



Research Article

Postgraduate Curriculum in Human Nutrition in Pakistan: Evaluation for Three Main Domains in Nutrition by Using the Novel Delphi Technique

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Abstract | The primary motivation behind the objective of this study was to discover innovative concepts for developing a postgraduate Nutrition education curriculum in Pakistan. The rise of nutrition as a separate education and research field has made a compelling requirement for nutrition institutions to adopt a more globalized strategy for curriculum to effectively address nutritional problems confronting the humanity at national and international levels. Therefore, the current study analyzed postgraduate NEC in Pakistan against a standard setup in previous research. The present study used the Delphi method to build consensus among selected (n=46) members of nutrition experts on research questions of interest. The experts were motivated to thoroughly review the postgraduate NEC contents against the three 'domains' ("Clinical Nutrition", "Applied Nutrition" and "Basic Nutrition"), which served as standards for comparison. They were requested to answer on: "which subject matters from every domain are addressed in the present postgraduate NEC?". In addition, they were requested to suggest new innovative learning ideas that could be incorporated in the present postgraduate NEC. The results show higher (>80%) consensus among the experts on 'the postgraduate NEC reflect 'very well' the three essential 'domains'. As many as 34 novel ideas were suggested that may be . In view of the findings of this study, we suggest the 34 previously missing from the postgraduate NEC may be incorporated. Future research should focus on examining the utility of these novel ideas and best practices for showing current findings in NEC.

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1. Introduction

Human Nutrition is an emerging field of learning and research in the modern era of healthcare

education system (Nakamura, 2022). The justification behind remembering nutrition as a subject for different educational programs shows the significant job of Nutrition that it can play towards the general

prosperity and soundness of a local area (Cuerda *et al.*, 2021; Alam *et al.*, 2017). Nutrition training and correspondence is progressively perceived as a fundamental impetus in the outcome of food and nutrition security mediations, guaranteeing that expanded food creation/pay converts into further developed nutrition status and further developed eats less. A few late surveys and key reports support nutrition training in rural/food and nutrition security mediations (Girard *et al.*, 2012; Leory and Frongillo, 2007; UNSCN, 2011).

Curriculum is thought of as the “heart” of any learning organization. This implies that scholastic foundations can't exist without an education curriculum (Alam *et al.*, 2017; Bilbao *et al.*, 2008). A research study by Donnini and colleagues has recognized and prescribed three primary domains to be essential for a degree in Human Nutrition (Donnini *et al.*, 2017). These domains are “Essential Nutrition”, “Applied Nutrition” and “Clinical Nutrition”, and as also reported in our previous studies (Alam *et al.*, 2017).

In Pakistan, nutrition education is at the phase of its earliest emerging stages. In fact, this is the best time to make changes or add new ideas in the existing curricula, if any. Some institutions are offering degree programs at the undergrad and postgraduate levels in Pakistan (Khandelwal *et al.*, 2014). Nutrition Education Curriculums (NEC) for different degree programs have been developed and in active practice. At the same time, some curricula are under the course of advancement (e.g., “harmonization of nutrition curricula” by a group of eminent investigators led by Dr Khalid Iqbal in Khyber Medical University, Peshawar). An educational curriculum for postgraduate degree program in Human Nutrition has already been developed with the assistance of the dynamic commitment of Pakistan's Higher Education Commission accessible via www.hec.org.pk with seminal inputs by the National Agriculture Education Accreditation Council (NAEAC) of HEC. This curriculum is being taught at the MS level in some of the universities in Pakistan also including The Human Nutrition Department at Bacha Khan University in Charsadda, Pakistan. As this curricula is in its infancy stages, and as it has not been previously critically reviewed, there is naturally a state of uncertainty about utility and productivity of the curricula. In particular, the curricula has not been reviewed whether it reflects the three main ‘domains’ as previously suggested. Therefore, we conceived the current study to investigate the postgraduate NEC.

We wanted answers for two main research questions. Firstly, how much of the three domains are reflected in the present curricula, and secondly what new and novel ideas can be incorporated to make the curricula more interactive and comparable to the international standards.

2. Materials and Methods

2.1 Study design

This was a cross-sectional study. For the current study, we used Delphi method (DM) with some minor modifications. This method is the best option to get an overall agreement from a panel of specialists in fields of nutrition and related sciences. “Two heads are superior to one” (Dalkey, 1969) and therefore in view of this approach, we utilized the DM, which is consensus-based. DM has been every now and again utilized in education research. By studying specialists in the field, we might be more ready to acquire a superior comprehension of how global nutrition content could be introduced into NEC.

2.2 Inclusion criteria

To assure that we must select a panel of the most qualified members in our panel of experts, these steps were taken: (1) the members must have something like three or more years of professional experience as a nutrition education instructor or diet/nutrition specialist; (2) the DM panel member must be presently engaged in nutrition teaching/research, and (3) the DM panel member must have insight with global nutrition/dietetics knowledge.

2.3 Sample selection

Following the “Snowball Strategy” (Goodman, 1961), a letter was sent to 51 specialists in nutrition/partnered fields. These experts were already identified from literature survey. Once we received a reply and agreement to participate in the study, the name of the expert was registered as a DM panel member. A subsequent “thanking letter” was then sent. Non-respondents were reached during round 1 by email and afterward by telephone. This enlistment expanded the example from 19 to 22 panel members. The example size for the master panel was $n = 22$ (32%) for Round 1, $n = 19$ (27.9%) for Round 2, and $n = 17$ (25%) for Round 3.

2.4 Data collection

2.4.1 Round 1

Hard and soft copies of the NEC were shared with

the specialists. They were approached to go through course-by-course items in NEC. They were motivated to think about the NEC contents, and review it in the light of the three 'domains' as a standard for comparison. They were requested to answer on: "which subject matters from every domain are addressed in the educational program?". Likewise, an inquiry that could go either way was utilized to recognize extra ideas that ought to be integrated into educational curriculum to make up the lacks as well as to additional calibrate the educational program. The underlying inquiry was, "what overall ideas ought to be remembered for the educational curriculum to fill in the hole information regions in the three areas of the Nutritional educational curriculum?"

2.4.2 Round 2

The responses from Round 1 were desk-reviewed by the main author and the co-authors of this paper. These responses were divided into two types; 1) agreement/conflict of the specialists on 'the amount of' the three 'domains' are addressed/reflected in the education curriculum; 2) general new ideas ought to be remembered for the educational curriculum to fill in the holes in every one of the three 'domains' of the nutrition educational program. A study instrument was created from Round 1 ideas for the DM panel members to take during Round 2. Utilizing a five-point rating scale, members positioned their degree of agreement/disagreement or conflict for every idea notable in Round 1. The rating decisions utilized for this study included: 1 = unequivocally dissent, 2 = deviate, 3 = neither concur nor dissent, 4 = concur, and 5 = emphatically concur. Notwithstanding the five-point rating scale, members were approached to revamp any of the ideas or propose extra ideas they accepted ought to be recognized however neglected to make the ideas list. As in Round 1, we sent sees and follow up suggestions to energize support from the panel members. Fourteen of the specialists took part in Round 2.

After the fulfillment of the subsequent rounds, the outcomes were dissected to figure out what new ideas would be held for Round 3. For an idea to be held, we decided deduced in view of that 80% of the members probably chose either concur or firmly concur. Furthermore, we added six recently distinguished ideas to the arrangements of AK in the three 'domains'. The recently recognized ideas were added to Round 3, and the members had the amazing chance to rate them to decide whether they would be held. Subsequently, 35 ideas progressed to Round 3.

2.4.3 Round 3

The new ideas recognized in Round 2 were additionally appraised in this round. A similar five-point Likert scale used in Round 2 was utilized in Round 3. We decided deduced for Round 3 that the arrangement rate would likewise be 80% for all-encompassing ideas to be suggested for consideration in the educational program. As in Rounds 1 and 2, we collected follow up suggestions to energize support from the panel members. Fourteen of the seventeen specialists gave criticism in Round 3.

3. Results

The main objective of this research study was to evaluate NEC under consideration against three main 'domains' ("Clinical Nutrition", "Applied Nutrition" and "Basic Nutrition"). This exercise was completed to know whether the NEC covers the knowledge areas under these three 'domains'. Another objective was to identify additional concepts in all the knowledge areas of the three 'domains' so that these may be incorporated into the curriculum in an effort making up the deficiencies and/or to further fine-tuning the NEC. A modified DM was applied comprising of three distinct rounds. Round 1 featured the following two questions: "which areas of knowledge from each domain are represented/reflected in the curriculum?" and "what overarching concepts should be included in the curriculum to fill in the gap knowledge areas in the three domains of the nutrition curriculum?"

The results on question 1 are summarized in Table 1. As evident, the panelists showed their agreement that the curriculum under consideration reflects the inclusion of knowledge areas from the three domains.

Table 1: Level of agreement for three domains.

Domains	Level of agreement (%)
Basic nutrition	85%
Applied nutrition	82%
Clinical nutrition	80%

The results obtained from question 2 are shown in Table 2. The panelists identified certain new additional concepts in round 1. These concepts may be incorporated into NEC in order to make up the deficiencies and/or to further fine-tune the curriculum. These concepts were finally approved in Round 2. An additional two more concepts (suggested by consultant members of NEAT) were also included. These were forwarded for consideration and approval by the DM panelists in round 3. In this way, a total of

Table 2: Concepts identified for post-graduate curriculum in human nutrition (n = 14).

Domains	Agree/ Strongly agree
A. Basic nutrition	
Nutritional role of bioactive molecules	100%
Relationship of nutrition sciences with other biological sciences	90%
Role of functional foods	100%
Application of knowledge in other fields in nutrition	90%
B. Applied nutrition	
Functional assessment of various organs and organ systems	85%
Nutritional status assessment of the fetus	85%
Nutritional trends and global food systems issues	90%
Particular issues for every stage of the life cycle	80%
Theories and techniques related to health behaviour that are used in a range of clinical, counselling, and nutrition education contexts to promote the modification of healthy behaviour.	80%
Nutritional approaches in disease prevention	100%
Comparative nutrition	85%
Nutrition program assessment	100%
required Culinary skills for clinical nutrition to guide the patients	90%
C. Clinical nutrition	
Basic concepts of immunology and its application to clinical nutrition.	100%
In order to diagnose and treat health and disease, consider the physiological and metabolic principles that underlie nutritional status.	80%
Nutrient metabolism in healthy, growing, ageing, and disease stages.	85%
Research that links diet and nutrition to specific illness conditions.	100%
Create the best nutritional therapy programmes for various clinical problems.	95%
Use nutritional needs concepts to manage patients with various conditions.	95%
Using case study methods, comprehend the role of diet in disease	100%
How nutrition is integrated in different clinics and hospital systems. Examples from USA, UK, Germany, and the rest of world.	100%
Useful dietary changes and dietary supplements will be used to reduce inflammation.	90%
Important terms related to behavioural nutrition, such as health psychology, behavioural epidemiology, mediating factors, theoretical framework, and cultural competence.	90%
The biological and pharmacological effects of herbal remedies; the biochemical components of plant extracts and the identification of their active	90%
Professional behaviours, establishing and maintaining healthy	100%
Boundaries with patients, credentials, the rights and limitations of the scope of practise, HIPAA, and risk management.	100%
The body's reactions to drug-induced nutritional depletions, an examination of the most significant herb/drug interactions, and a survey of relevant databases and information. These two primary issues with integrated medicine are supported by, documented by, and explained by scientific research.	100%
Therapeutic dietary modification.	95%
Various clinical nutrition ideas	100%
Management of food services in clinical nutrition 21	100%
Clinical nutrition practice scope and code of ethics.	100%
The responsibilities and accomplishments of national and international organisations involved in clinical nutrition.	95%
The effects of drug-induced nutritional depletions on the body; a study of the most important herb/drug interactions; and a review of databases and information on this subject. Scientific studies that document, support, and explain these two major problems in integrated medicine	95%

Table continued on next page.....

Domains	Agree/ Strongly agree
Clinical Sports Nutrition; nutritional theories on how the body uses macro- and micronutrients to fuel energy systems; well-known supplements for weight loss and performance enhancement; and dietary and exercise recommendations for athletes, adolescents, the elderly, and those with disease.	95%
Therapeutic dietary modification.	100%
Various clinical nutrition ideas	100%
Management of food services in clinical nutrition	95%
Clinical nutrition practice scope and code of ethics.	100%
The responsibilities and accomplishments of national and international organisations involved in clinical nutrition.	100%
Create the best nutritional therapy programmes for various clinical problems.	100%
Use nutritional needs concepts to manage patients with various conditions.	95%
Therapeutic dietary modification.	95%
Various clinical nutrition ideas	95%

17 new concepts were suggested to be incorporated in the existing NEC. As evident, most of the new concepts related to the domain of “Clinical Nutrition” (12), followed by “Applied Nutrition” (3) and “Basic Nutrition” (2).

4. Discussion

The panel of nutrition experts arrived at agreement on that the current post-graduate NEC reflects amazingly the subject matters under the headings of the three ‘domains’ as also recently reported by Doninnin *et al.* (2017). A higher (>80%) consensus among the experts was found on ‘the postgraduate NEC’ reflect ‘very well’ the three essential ‘domains’ set-forth as ‘standards’ based on previous study by Doninnin *et al.* (Table 1). In response to the second question, a final consensus was reached upon on 34 out of 42 additional novel education ideas that need to consolidated in the postgraduate NEC. Relatively a large portion of these new idea were proposed for the ‘domain’ of “Clinical Nutrition”, followed by “Applied Nutrition” and “Fundamental Nutrition” (Table 2). Nutrition experts in this study appeared to perceive “Clinical Nutrition” as a significant part of postgraduate NEC - a fact also advocated by the expert group for “harmonization of nutrition curricula” led by some eminent researchers led by Dr Khalid Iqbal of Khyber Medical University, Peshawar.

Nutrition education is an emerging discipline and NEC has been reviewed vastly (Shill, 1990; Hollander *et al.*, 2002; Crowley *et al.*, 2015; Hark, 2006; Khandelwal *et al.*, 2014; Burke *et al.*, 2002). As a whole, these studies emphasize that a nutrition curriculum

at postgraduate level must reflect three main areas/ domains: “Basic Nutrition”, “Applied Nutrition” and “Clinical Nutrition” (Donini *et al.*, 2017). It has been suggested that degree program in nutrition may incorporate specific subjects and domains to be a compelling device for human nutrition education and research (Donini *et al.*, 2017). In light of advocacy by Donini *et al.*, we in the current study considered the proposed postgraduate NEC against 32 objects recognized by Donin *et al.* as the principal ‘subjects’ or ‘domains’ of a viable NEC. The outcomes show (Table 2) that the proposed NEC feature the greater part of the ‘topics’ or ‘areas’. Nutrition is a multidisciplinary field drawing in various natural sciences and certain sociologies (Ministero *et al.*, 2011). This implies that the ‘subjects’ or ‘domains’ framed by Donini *et al.* (2017) is a brilliant rundown of these attributes.

The current study has some strengths but also few limitations that must be taken in account while drawing conclusions. Firstly, Delphi method (DM) utilized in this study is an established methodology when we need consensus development on an issue under debate (Dalkey and Halmer, 1963). This study included specialists from different disciplines (e.g., teachers, scientists, authorities in NGOs). These experts had diverse scholarly capabilities and research experience in the field of nutrition/dietetics. Scheele (2002) proposes that to make an effective combination of specialists, teaching and practical experience of the persons are the important pre-requisite for a DM. Our sample size of specialists (n=46) was exceptionally suitable (Herring, 2004; McIlraht *et al.*, 2009; Torrance *et al.*, 2010; Ager *et al.*, 2010; Wilson *et al.*, 2010). In the limitation discussion of the current

study, there were sure shortcomings; the primary one is our powerlessness to reach a substantial inference from the singular remarks we got from the specialists in regards to individual courses. These are significant remarks, yet we were unable to examine and introduce them in the current paper predominantly in view of the length of the ongoing paper. Notwithstanding, we will introduce that subjective information in a different paper. By and by, those arrangement of information don't influence the nature of the information introduced in this paper. One more shortcoming is some conceivable vulnerability related with the information. As we requested that the specialist concentrate on each course separately with a goal to score each course, in light of their items, as though how much (in percent) that specific course might satisfy the expected standards as per their discernment and perspective. Despite the fact that, they enhanced their reactions with their remarks, it is consistently an inquiry to which specific standard they could have looked at these courses. In any case, we had the option to get an image - albeit a piece obscured, which is normally connected with subjective nature of the information.

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Novelty Statement

Albeit, the Delphi Procedure is an old method. Be that as it may, it is exceptionally clever involving the well-known Delphi method for arriving at an agreement on subject connected with educational programs, significantly in human nourishment and dietetics.

Author's Contribution

IA conceived the exploration thought; IA and SS led the review and composed the composition. MF

and SR helped in review. SS, MF and SR helped in information assortment, while IA dissected the information. Every one of the authors fundamentally surveyed the composition and supported.

Conflict of interest

No conflict of interest is declared.

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