition, the questionnaire contained some demographical variables such as gender, age, qualification, occupation, type of hospital (private or public), and the location of the hospital.

**Statistical analysis**

Data entry and analyses were carried out using IBM SPSS Statistics version 21 (IBM Corp., Armonk, NY). Factor analysis was performed to measure the ability of the questions asked to relate to the actual construction that was intended to use. In the first step, the interitem correlation was explored. This created a matrix of correlation of all items. Eigenvalues and amount of variances explained were calculated for each factor and hence for each item.
Table 1: The strategic nutrition questionnaire with different factors and their items

1. Strategy development
   - Hospital senior management is effectively involved in the development of nutrition strategies
   - Management strategies require the involvement of senior management of the hospital to ensure lower incidence of NCDs
   - Before implementing nutrition programs, the hospital establishes the relevant importance of key performance indicators
   - Strategy development is important to the success of implementing nutrition programs
2. Resources and enablement
   - The hospital uses the life span approach in nutrition interventions
   - Cross-government or cross-sector departments are involved in nutrition interventions
   - It is important for this hospital to finance programs for nutrition interventions
   - Resources are important to the success of implementing effective nutrition programs
3. Process and activity
   - Nutrition is sufficiently addressed as part of patient education in my hospital
   - The demographic profile of the UAE is effectively used when setting up nutrition programs
   - Age-related programs are important in nutrition interventions
   - Demographics are important to the success of implementing effective nutrition programs
4. Patient orientation
   - The hospital has clear processes for patient orientation
   - The hospital has clear processes in place to assess user expectations of nutrition programs
   - User expectation feedback are effectively used in nutrition programs
   - Patient empowerment is important to the success of implementing effective nutrition programs
5. Quality
   - The hospital has quality measures in place to ensure nutrition care is delivered across all areas consistently
   - The hospital has effective processes to ensure evidence-based nutrition interventions
   - Quality assurance measures are used to ensure patient-centered nutrition care
   - Quality assurance measures are a success to implementing effective nutrition programs
6. People and competencies
   - Training programs that staff undergo include up-to-date nutrition care
   - The staff’s core competencies include skills to ensure patient nutrition education
   - Up-to-date training in nutrition care is provided in my hospital
   - Training programs are important to the success of implementing effective nutrition programs
7. Values and care design
   - Shared decision-making processes are used in nutrition programs
   - The methods of communicating the different nutrition services provided to patients are clear
   - The activities in nutrition intervention are considered part of an integrated healthcare system in this hospital
   - Communication method is important to the success of implementing effective nutrition programs
8. Measurement and impact
   - In my hospital, impact of nutrition programs are measured effectively
   - The hospital uses sufficient tools for measuring impacts of nutrition programs on the population

Table 1: Contd....

   - In my hospital, clear processes are available to assess the effectiveness of nutrition health initiatives
   - Measurement of impact is important to the success of implementing effective nutrition programs
9. Innovation and best practice
   - The hospital uses various e-health services such as social media, telehealth, television commercials, and internet in nutrition interventions
   - Technology is used in nutrition interventions in this hospital
   - Information to patients is achieved through advanced technological means
   - Innovation is important to the success of implementing effective nutrition programs
10. Teamwork
    - Multidisciplinary teams in this hospital include nutrition personnel
    - The hospital has different teams that provide nutrition assessment, screening, and care effectively
    - The nutrition personnel in multidisciplinary teams have a well-defined role
    - The inclusion of nutrition department is multidisciplinary teams is important to the success of implementing effective nutrition programs
11. Culture and diversity
    - Considering culture diversity of the patient is important to the success of implementing nutrition programs
    - Culture and diversity in the patient population is considered in the nutrition strategy
    - The culture and ethnicity of the patient population is considered when setting up the services by nutrition department
    - The patient population of the hospital is considered before setting up menus

NCDs - Noncommunicable diseases, UAE - United Arab Emirates

At this stage, the risk of singularity and multicollinearity had to be taken into account (the item that is perfectly correlated $R > 0.9$). Therefore, subitems by factor were identified: (a) those failed to correlate with other and (b) those which demonstrated singularity. This was a prerequisite for the second step (i.e., reliability test) since the above items, if any, had been excluded. Kolmogorov–Wilk test of normality of reliability distribution of the scores was also done.

Internal consistency reliability test (test–retest measure of reliability) was then performed by administrating the same questionnaire to the same group of health professionals. The internal reliability estimates were calculated using Cronbach’s alpha coefficient. It provides a conservative estimate of reliability and generally represents the lower bound to the reliability of a scale item. Cronbach’s alpha coefficient $\geq 0.70$ was taken as an acceptable criterion of reliability of the scale.

Ethical approval

Ethical approval of this project was given by the Chair of Humanities and Health Sciences Research Ethics Panel (UAE). All the participants were consent for participation in the study.
Results

A total of 161 respondents replied to the questionnaire out of the 200 distributed. The item “the hospital uses the lifespan approach in nutrition interventions” was deleted.

Table 2: Display the load of variance explains per item and with each factor

| Item                                                                 | Extraction load |
|----------------------------------------------------------------------|-----------------|
| 1. Strategy development                                              |                 |
| 1.1. Hospital senior management is effectively involved in the development of nutrition strategies | 0.739           |
| 1.2. Management strategies require the involvement of senior management of the hospital to ensure lower incidence of NCDs | 0.831           |
| 1.3. Before implementing nutrition programs, the hospital establishes the relevant importance of key performance indicators | 0.852           |
| 1.4. Strategy development is important to the success of implementing nutrition programs | 0.859           |
| 2. Resources and enablement                                          |                 |
| 2.1. The hospital uses the lifespan approach in nutrition interventions | 0.215           |
| 2.2. Cross-government or cross-sector departments are involved in nutrition interventions | 0.734           |
| 2.3. It is important for this hospital to finance programs for nutrition interventions | 0.855           |
| 2.4. Resources are important to the success of implementing effective nutrition programs | 0.789           |
| 3. Process and activity                                              |                 |
| 3.1. Nutrition is sufficiently addressed as part of patient education in my hospital | 0.784           |
| 3.2. The demographic profile of the UAE is effectively used when setting up nutrition programs | 0.704           |
| 3.3. Age-related programs are important in nutrition interventions     | 0.820           |
| 3.4. Demographics are important to the success of implementing effective nutrition programs | 0.842           |
| 4. Patient orientation                                               |                 |
| 4.1. The hospital has clear processes for patient orientation         | 0.910           |
| 4.2. The hospital has clear processes in place to assess user expectations of nutrition programs | 0.918           |
| 4.3. User expectation feedback are effectively used in nutrition programs | 0.912           |
| 4.4. Patient empowerment is important to the success of implementing effective nutrition programs | 0.673           |
| 5. Quality                                                           |                 |
| 5.1. The hospital has quality measures in place to ensure nutrition care is delivered across all areas consistently | 0.863           |
| 5.2. The hospital has effective processes to ensure evidence-based nutrition interventions | 0.933           |
| 5.3. Quality assurance measures are used to ensure patient-centric nutrition care | 0.935           |
| 5.4. Quality assurance measures are a success to implementing effective nutrition programs | 0.817           |

Table 2: Contd...

| Item                                                                 | Extraction load |
|----------------------------------------------------------------------|-----------------|
| 6. People and competencies                                          |                 |
| 6.1. Training programs that staff undergo include up-to-date nutrition care | 0.872           |
| 6.2. The staff’s core competencies include skills to ensure patient nutrition education | 0.874           |
| 6.3. Up-to-date training in nutrition care provided in my hospital | 0.855           |
| 6.4. Training programs essential to the success of implementing effective nutrition programs | 0.675           |
| 7. Values and care design                                            |                 |
| 7.1. Shared decision-making processes are used in nutrition programs | 0.865           |
| 7.2. The methods of communicating the different nutrition services provided to patients are clear | 0.881           |
| 7.3. The activities in nutrition intervention are considered part of an integrated health care system in this hospital | 0.911           |
| 7.4. Communication method is important to the success of implementing effective nutrition programs | 0.724           |
| 8. Measurement and impact                                            |                 |
| 8.1. In my hospital, impact of nutrition programs are measured effectively | 0.926           |
| 8.2. The hospital uses sufficient tools for measuring impacts of nutrition programs on the population | 0.891           |
| 8.3. In my hospital, clear processes are available to assess the effectiveness of nutrition health initiatives | 0.935           |
| 8.4. Measurement of impact is important to the success of implementing effective nutrition programs | 0.717           |
| 9. Innovation and best practice                                     |                 |
| 9.1. The hospital uses various e-health services such as social media, telehealth, television commercials, and internet in nutrition interventions | 0.927           |
| 9.2. The technology uses in nutrition interventions in this hospital | 0.923           |
| 9.3. Information to patients achieved through advanced technological means | 0.911           |
| 9.4. Innovation is important to the success of implementing effective nutrition programs | 0.911           |
| 10. Teamwork                                                         |                 |
| 10.1. Multidisciplinary teams in this hospital include nutrition personnel | 0.849           |
| 10.2. The hospital has different teams that provide nutrition assessment, screening, and care effectively | 0.812           |
| 10.3. The nutrition personnel in multidisciplinary teams have a well-defined role | 0.860           |
| 10.4. The inclusion of nutrition department is multidisciplinary teams is important to the success of implementing effective nutrition programs | 0.762           |
| 11. Culture and diversity                                            |                 |
| 11.1. The patient population of the hospital is considered before setting up menus | 0.897           |
| 11.2. The hospital considers the differences in the patient ethnicity when setting up the services by nutrition department | 0.928           |
| 11.3. Culture and diversity in the patient population is considered in the nutrition strategy | 0.918           |
| 11.4. Considering culture diversity of the patient is important to the success of implementing effective nutrition programs | 0.766           |

NCDs - Noncommunicable diseases, UAE - United Arab Emirates

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Table 3: A summary of results from factor analysis on the questionnaire per 11 factors for the agreement

| Factors                        | Sample size | Kaiser-Meyer-Olkin measure of sampling adequacy | Bartlett’s test of sphericity (P) | Cronbach α | Percentage of amount of variance explained |
|--------------------------------|-------------|-------------------------------------------------|----------------------------------|-------------|--------------------------------------------|
| Strategy development           | 154         | 0.780                                           | <0.001                           | 0.828       | 67.517                                     |
| Resources and enablement       | 150         | 0.61                                            | <0.001                           | 0.727       | 65.980                                     |
| Process and activity           | 148         | 0.707                                           | <0.001                           | 0.792       | 62.32                                      |
| Patient orientation            | 152         | 0.769                                           | <0.001                           | 0.879       | 73.872                                     |
| Quality                        | 152         | 0.845                                           | <0.001                           | 0.924       | 81.887                                     |
| People and competencies        | 145         | 0.775                                           | <0.001                           | 0.838       | 67.743                                     |
| Values and care design         | 155         | 0.765                                           | <0.001                           | 0.869       | 71.961                                     |
| Measurement and impact         | 146         | 0.813                                           | <0.001                           | 0.892       | 75.988                                     |
| Innovation and best practice   | 152         | 0.806                                           | <0.001                           | 0.879       | 73.936                                     |
| Teamwork                       | 148         | 0.723                                           | <0.001                           | 0.838       | 67.513                                     |
| Culture diversity              | 148         | 0.812                                           | <0.001                           | 0.906       | 78.158                                     |

from the questionnaire due to a problem of singularity and extracted variance 21.5% [Tables 1 and 2].

Table 2 displays the loadings of each item onto each factor; it represents the level of variance explained by the particular item for the corresponding factor, and the extraction is recommended to be at least 3%. This entails more evidence to exclude item “the hospital uses the lifespan approach in nutrition interventions” (with an extraction load of 0.215) in addition to its problem of singularity caused by this item. The rest of the items did not cause neither multicollinearity/singularity in the original correlation matrices nor of any of its extracted variance had its value <3%. As a result of that, all the items were included in the questionnaire under the corresponding factors.

After the exclusion of the item “the hospital uses the lifespan approach in nutrition interventions” from the questionnaire and factor analysis was running for the 43 items once regardless the categorization of items by factor, the test of Kaiser-Meyer-Olkin (KMO) and Bartlett’s test of sampling adequacy revealed that the original correlation matrix was significantly not identity matrix; the KMO value was 0.930 and Bartlett’s test with $P < 0.001$. No incidence of multicollinearity or singularity and the minimum extraction value of variance explained was 63.5%. The procedure confirmed that all the 43 items were included in the questionnaire. In addition, the internal consistency reliability was tested by Cronbach’s coefficient for 43 items with the participant as the unit of analysis. The observed coefficient was 0.977, indicating very high reliability of the questionnaire.

Factor analysis
Table 3 shows that all the 161 responses for the items of agreement questionnaire were entered in a factor analysis, with a minimum of one eigenvalue for factor extraction for item-to-factor loading. All the matrices for the 11 factors are statistically significant therefore rejecting the hypothesis that the original correlation matrices are identity matrices for measures of sampling adequacy, $P < 0.001$; and hence, there are some relationships between the items will be included in the analysis for each factor. The procedure generated all the 11 factors were included, only one item from the second factor (resources and enablement). “The hospital uses the lifespan approach in nutrition interventions” was excluded due to singularity in the data. The explained variance ranged from 62.32% to 81.9%, depending on the factor, as result of this outcome no factor need to be excluded from the questionnaire.

Reliability
The internal consistency reliability was tested by Cronbach’s coefficient for each of the 11 factors in each of the four questions (except the second factor 3 question after exclusion of item “the hospital uses the lifespan approach in nutrition interventions”) with the participant as the unit of analysis. The observed coefficients ranged from 0.727 to 0.924, indicating exceptionally high reliability. By convention, a lenient cut-off of 0.60 is common in exploratory research; alpha should be at least 0.70 or higher to retain an item in an “adequate” scale. Many researchers require a cut-off value of 0.80 for a “good” scale.$^{[16]}$

Discussion
The increase of NCD creates a great burden on healthcare systems; hence, it is essential to the UAE government to have a thorough nutritional-based strategic plan to counter this trend. This questionnaire aims to understand the assessment of what influences the implementation of a nutritional-based strategy. It is built upon a hypothesis that the participants are the best experts in this respect. Nevertheless, the participant’s opinion is based on many factors which include private or public sector, the degree to which they are involved in the strategy, and educational level.$^{[17]}$
Questionnaires seeking participants’ opinion should be not only reliable, valid, and consistent but also concise and adequate [Tables 2 and 3]. This is especially so if the area studied is conventionally regarded as sensitive such as participants provide their expertise for establishing a strategic plan that will be implemented nationwide. The exclusion of the first item from the second component “the hospital uses the lifespan approach in nutrition interventions” was informed by the logical and pragmatic approach. This demanded that all the key components in the original questionnaire be retained. Furthermore, the remaining 43 items which covered major aspects of factors of nutrition strategic were more simply and clearly phrased for the decision-makers. Hence, it was gratifying to note that the reduction of the items from 44 in the original instrument to 43 in the present version did not result in a significant reduction in reliability, validity, or consistency of the instrument. Another point to raise is that either the number of factors of a strategic plan of the specific domain such as nutrition to affect the burden of NCDs or the number of professionals needed to validate this instrument is a real dilemma. The question of an overall number of factors and sample size that needed to validate the instrument of a strategic plan as general is very fluctuated in the literature. In this study, the existing number of factors (11) and their subitems (43) have robust, reliable, internal consistency and validity. Unfortunately, the method of validation and reliability of an instrument is able to exclude the inadequate factors and items involved, but without any ability to test the completeness of neither factors nor the items per component.

**Conclusion**

The study concluded that the questionnaire was valid and reliable on its form of 43 items divided into 11 factors to assess the agreement toward factors needed to implement a nutrition strategy in the UAE.

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Nil.

**Conflicts of interest**

There are no conflicts of interest.

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