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Practitioner Rankings of Entry-Level Competencies for Public Health Nutrition

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To the Graduate Council:

I am submitting herewith a thesis written by Courtney Teal Schand entitled "Practitioner Rankings of Entry-Level Competencies for Public Health Nutrition." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Nutrition.

Marsha L. Spence, Major Professor

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Practitioner Rankings of Entry-Level Competencies for Public Health Nutrition

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Abstract

Background: The Association of Graduate Programs in Public Health Nutrition's graduate competencies were updated and refined by an expert panel and a survey of Public Health Nutrition (PHN) academicians, which resulted in 58 proposed competencies in five domains, Food and Nutrition Science, Advocacy, Research and Evaluation, Communication and Cultural Competency, and Management and Leadership.

Objectives: The objectives of this study were 1) to determine if differences existed in calculated domain scores of practitioner rankings of essentiality for the PHN graduate competencies by demographic variables of interest (current position, years of experience, education, and/or intent to retire); 2) to determine the number of proposed PHN graduate competencies that were not ranked as "entry-level" by the majority (>51%) of PHN practitioners surveyed; 3) to determine if the demographic variables of interest were significant predictors of practitioner rankings of essentiality for the competencies that did not reach majority consensus among practitioners surveyed.

Design: Cross-sectional web-based survey

Methods: A web-based survey of PHN practitioners (n=132; 38% response rate) was administered to determine practitioners' ranking of each competency as "not essential", "essential, but advanced practice", or "essential for entry-level practice". Descriptive statistics were calculate for demographic variables; domain scores were calculated from respondents' essentiality rankings of competencies in each domain and MANOVA was used to detect if domain scores differed by demographic variables of interest; frequencies of essentiality rankings were used to determine the number of

competencies with <51% practitioner agreement as essential for entry-level practice; multinomial logistic regression was used to detect if demographic variables were significant predictors of essentiality rankings for the competencies with <51% concordance among PHN practitioners.

Results: There were no significant differences in domain scores by practitioner demographic variables. However, 15 of the 58 competencies had <51% concordance as essential for entry practice. Further analysis showed that the demographic variables were not significant predictors of essentiality rankings for the competencies that did not reach majority consensus.

Conclusions: The study showed similar opinions among practitioners in the development of entry-level competencies for future PHN personnel, which may indicate that the majority of proposed competencies met the expectations of current practitioners.

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CHAPTER ONE: BACKGROUND

Defining Public Health Nutrition

A definition for Public Health Nutrition (PHN) has been an ongoing project for many years and by many organizations.[1-5] Professionals in developed countries such as the United States, the United Kingdom, the European Union, Canada and Australia are most prominent in the efforts to define PHN. Roger Hughes, a frontrunner in the international PHN workforce research, encouraged consensus for the purpose of assessing workforce requirements and met with experts from nine countries to reach agreement on an international PHN definition.[1] The international panel did not limit the definition to only one phrase, but instead they recommended various aspects of PHN with key descriptors that could serve as the basis of definitions in each of the countries to best suit the perceptions and functions unique to each nation.[1] The descriptors included for each definition of PHN were: "solution-oriented, social and cultural aspects, advocacy, disease prevention, and interventions based on systems, communities and organizations (p. 618)."[1]

However, Hughes decided to use the definition from The World Public Health Nutrition Association that defined PHN as "the promotion and maintenance of nutrition-related health and wellbeing of populations through organized efforts and informed choices of society (p. 765)."[4] And in a later discussion he and Barrie Margetts urged that it follow a Public Health model in its emphasis of "prevention rather than treatment, populations rather than individuals, and interventions that address the determinants of health rather than the treatment of disease (p. 4)."[5]

Table 1. Definitions of Public Health Nutrition from International and Domestic Workgroups

Author	Definition
International Panel	*Solution-oriented, social and cultural aspects, advocacy, disease prevention, and interventions based on systems, communities and organizations (p. 618).”*[1]
Canadian Dietitian Group	*Health promotion through awareness raising, education and skill building, supportive environments and policy development, collaborations and partnerships, research and evaluation, and the mentoring and education of future nutrition and health professionals as well as other congruent descriptors (p. 6).*[2]
Mildred Kauffman	*That member of the public health agency staff who is responsible for assessing community nutrition needs and planning, organizing, managing, directing, coordinating, and evaluating the nutrition component of the health agency's services. The public health nutritionist establishes linkages with related community nutrition programs, nutrition education, food assistance, social or welfare services, child care, services to the elderly, other human services, and community based research (p. 1218).*[3]
The Academy of Nutrition and Dietetics PHN Taskforce	*The application of nutrition and public health principles to improve or maintain optimal health of populations and targeted groups through enhancements in programs, systems, policies, and environments* (p. 5)”.[6]

In 2012, the Academy of Nutrition and Dietetics PHN Task Force developed definitions for PHN (see Table 1) and community nutrition, and described the roles of professionals and scope of practice for each subspecialty.[6] Although often used synonymously, public health nutritionists and community nutritionists have different training requirements and job descriptions.[6] The definition focused on the dual training of a PHN practitioner in both dietetics and the core functions of public health, while the

community nutritionist was designated as the nutrition- trained professional that conveys nutrition science principles, nutrition interventions, and counseling and medical nutrition therapy to community members, usually in group settings, rather than impacting the broader population and systems.[6]

To be expected, commonalities exist among these definitions of PHN and for the expectations of PHN professionals, including support of a healthful environment through advocacy and policy development based on system evaluations within communities. Regardless of the unique needs of each country that attempted to define PHN, the overlap of ideas is important since the focus is distinctly different from traditional clinical nutrition practice[7]. Thus, PHN practitioners should have advanced training and in-depth understanding of the current evidence-based guidelines and best practices in nutrition and public health.[1]

Public Health Nutrition Workforce

Current Workforce Demands

The field of PHN has attracted more publicity and research in recent decades as the threat of obesity, food insecurity, and nutrition-related health problems across diverse populations contribute substantial costs to countries.[8,9] With the recent sustained economic hardship in many American families, supplemental nutrition programs like the National School Lunch and Breakfast Programs, the Supplemental Nutrition Assistance Program, and the Special Supplemental Nutrition Program for Women, Infants and Children have experienced some of the highest utilization rates in decades.[9] Since many of the programs are threatened by proposed budget reductions,

many Americans, particularly minority populations, may be nutritionally at-risk and many more may experience the effects of chronic diseases.[9] Additionally, as the population of the United States grows older and more diverse, the needs and norms of health care delivery, including nutrition, will be forced to adapt to meet the changing demands.[9,10] Longer lifespans coupled with the duration and rate of chronic diseases, are simultaneously increasing the need for nutrition-related behavioral interventions and medical nutrition therapy tailored to an older, more diverse population.[9,10] A culmination of these factors launches PHN to a public health priority in the United States, so that trained PHN professionals can advocate for the recognition of the role that nutrition plays in health outcomes across the life course.[6,9,10] Although many nutrition practitioners have traditionally focused on clinical practice, the knowledge and skills of PHN practitioners is paramount to improve population health and should be included in policy-level decision making to promote health and prevent or delay the onset of chronic diseases.[10] These skills are especially valuable in light of the health care shift, a result of the Patient Protection and Affordable Care Act,[11] which emphasizes the need for preventive healthcare along with traditional clinical medicine.[11,12] Therefore, to strengthen the effect of health promotion, interdisciplinary learning methods are projected to be at the forefront of training programs to develop workers that understand the benefit of combined efforts as equal to those of specialized knowledge in strategies to address future health concerns.[9]

The Institute of Medicine outlined suggestions for the future of Public Health professional training and discussed the multifaceted nature of health concerns and the importance of a multidisciplinary approach in *Who Will Keep the Public Healthy?:*

Educating Public Health Professionals for the 21st Century.[13,14] To improve outcomes of the nation's health, each multidisciplinary team member should be well-trained in the most current evidence-based guidelines and best practices.[13] Developing the knowledge and skills necessary to find solutions to curtail the rising trend in obesity rates and decrease the prevalence of other diet-related diseases are necessary to insure productivity of the future workforce, [8,10,14] Thus, the training of new professionals should include a basic understanding of the Socioecological Model, among other behavioral theories, because realizing effects of behavior, biology, social, economic and environmental factors on individuals is essential to improving population health.[10,13]

In 2006, the World Congress of PHN, a global partnership of international PHN professionals, scientists, academic leaders, policy makers, epidemiologists and healthcare providers from 79 developed and developing countries, held a discussion section to address the future needs of the PHN profession on a regional and global scale.[15] They identified an international need for future research, technology development, and partnerships between public and private sectors to address both under- and over-nutrition and related health concerns within the field. The panel advised that to be most effective, multiple disciplines from different countries would need to be involved, as in the successful example of the elimination of communicable diseases by immunization.[15] Once established, these partnerships would require transparency and common ethical principles. However, thus far, the difficulty in forming such partnerships has been varying outcomes of interest that may be negotiable only for some professions.[15] Hence, a proposal was made for a World Association of PHN that would continue international partnerships established at the first World Congress of PHN

meeting. The focus of the proposed Association would be to strengthen PHN practice and science to improve PHN practice at the local, state, national, and international levels and to advance nutrition-related health and well-being worldwide.[15]

Future Workforce Development Needs

Since the current PHN workforce is responsible for meeting the ever-changing needs of the public to promote healthy lifestyle initiatives, it is imperative that PHN practitioners stay abreast of current evidence-based and/or best-practice recommendations through continued education and professional development strategies.[16] Hughes, in his editorial about PHN workforce development, claimed that it is a "neglected focus of scholarship (p. 765)" in the field.[4] He also noted a large discrepancy between the methods of assessment, implementation and evaluation used in the field and those used to determine the needs of the workforce.[4] Since research on workforce development is almost exclusively limited to developed countries, there is a gap in the literature, especially in countries where government-funded PHN workforce development is most needed.[4] He emphasized that, ideally, there should be a balance between focusing on workforce size and assessing the quality of its training, organization, diversity, and operation to yield a more effective development strategy.[4] If the capacity of the current workforce is to continue to increase, it is critical to locate current and future funding sources for nutrition programs and training at all levels of employment.[16] Roger Shrimpton and Hughes added that the capacity of the nutrition workforce should be assessed on multiple levels: systems, organizational, workforce, and community, to obtain a multidimensional scope of assets and needs.[16] Further, they suggest that forecasting the needs of the PHN profession should include short, medium,

and long term goals and objectives in the United States and collectively with international PHN workgroups.[16] Results from this multi-level assessment would provide structure to the development of practitioner training programs to meet the forecasted needs of the profession.

Currently, workforce needs are met through professional development initiatives have been expanded over the past 30 years to include certificate programs, enrichment courses, professional licensure, and academic credits to improve the quality of the public health workforce. There are multiple pathways for a PHN professional to obtain credentialing in the field.[2] While a background in nutrition is necessary, further education is often obtained, most frequently in the disciplines of Public Health, Health, Community Nutrition, and PHN.[2,17,18] Svandis Jonsdottir, who is responsible for several European PHN workforce assessments, notes the cross-cutting functions of PHN practitioners. In his work with Hughes, they note the knowledge and skills needed for PHN may be more closely described as a specialty of public health than of nutrition.[19] However, without an appropriate amount of exposure to public health-related practice in undergraduate, graduate, or internship programs, some PHN professionals may be ill-prepared to deal with the demands of practice and interdisciplinary approaches necessary to assure community wellness.[2] Thus, graduate-level PHN programs provide an enhancement of professional skills such as assessment, implementation and evaluation, policy development, and other essential public health functions and services.[2]

Additionally, leadership development efforts remain a priority in the field to ensure individual- and organization-level competence to promote health for the entire

community.[18] Many professionals in public health and PHN have leadership roles in their agencies and organizations; however, many have no formal training in public health or leadership.[18] Thus, multiple opportunities remain for workforce development to address these gaps.[18] Further, leadership development is important to the profession, because trained leaders in public health and PHN are valuable resources to entry-level personnel, making mentorship an influential avenue of continued education in the field of PHN.[17] Mentoring serves as a means to foster relationships and can be coupled with continuing education initiatives.[16,17] Since the supply of practitioners may take several decades to catch up to the demand, continued education is a necessity for current practitioners.[16] Mentoring may be an efficient method of facilitating discussions about new research, while also imparting experiential knowledge from seasoned professionals to less experienced practitioners. [16,17] Dr. Claire Palermo, who has been influential in assessing and advocating for PHN workforce development in Australia, suggested that the workforce would benefit from mentor circles, the pairing of an experienced PHN practitioner paired with several novice PHN professionals, which would thereby maximize the effectiveness of each mentor.[17] While the success of this model is still dependent on the interest, commitment, and participation of practitioners, it may be an effective strategy to further develop the current workforce in area of leadership. Palermo also noted that this model may have the capacity to re-shape the professional culture to one that is more supportive of mentoring relationships for leadership development.[17]

Previously, continuing education efforts that were most prevalent in specialized professions such as PHN were focused on maintaining credential status rather than improving leadership capacity or obtaining academic credit to advance formal

education.[18] To forecast and meet the needs of professionals for career advancement and to ascertain the level of competence that will be required for future training, Wright and colleagues suggest conducting training needs assessment of the current workforce.[18] Annually, the Association of State Public Health Nutritionists (ASPHN), formerly the Association of State and Territorial Public Health Nutrition Directors (ASTPHND), conducts a training needs assessment for its members.[20] Results from the 2010 assessment indicated that the highest priority training topics were leading and facilitating partnerships and coalitions, implementing policy and environmental changes, the use of data, evidence, and evaluation criteria in proposing policy changes, and analyzing the potential impact of policies on diverse population groups.[20] ASPHN members surveyed were mostly senior practitioners, nutrition directors, and PHN graduate program faculty, which as Hughes notes, is important when forecasting the needs of the PHN field, because the opinions of advanced practitioners should be considered in the training of future professionals, as these experienced practitioners are likely the most capable of forecasting the training needs of PHN professionals.[4]

As previously mentioned, leadership promotion and specialized continuing education are vital to the field; however, they must maintain a delicate balance. If the focus of practitioner development becomes too narrow and specialized, it can have the potential to distract from the broad, interdisciplinary approach desired for public health promotion.[18] Therefore, a greater emphasis must be placed on objective-based training to improve education of professionals and allow for monitoring of quality assurance.[18] Objective-based training is ideal for public health practice and training future

practitioners, particularly when multiple disciplines are involved so that trainees become accustomed to working with other specialized professionals.[13,18]

Competency-Based Learning Objectives

To be an effective profession, the PHN workforce should be properly trained prior to entering the field with an established understanding of the core public health functions, essential PHN services, best practices, and the evidence-based recommendations related to PHN.[4,21,22] Employers expect graduates to exhibit professional competence in abstract and integrated processes, while simultaneously displaying the mastery of subject knowledge and the flexibility required in dynamic situations.[23] Therefore, competencies have been embraced by educators and personnel managers as the standard for designing curricula for future workforce members and developing current professionals.[23,24] Further, curriculum objectives, the incremental learning experiences that lead to the development of competencies,[25] should be clearly defined and based on a consensus of the literature, current professionals, and academia.[13,21] A competency is a "cluster of related knowledge, skills, and attitudes that affect a major part of one's job (a role or responsibility), that correlated with performance on the job, that can be measured against some accepted standards, and that can be improved via training and development (p. 48)."[26] They are developed to assess the overlap of applied knowledge or skills in practical situations, demonstrating a thorough understanding of learning objectives.[23] Additionally competencies standardize objective-based training across the profession by providing measureable benchmarks, while increasing visibility of the skill sets unique to the field.[7,27]

In addition to ensuring that professionals that deliver nutrition-related health messages provide reliable information, standard competencies aid in creating job descriptions for entry-level positions.[19,28] Competencies are also generally used as a measure of understanding prior to graduation based on the fulfillment of learning objectives and educational experiences.[29] However, Dr. Bill Genat, in his work with developing competencies for Australian public health practitioners, recommended that it might be a better measure of the assimilation into professional expectations to assess the competence of an entry-level professional based on an evaluation six months post-graduation as opposed to upon graduation.[30] Therefore, to maintain competitiveness among current professionals, original learning objectives should be used as the basis for routine evaluation throughout one's career to assess the need for further training.[18]

The concept of practical application is critical for continuous learning and has therefore been incorporated into competency development.[31] Since adult learners are motivated by understanding the rationale and relevance for learning and involvement in problem solving, Hughes proposed a bi-cyclic model.[32] This model expands the boundaries of traditional education to experiential education by incorporating intellectual understanding, action, and evaluation with forward directionality in both the learning process and in practice (See *Appendix B.* Figure 1).[32] The evaluation and intellectual loops in the model are connected in a feedback loop so evaluation is supported by reassessment and learning and intellectual understanding is applied in practice.[32] For this reason, it is appropriate for graduate education and training and remains applicable throughout a career as an assessment tool of continuing education in PHN. Collectively,

this cycle encourages learning, developing and applying new skills, and evaluating intellectual needs using current evidence-based and best practice recommendations.[32]

An alternative framework, the Dreyfus Model, has also been used in the development of competencies in the areas of leadership[33] and public health.[31] This model focuses on the foundational knowledge and transitions to increasingly refined stages of competence for the development of leadership through practical experience.[33] This framework proposes that knowledge and experience compound to cause a gradual transition from what the model refers to as a "novice" learner to an "advanced beginner", a "competent performer", a "proficient performer" and finally, an "expert".[33] Since the transition through the stages of competence results in a deeper understanding of professional progress and continuing education needs, it is also suggested as a self-assessment method throughout one's career.[31] Similarly, Benjamin Bloom's *Taxonomy of Educational Objectives*,[34] originally published in 1956, has also served as the basic structure of many educational objectives by organizing them on a continuum from basic knowledge and understanding to being able to perform an objective and higher levels of reasoning.[34]

Competence, however, is more than an acquisition of knowledge; it is the efficient application of knowledge that proves a level of understanding of the material appropriate for professional use.[23] A demonstration of competence is the foundation for accreditation and licensure of most professions. As a result, the educational system continues to urge competence-based education for graduates.[35] This expectation is also the basis of continuing education requirements in an effort to maintain a workforce that

is competent in current practices, adding knowledge and new perspective to the workplace.[35,36]

Development of Core Competencies

Several core competency initiatives have been developed for Public Health[13,21] and Nutrition.[19,28] Although it has been of interest for many years, the literature is not extensive regarding PHN competencies in the United States.[19] The need is suggested throughout the literature and two associations for public health directors, the National Association of County and City Health Officials and The Association of State and Territorial Health Officials, recommended the development and implementation of core competencies in the training and assessment of all public health professionals.[37,38] As a result, competency development efforts for disaster medicine, health education and the public health core competencies began by establishing a work group with the necessary expertise to produce a working document with suggested competency-based learning objectives.[7,21,38]

Gathering consensus from experts in the profession is commonly used as a preliminary step in the development of curriculum competencies and objectives[24] and has been used in the assembly of curriculum for degrees in public health at the baccalaureate, masters, and doctorate levels.[21,38] The input of future employers is also a valuable consideration when developing competency-based curriculum.[19,24,39] In a survey of the perception of potential PHN employers in Norway, Torheim revealed the importance of including the functions of the current workforce the development of curriculum to meet workforce needs [24] Hughes acknowledges a 5 to10 year gap in the demand for and supply of trained practitioners as a challenge in forecasting future

workforce demands. Therefore, he recommended including employer and practitioner opinions in the development of competencies to support the expectations in workforce training.[4] In later work with Jonsdottir, he points out another benefit of employer and practitioner input as a built-in evaluation component to measure the adequacy of preparation of entry-level professionals to meet the expectations of the job description.[19]

In a correspondence about educating and training the public health workforce, Paccaud also notes the benefit of practitioner input in the training of new public health professionals.[40] He suggests that the academician's involvement in the community as a practitioner may provide a feedback mechanism by maintaining and refining relevant skills that will be taught and also providing a fresh perspective of current research needs and future innovations.[40] These working relationships may also establish an opportunity and expectation of experiential learning that is recommended in leadership development of health professionals.[41] This process stretches beyond traditional learning of leadership competencies by supporting knowledge with mentorship and practice followed by constructive feedback to further develop and refine their competence.[41]

The Delphi technique, or a modified approach, is commonly used for gaining consensus among a sampled population.[42,43] While it originally asks respondents open ended questions, there are variations, which are often determined by the researcher, that have been helpful to confirm concordance.[1,42,44,45] The Delphi technique and its variations are beneficial in several ways, including the abilities to repeatedly aggregate anonymous opinions regardless of proximity of panel members.[45] It is also easily accomplished with greater cost-effectiveness by using web-based data collection tools

available; and therefore, is often used in the initial phases of competency development to determine agreement.[19]

Additionally in the formative stages of the development process, many disciplines cross-walk competencies to both differentiate the roles of each profession and improve compatibility with similar disciplines.[7] This process compares established competencies of a similar field to the drafted competencies to assess compatibility and can be ranked as a complete, partial or no match based on the complexity or skill level.[7] There may be broad, cross-cutting competencies, but there should also be specific competencies or entire subject domains that are unique to the discipline and clearly defined by the new competencies to serve in the development of discipline-specific job training, differentiation and continuing education.[7] The developed competencies should use scientific language based on current job descriptions, as well as projected trends in the workforce to increase validity and allow for international compatibility for collaboration as needed.[7]

The structure and organization of competency sets vary, which can influence the generation of new competencies that may be needed in the field.[7] Some competency sets are organized by subject domains while others are structured by complexity or level of skills required.[7] For example, the Council on Linkages Between Academia and Public Health Practice cross-walked drafted competencies with previous competencies to develop the current Public Health Core Competencies, which continues to serve as an influential document for public health-related fields.[38] The Core Competencies include domains such as Advocacy, Communication, Community-Cultural Orientation, Critical Analysis, Leadership, Management, and Professionalism and Ethics in the graduate

training.[38,46] Then, within these domains, each competency was divided into three tiers to specify increasingly advanced competencies from that of entry-level professionals, for supervisors, and for senior managers, based on the complexity of the skills needed for each level.[38]

To best forecast the future needs of the field it is important to assess the perceived needs of the current workforce.[4] In a study by Jonsdottir, PHN competency tiers were established that would serve as a framework for future workforce development initiatives in European countries.[19] For example, in the JobNut project, a multi-country study by Jonsdottir and Hughes, the perception of relevance of PHN functions were assessed using a three-part Delphi survey.[19] Both academic and upper-level PHN practitioners, potential employers of new graduates, were sampled, revealing a high level of consensus between Delphi rounds and significant differences in only one domain.[19] The results of that study[19] and a more recent assessment[44] revealed a similar expectation of competence within PHN practitioners in the European context regardless of cultural demands that are unique to each of the countries.[19] Many of the PHN functions identified by practitioners as “core” involved the planning, implementation, and evaluation of population-based interventions and basic research and evaluation skills such as assessment and monitoring of community health trends.[19,44]

The proposed European PHN competencies were adapted into a survey for revisions until it was agreed upon by the expert group, recruited from network connections made at conferences, PHN research projects, university and public websites, Nutrition Society members and recommendations from panel members, before the refined competencies were dispersed to a stratified sample.[19,21,44] Panel

members were divided into employers and academics with “consensus” defined as >50%. Cross-tabulations of the data revealed significant differences between the two subgroups of practitioners.[44] Jonsdottir reported that regardless of the differences between academics and practitioners in one domain, the high level of overall agreement (>66.7%) between international PHN professionals in the development of these core competencies, which was also seen in Hughes’ work,[47] indicated a consistent expectation of professional knowledge and practice that is closely related to a sub-sector of public health practice.[44] Once core functions reached consensus, the core functions provided the benchmarks that would also aid in workforce development.[44]

Competency-Based Curriculum Development

In the Institute of Medicine report on the *Future of Public Health*, practitioners were urged to promote evidence-based practices.[48] Since personnel training and professional development are critical areas for attention, it is imperative to begin with the appropriate academic training and expand to continued education among public health professionals as a means to stay abreast in a constantly changing field.[48] The report expressed concern of the possibility of inadequate supply or training of the future workforce.[48] Therefore, training and academic institutions were encouraged to adapt a competency-based model to ensure adequate preparation of professionals.[23] While further education improves the workforce by enhancing research and critical thinking skills,[2] Calhoun, who was influential in the development of public health competencies, suggested that academic institutions may be too research-oriented and graduates may not be prepared for the integration of research into daily professional responsibilities.[25] However, research is essential and has been the driving force behind curriculum

development in recent years. It provides the foundation for training that is focused on preparedness of the future employees based on current research findings.[25]

Current curriculum development strategies strive to include learning objectives that will provide the most significant, evidence-based and best practice material. The outcome should maximize the learner's autonomy with the most efficient use of their time.[49] Objectives should meet practical application goals that make the curriculum feasible. This is often achieved by pairing content with practice experiences similar to professionals in the field of study.[46,49] It may also be beneficial to future professionals for academicians to further develop their own interdisciplinary skills and utilize new learning methods and technologies to promote collaboration and understanding across discipline boundaries.[9,13] However, many academic professionals continue to teach discipline-specific material in the manner in which they were taught and are comfortable teaching, namely a lecture format.[46] Curriculum that encourages team-based learning allows professionals to not only gain knowledge about the roles of disciplines similar to their own, but also develop their understanding of common professional language and leadership in a collaborative environment while also highlighting the benefits of cross-walked educational objectives.[7,9]

Strategies for Success: Curriculum Guide for Graduate Programs in Public Health Nutrition

Competency-based learning methods are necessary to maintain a standard level of professionalism upon entry to the workforce,[2,25] but competence should not end once a career begins. Competencies should match the current demands of professionals and therefore, maintaining or refining the competencies of practicing nutrition professionals

should be continued throughout their careers.[2] Further, competencies should be up-to-date and address current and future trends in a profession, such as PHN.[44] *Strategies for Success: Curriculum Guide for Graduate Programs in Public Health Nutrition* (SFS)[50,51] is the competency-based knowledge and skills guidelines for graduate PHN programs of member institutions in the Association of Graduate Programs in Public Health Nutrition (AGPPHN).

The first edition of SFS was developed in 1989 by members of the Association of the Faculties of Graduate Programs in Public Health Nutrition, the predecessor of AGPPHN.[51] The members of ASTPHND, with funds from the Bureau of Maternal and Child Health and Resource Development, sought to delineate competency statements that most appropriately represented the knowledge and skills needed by PHN professionals.[51] A second edition was published in 2002 by the AGPPHN after a four-year refining process including an expert panel and practitioner survey.[51] In 2010 a AGPPHN work group began revising the competency statements using a modified Delphi approach[51] to update the second edition. An expert panel was then convened and follow up consensus was achieved via an online survey of panel members and a subsequent survey of AGPPHN graduate faculty, resulting in 58 proposed competency statements in five subject domains.

As a final phase of the multi-phase process, this study administered a practitioner survey to determine practitioners' essentiality rankings of the proposed PHN graduate competencies. The objectives of this study were 1) to determine if differences existed in calculated domain scores of practitioner rankings of essentiality for the aforementioned competencies by demographic variables of interest, including current position, years of

experience, education, and/or intent to retire; 2) to determine the number of proposed PHN graduate competencies that did not reach majority consensus among practitioners surveyed (<51% agreement for "entry-level" ranking); 3) to determine if the demographic variables of interest were significant predictors of practitioner rankings of essentiality for the competencies that did not reach majority consensus.

Survey Development

At a 2010 annual meeting of AGPPHN, the leadership determined that a revision of SFS was needed, beginning with obtaining practitioner input at the ASTPHND meeting in June 2011. This input provided the first phase of revisions, which included updating existing competencies with language consistent with the work progression tiers of core competencies by the Public Health Foundation[38]. Additionally, practitioners alerted AGPPHN leadership that there were some gaps in the second edition of SFS, especially related to current PHN strategies and evidence-based practices; this necessitated a more in-depth revision, which was accomplished by an expert panel of PHN practitioners, administrators, and academicians. A modified Delphi technique was used due to the lack of existing literature, and a panel of experts from the field of PHN was formed from directors, practitioners, and those in academic settings.[42]

Using the expert panel recommendations, existing competencies were updated based on language consistent with the work progression tiers of core competencies by the Public Health Foundation[38]. Prior to a one-day face-to-face meeting in October 2011, panel members reviewed the SFS document, relevant literature, core competencies for Master of Public Health programs, and core competencies developed by the Council on Linkages Between Academia and Public Health Practice[38]. At the

meeting, panel members provided input for new competencies and revisions of competencies in the second edition of SFS. Meeting notes and suggestions for revisions were compiled into a revised list of competencies in five subject domains: Food and Nutrition Science, Advocacy, Research and Evaluation, Communication and Cultural Competence, and Management and Leadership. An online survey was developed using the revised competencies, and further input was obtained from the original expert panel members and additional members who were unable to attend the face-to-face meeting. The survey asked the respondents to determine if each competency should be kept, revised, or deleted, and provided a space for suggested revisions.

Based on the survey responses, suggested revisions were made and a second online survey was developed with the revised competencies. During this phase, all faculty members of the AGPPHN (n=59) were asked to respond to the survey and provide input based on their opinion of whether each competency was “essential for entry-level practice”, “essential, but advanced practice” or “not essential for entry-level practice”. About 52% of the members responded (n=30). Competencies were retained as written if >80% of respondents indicated that they thought that the competencies were essential for entry-level practice. Competencies were highlighted for further review if $\leq$80% of respondents indicated that they thought that the competencies were necessary for entry-level practice or had mixed results (i.e., some indicated essential, others indicated essential for advanced practice).

At the 2012 American Public Health Association annual meeting, AGPPHN members met to discuss the survey results, resolve issues regarding competencies,

and develop a final draft of the competencies. This study focuses on the final phase of the SFS revision, which consisted of a PHN practitioner survey, using the proposed competencies. This survey asked PHN professionals to rank each competency as "essential for entry-level practice", "essential, but for advanced practice", or "not essential" for practice. In addition, the survey consisted of eight demographic questions to determine basic work demographic characteristics (education level, agency or organization of employment, position at the agency or organization, years of experience, intent to retire, credentials and professional association memberships) and 58 questions (See *Appendix B*) about the essentiality of each competency.

The results of this survey served to assist in the final version of the SFS curriculum guidelines. At the ASPHN 2013 annual conference, the results were discussed among board members of AGPPHN. Competencies with ≤51% concordance, as defined as majority agreement by the researchers, (n=15) on the practitioner survey were reassessed, which resulted in the elimination of one competency, as it was deemed cross-cutting and was discussed elsewhere in the document. Additionally, the wording of the other competencies was revised for clarity. Further, other aspects of the SFS document were discussed and finalized. The 3rd version of the curriculum guide[51] was distributed to AGPPHN members via a password-protected website. The final document serves as a foundation for curriculum development and will be applicable until the AGPPHN leadership determines that reevaluation is necessary.

CHAPTER TWO: MANUSCRIPT

[This chapter is full manuscript to be submitted to the Journal of the Academy of Nutrition and Dietetics and is limited to 2,500 to 4,000 words with succinct tables and figures.]

Background

Public Health Nutrition

Defining Public Health Nutrition (PHN) has been an ongoing project for many years and by many organizations. Key phrases, such as “support of a healthful environment”, “advocacy and policy development”, and “system evaluations” have been included in multiple definitions.[1-6] In 2012, the Academy of Nutrition and Dietetics Public Health Taskforce defined PHN as “the application of nutrition and public health principles to improve or maintain optimal health of populations and targeted groups through enhancements in programs, systems, policies, and environments (p 5).”[1,7] Since the focus of PHN is distinctly different from traditional clinical nutrition and even community nutrition practice, PHN practitioners should have advanced training and in-depth understanding of the current evidence-based guidelines and best practices in both nutrition and public health.[1] Graduate-level programs provide an enhancement of professional skills such as assessment, implementation and evaluation, and other public health functions. However, without an appropriate amount of exposure to PHN-related principles and practice in undergraduate, graduate, or internship programs, PHN professionals may be ill-prepared to deal with the demands of practice and interdisciplinary approaches necessary to assure community and population wellness.[3]

The field of PHN has attracted more publicity and research in recent decades as the threats of food insecurity, obesity, and nutrition-related health problems that affect an increasingly divers and aging population contribute substantial costs to countries.[8,9] Due to the sustained economic hardship in many American families, enrollment in supplemental nutrition programs remains a priority in an effort to support nutritionally at-

risk populations like pregnant women, children and the elderly.[9] Additional health risks are aggravated by longer lifespan coupled with the duration and rate of chronic diseases simultaneously increasing the need for nutrition-related behavior interventions and medical nutrition therapy tailored to an older, more diverse population.[9,10] Public health nutrition practitioners have dual competencies in nutrition and public health; and therefore, have specialized knowledge and skills to contribute to systems-level changes and a strong public health infrastructure.[1,10,11]

Competency-Based Learning Objectives

A competency is a "cluster of related knowledge, skills, and attitudes that affect a major part of one's job (a role or responsibility), that correlated with performance on the job, can be measured against some accepted standards, and that can be improved via training and development (p. 48)."[12] Thus, competencies assess the overlap of applied knowledge or skills in practical situation, demonstrating a thorough understanding of the learning objective.[13] However, competence is more than an acquisition of knowledge; it is the efficient application of knowledge that proves a level of understanding of the material appropriate for professional use.[13] Since a demonstration of competence is the foundation for accreditation and licensure of most professions, the educational system continues to urge competence-based education for graduates.[14] These learning objectives are also foundational to continuing education requirements by providing measurable benchmarks throughout the professional career.[14-17]

Development of curriculum often springs from the expertise of practitioners and academicians, using focus groups, informant interviews, surveys, or the Delphi technique[18] to gain consensus[18-21]. In addition, competencies are often cross-walked

with those of similar fields to differentiate roles, improve compatibility, and develop the curriculum.[16,22] Further, to ensure relevance to the field, often times, input from practitioners in the field regarding competencies and/or learning objectives is ascertained before they are refined and approved.[19,22-25]

To update graduate-level PHN competencies in *Strategies for Success: Curriculum Guide for Graduate Programs in Public Health Nutrition*[25], the Association of Graduate Programs in Public Health Nutrition (AGPPHN) used a multi-step process, beginning with a workgroup session with PHN practitioners, academicians, and graduate students at the Association of State and Territorial Public Health Nutrition Directors (currently, the Association of State Public Health Nutritionists). Results indicated that the workgroup participants thought that many of the competencies were outdated and should be revised. In fall 2011, an expert panel of PHN practitioners at federal and state public health agencies, national public health-related foundations, and faculty from AGPPHN member institutions was convened to update the competencies. The draft competencies were refined and cross-walked with the Core Competencies for Public Health Practitioners to appropriately address the current needs of the workforce.[22] A modified Delphi technique was then utilized to further refine the competencies and reach consensus among the expert panel. Further input was collected from faculty of AGPPHN member institutions, using a web-based survey. In fall 2012, the draft competencies were finalized in a face-to-face meeting of AGPPHN faculty.

As one of the final steps in this multi-step process to update the competencies, a survey was developed to help inform the AGPPHN about practitioner's perceptions of

the essentiality of the proposed competencies for entry-level public health nutrition professionals. The purpose of this study was to: 1) to determine if differences existed in calculated domain scores of practitioner rankings of essentiality for the aforementioned competencies by demographic variables of interest, including current position, years of experience, education, and/or intent to retire; 2) to determine the number of proposed PHN graduate competencies that did not reach majority consensus among practitioners surveyed (majority consensus was set at ≥51% agreement for "entry-level" ranking); 3) to determine if the demographic variables of interest were significant predictors of practitioner rankings of essentiality for the competencies that did not reach majority consensus.

Methods

Assessment of Competency Essentiality

The final stage of the multi-step process resulted in 58 competencies, which were divided into five domains Food and Nutrition Science, Advocacy, Communication and Cultural Competency, Research, and Management. All of the proposed competencies were included in a survey to determine practitioners' ranking of the essentiality of each competency for entry-level practice by master's level PHN professionals. Using a web-based survey, respondents were asked to read each competency and select if it was "not essential", "essential, but for advanced practice", or "essential for entry-level practice". Respondents could only select one choice for each competency Following the Dillman Protocol,[26] invitations to participate were sent to a random stratified sample of the 402 practitioners with valid email addresses listed on publicly available membership registries including: The Association of State and

Territorial Public Health Nutrition Directors, State Directors and Coordinators for the Special Supplemental Nutrition Program for Women, Infants and Children (WIC), State Fruit and Vegetable Coordinators, and State Breastfeeding Coordinators.

The opening page of the survey was a consent form that stated proceeding to the next page implied consent. This study was approved by the University of Tennessee Institutional Review Board. As an incentive to participate, six $30.00 gift cards to an online retailer were given to one randomly selected respondent for every 25 completed surveys.

An essentiality score for each subject domain of competencies was calculated by summing the essentiality rankings of all competencies within each domain to determine if any competencies should be individually tested. These scores were then tested for normality and used to determine if there were differences by demographic characteristics of interest. Frequencies of demographic characteristics of interest and essentiality rankings of all competences, a MANOVA to detect differences in subject domain scores by demographic characteristics, and multinomial logistic regression of essentiality rankings by selected demographic characteristics for the competencies that did not reach >51% concordance were calculated using IBM SPSS version 21.

Results

Of the 152 practitioners that responded to the survey (38% response rate), 132 had complete data to be included in the analysis. The demographic data are delineated in Table 1. Seventy-five percent (n=99) of respondents were master's level practitioners, with the 89% (n=118) working in a state-level health department. Of the 58

competencies, 15 had ≤51% practitioner concordance for being “essential for entry-level practice” (Table 2).

Table 2. Demographic Data of Public Health Nutrition Practitioner Survey Respondents, 2013

Variable	% (n)
Registered Dietitian	
Yes	92% (121)
No	8% (11)
Years Worked	
1-2	4% (5)
3-7	13% (17)
8-10	9% (12)
11-15	15% (20)
>15	59% (78)
PHN Position	
Federal Government Agency	1.5% (2)
State Health Department	89% (118)
Local Health Department	1% (1)
State Education Agency/ Board	1.5% (2)
University/ College	5% (6)
Non-Profit	2% (3)
Urban/Rural Health Clinic	-
Out Patient	-
Industry	-
Intent to Retire	
<5 years	23% (30)
5-9 years	16% (21)
10-15 years	22% (29)
16-20 years	14% (19)
>20 years	25% (33)
Education Level	
Bachelors	23% (30)
Masters	75% (99)
Doctorate	2% (3)
Classification	
Management Series	44% (58)
Professional Series	56% (74)

Table 3. Percentage of Public Health Nutrition Practitioner Survey Respondents by Essentiality Ranking for Proposed Competencies that Lacked Majority Concordance (≤51% Agreement on Essentiality Ranking)

Competency Statement	Not Essential % (n)	Essential for Entry-level Practice % (n)	Essential for Advanced Practice % (n)
Food and Nutrition Science			
Describes local, state, and federal governmental structures and the political processes involved in the development of public policy, legislation, regulations and delivery of services that influence food systems and subsequently food intake, nutritional status and population health.	12.9 (17)	40.9 (54)	46.2 (61)
Applies appropriate conceptual models, such as the socio-ecological model, to the development of logic models and interventions to promote health.	7.6 (10)	49.2 (65)	43.2 (57)
Describes nutrition-related disaster planning and response and identifies partners within the disaster planning network such as stores, environmental agencies, and emergency response organizations.	31.8 (42)	30.3 (40)	37.9 (50)
Research and Evaluation			
Identifies and uses skills in biostatistics, including principles of data collection and management, statistical analysis and inferences, and computer applications for data compilation and analysis.	20.9 (27)	25.6 (33)	**53.5 (69)**
Uses and interprets the principles of the epidemiological approach (odds ratios, relative risk, application to populations) to measure and describe health, food and nutrition status.	17.8 (23)	25.6 (33)	**56.6 (73)**
Describes and applies qualitative methodologies, including community-based participatory data collection methods, electronic and visual approaches, focus groups, in-depth interviews, and participant observations.	12.4 (16)	39.5 (51)	47.0 (62)
Describes and applies research method, including cohort studies, randomized control trials, surveys, and natural experiments.	17.1 (22)	24.0 (31)	**58.9 (76)**
Management and Leadership			
Applies the principles of community assessment, planning (including program, operational/business, and strategic planning), marketing, implementation, and evaluation to community-based public health, food and nutrition programs, policies, and services.	9.5 (12)	50.0 (63)	40.5 (51)
Describes principles for effective management and evaluation of grants, cooperative agreements, MOUs, and interagency agreements and contracts.	14.3 (18)	28.6 (36)	**57.1 (72)**
Identifies and develops grant proposals and contracts for public health and food/nutrition programs and services.	15.9 (20)	31.7 (40)	**52.4 (66)**

Table 3. Continued

Competency Statement	Not Essential % (n)	Essential for Entry-level Practice % (n)	Essential for Advanced Practice % (n)
Identifies the principles of human resource management by adhering to organization's policies and procedures surrounding workplace violence, discrimination, IT practices, workers' rights, Americans with Disabilities (ADA) Family Medical Leave, and Health Insurance Portability and Accountability Act (HIPAA).	23.0 (29)	49.2 (62)	27.8 (35)
Describes the principles of financial management in the development and operation of food and nutrition programs and services.	19.8 (25)	50.8 (64)	29.4 (37)
Describes organizational policies and procedures and health care reimbursement for nutrition services.	32.5 (40)	44.7 (55)	22.8 (28)
Describes principles of cost analyses, such as cost-effectiveness and cost-benefit, return on investment and other finance decision making strategies to food and nutrition programs and services.	18.7 (23)	34.1 (42)	47.2 (58)
Describes the role of governmental and non-governmental organizations in the promotion and delivery of food- and physical activity-related community health services, including policies pertaining to zoning, transportation, land use, law enforcement, and safety.	22.0 (27)	50.4 (62)	27.6 (34)

The MANOVA revealed no significant differences in subject domain essentiality scores based on the demographic characteristics of interest or as interactions of these characteristics. Results from the multinomial logistic regression for each competency that did not reach majority concordance showed no significant differences in essentiality rankings by selected demographic characteristics.

Discussion

The input of practitioners and potential employers is an integral part of the development of competency-based curriculum.[27] Roger Hughes, an expert in the PHN workforce literature, cites forecasting future needs as a challenge to workforce training and the development of competencies.[5] He suggests that these projected demands be included in training initiatives and competency development to meet the ever-changing population and workforce needs and to account for the 5-10 year lag between the training and employment of entry-level practitioners.[5] A survey of the perceptions of potential public health nutrition employers in Norway demonstrated that it is important to include the major functions of the current workforce in the development of curriculum competencies to meet future workforce needs.[27] This input not only delineates the expectations of potential employers, but also serves as an evaluation component to measure competence of entry-level professionals.[24]

In a correspondence about educating and training the public health workforce, Fred Paccaud notes the benefit of practitioner input in the training of new public health professionals. He suggests that the academician's involvement in the community as a practitioner may provide a feedback mechanism by maintaining and refining relevant skills that will be taught and also providing a fresh perspective of current research

needs and future innovations.[28] These working relationships may also establish an opportunity and expectation of experiential learning, which is recommended in the leadership development of health professionals.[29] This process stretches beyond traditional learning of leadership competencies by supporting knowledge with mentorship and practice, followed by constructive feedback to further develop and refine their competence.[29]

The results of this survey revealed that within the Communication and Cultural Competence and Advocacy domains, all competencies were considered essential for entry-level PHN practice by the majority of practitioners. The population focus of PHN as indicated in multiple definitions[1,2,4] makes communication, cultural competence, and advocacy valuable skills,[27] which may explain the high levels of practitioner agreement in these domains. In addition, a survey of European PHN professionals demonstrated similar findings with high levels of consensus between Delphi rounds indicating agreement in essentiality, especially in competencies describing nutrition science, communication skills and professionalism in a variety of situations and populations.[24] Professionals in PHN have various training backgrounds;[30] however, they must also have an understanding of basic public health principles. PHN combines the scientific knowledge and interpersonal skills of public health and nutrition that are necessary not only to advocate for the health concerns of communities, but also to communicate healthy behavior changes tailored to the needs of diverse populations; therefore, there are many cross-cutting competencies between the two fields.[24] Svandis Jonsdottir and Roger Hughes, PHN workforce experts, even suggest that the skills and knowledge

relevant for PHN more closely resemble those of a specialty of public health rather than those of nutrition.[24]

The Delphi approach[18], or a modified version as used in this study, is a favorable method of gathering the opinions of experts[18,20,21] particularly in PHN.[19,24] Because the competencies were already developed using a traditional Delphi methodology,[31] the modified version did not include open-ended questions, but rather ranked competencies on relevance to the field. The literature is unclear in establishing a cutoff in the level of "consensus"[20,21]; therefore, for this study, the research team in collaboration with the Executive Board members of AGPPHN decided that all competencies with <51% consensus would be presented to the AGPPHN board at the 2013 board meeting for refinement. Table 3 provides a summary of the 15 proposed competencies with <51% agreement of relevancy.

Most of the competencies that did not reach majority agreement (≥51%) were in the largest domain, Management and Leadership. Leadership development initiatives have been noted as a gap in the education and training of public health and public health nutrition professionals[30]; and therefore, have been recommended as a priority in workforce development through continuing education.[32] The majority of practitioners indicated that five of the competencies were advanced-practice, two of which were in the management section. This domain was also rated more "advanced" in a study of European PHN professionals.[24] This may reveal the incremental nature of professional development rather than the expected mastery of these skills in an entry-level position.

The basic ability to apply concepts of public health research, to evaluate interventions, and to disseminate new recommendations is vital to the PHN field and

develops the evidence base and maintains best-practices.[27] However, the results showed that the Research and Evaluation domain had three competencies that a majority of practitioners ranked as “advanced” practice. Practitioners with mastery of these skills often have advanced degrees and focus on conducting research as opposed to general PHN practice.

During the final revision of the competencies, of the 15 competencies that lacked majority practitioner consensus, one was removed as a competency, but incorporated into the overview, because of its cross-cutting attributes and 12 were revised, including the five that were designated by the majority as advanced practice. Two were included as written, because they were either considered to be core functions of public health nutrition or were related to Masters of Public Health core competencies.

The majority (59%) of respondents in this study had 15 or more years of experience with many (75%) holding a Master’s degree. This may be related to the fact that most of these seasoned practitioners work in state-level positions that often require more experience and management skills. However, the invitation process may have contributed to some respondent bias by encouraging the self-selection of practitioners who thought that they had sufficient experience or expertise to contribute.[24] Unlike the surveys of international PHN leaders,[24,33] the lack of significant differences by demographic variables may be related to the homogeneity of profession in the United States,[10] but also may indicate a unified vision for future needs of the field.[24] This consistent view of practitioners also may indicate a strong match of competency statements to the expectations of the field and hiring agencies.[24,27,34] This consensus provides the structure for clear curriculum guidance for graduate training in PHN.[31] It will

also serve as a human resource management construct to be used in the job descriptions and workforce development assessments for PHN professionals.[19] However, further research is needed to determine the international PHN competencies needed to address global PHN concerns, particularly in developing countries.[5]

Although the survey tool could be accessed more than one time, the length of the survey may have inhibited practitioners from completing it. Of the 152 practitioners that accessed the survey, 28 did not complete it. Three of the practitioner comments were related to the survey length. However, the comment section was available at the end of the survey, so comments were not made by practitioners that did not complete the survey. Though the competencies were refined several times and the number of competencies was reduced from the original draft prior to the development of the practitioner survey, the daily demands of PHN practitioners may have limited the number of respondents. While there were frequent reminder emails to encourage completion of the survey, many practitioners had automated out-of-office responses and may not have seen the reminders. Finally, because the sample of PHN professionals was mostly from state-level positions, the results may not be generalizable to all PHN professionals, particularly at local- or national-levels.

Conclusion

The objective of this study was to determine the essentiality rankings of proposed entry-level PHN competencies by administering a survey to current PHN practitioners. The study showed similar opinions of practitioners in the development of competencies for future PHN personnel, which indicates that the proposed competencies met the expectations of current practitioners. With recent legislation[11] and health care shifts,

preventive healthcare services requiring a greater use of interdisciplinary teams are the new expectation.[35] The demand for well-trained nutritionists in public health and community nutrition programs increased over the previous decade and is projected to continue, especially as a substantial portion of current public health nutritionists intend to retire within the next 15 years.[36] With these projected needs in mind, it is more important than ever to educate and train a competent PHN workforce.

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APPENDICES

Appendix A: Expanded Research Methods and Procedures

Methods

Standard Survey Protocol

Modern technology allows the communication and gathering of opinions almost instantaneous. Unfortunately, it also decreases response to web-based surveys while increasing both responder and coverage bias.[52,53] However, personalized contact with participants prior to the survey, survey design, and follow up reminders for non-respondents are several strategies that have been observed to improve response.[53] Since professionals and university employees are among the most likely to have access to the internet, they are theorized to have the highest response rate to web-based surveys of any sample population.[53] The practitioner survey was distributed to the email accounts of PHN professionals included in the publicly available membership lists of professional organizations. A hard-copy of the survey could be requested, but some coverage bias could not be completely eliminated since the announcement was only made via email.

Professional associations serve as a network of professionals with similar career interests. Therefore, invitations to participate were sent to ASTPHND members, state- and local-level WIC Directors, State Breastfeeding Coordinators, and State Fruit and Vegetable Coordinators to gather the perspectives of advanced-practice PHN professionals. These professional organizations or interest groups were selected for the increased likelihood that a large percentage of members hold positions in PHN, have advanced-level experience and education, and are likely involved in the selection process for entry-level candidates in PHN.

As suggested in *Dillman's Mail and Internet Surveys*[54] guide, participants were notified of the upcoming opportunity to participate in the survey (See *Appendix D*). Within three business days, a cover letter was personalized for each list and included an overview of the survey, a randomized identification code, the hyperlink to the survey, and instructions for participating. Up to three follow up reminders were sent three, seven, and 12 business days after the initial invitation email was sent. A brief reminder was emailed to participants who logged onto the website and those who had not completed the survey to encourage them to complete the survey.[52] All information remained coded and emails were sent to each individual participant with the corresponding code. Participants that had an out-of-office response were offered an additional opportunity to participate and received one follow-up reminder. Participants were offered an incentive for completing the survey; a $30 gift card to Amazon.com was given to one randomly selected participant out of every 25 participants.

Participants

Sample Size

Participants were recruited via publicly available membership lists for professional organizations and state-level government positions. We conducted a random stratified sample of 491 professionals included in the following registries: American Public Health Association Food and Nutrition Section, ASTPHND members, state WIC Directors, State Breastfeeding Coordinators, and State Fruit and Vegetable Coordinators. To account for a 50% attrition rate, it was necessary to recruit 408 participants to ensure the 95% confidence level needed from an estimated 199 participants at power= 0.8. Once potential participants were randomly selected, an

announcement was distributed to the participants following standard survey protocol (See *Appendix D*) followed by the invitation to the web-based survey.

Participants were given unique identification numbers that were used for follow-up on non-responders, to prevent participants from being selected from more than one professional organization, and to prevent multiple responses from participants. However, only the investigators had access to the participant information and only the identification codes were used by the research team. If a member of any of the organizations requested a paper copy of the survey, a recruitment letter, consent form, and paper copy of the survey would have been mailed with a pre-paid envelope to the address listed in the membership database. Only one survey was distributed per identification number. If a participant was included on multiple directories, to prevent multiple responses from the same participant, their email address was deleted from the other lists based on primary membership and only one survey code was sent per email address.

Eligibility

Eligibility was determined based on whether or not the respondent self-reported being currently employed in a PHN position. If the respondent indicated that he/she was not employed in a PHN position, he/she was excluded from the analyses.

Consent

Consent was implied by participating in the survey, with a disclaimer of informed consent on the opening page of the survey (See *Appendix D.1*). No survey data were

completed until the research protocol was approved by the Internal Review Board of the University of Tennessee.

Statistical Analysis

The competencies were developed and refined by an expert panel of PHN professionals and academicians. Subsequently, the competencies were distributed to all AGPPHN member institution's faculty to assess the essentiality for entry-level professionals. Discussions regarding discordance were held at the fall 2012 AGPPHN annual meeting. The proposed competencies were distributed via a web-based survey[55] to practitioners to assess their perceptions about the essentiality of the competencies.

Data from the practitioner survey were coded (*See Appendix E.2*) and analyzed using IBM SPSS version 21.0 software. Of the 488 practitioners listed on the publically available directories, 402 had current email addresses. One hundred and fifty-two (38%) practitioners responded to the demographic portion of the survey. Of those, seven were excluded for only having completed the demographic responses and one was excluded because the respondent did not complete rankings for at least one domain. Twelve respondents answered "No" to "Are you currently employed in a public health nutrition professional?" and were therefore, excluded from analysis, leaving a total of 132 practitioners to be included in the data analysis. One respondent did not complete the Food and Nutrition Science Domain, three did not complete the Research and Evaluation Domain, one did not complete the Communication and Cultural Competence Domain, and four were excluded from analysis for not completing the Management Domain. The data were coded as follows: 3 = Essential for Entry-level Practice, 2 = Advanced Practice, and 1 = Not Essential. At the end of each domain, the data were

totaled and those with incomplete or partially completed domains were counted as "missing data" in the incomplete domains.

First, frequencies for each of the competency rankings were conducted to determine the number of competencies that had ≤51% concordance. If ≤51% of respondents answered that any competency was "essential for entry-level practice" or any were considered "essential, but for advanced practice" it was noted and recommended that the AGPPHN discuss and revise the competency, as necessary (*See Appendix E.3*). Essentiality scores were summed for each competency domain and used to test for differences by demographic variables using a MANOVA. Data from competencies with ≤51% concordance were tested to detect if demographic variables of interest were significant predictors of essentiality rankings using multinomial logistic regressions.

Demographic Data

One hundred and twenty-one respondents (92%) were Registered Dietitians with the majority (59%) of respondents having more than 15 years of experience. Eighty-nine percent of practitioners were employed in a state health department, with the highest proportion of practitioners (75%) having received Master's degree. Thirty respondents indicated that their highest college degree was at the bachelor degree level and three respondents indicated that they had doctorate degrees. Twenty-three percent of respondents intended to retire within five years with 22% intending to in 10-15 years, 25% intending to work at least 20 years before retiring and 16% and 14% reported retirement in the five to nine (5-9) years and 16-20 years categories, respectively. For the multinomial logistic regression analysis, categories were collapsed into binary

categories as follows (See *Appendix E.2*): Employment 1= Not State, 2= State; Education 1= Bachelor, 2= Master or higher; Years worked 1= ≤10, 2= >10; Job Classification 1= Management, 2= Professional, and Intent to Retire 1=<10 years, 2=≥10 years.

Results

Of the 58 competencies (*See Appendix C*), none were considered "Not Essential" by the majority (≥51%) of respondents. Subject domain scores were calculated by summing the rankings of each competency in the domain and tested using a MANOVA to determine main effects and two-way interactions by work demographic variables of interest, of which, there were no significant differences ($p<0.05$). The results showed that 15 competencies had ≤51% concordance with five being considered "advanced" by the majority of practitioners (*See Table 3*). To test if the work demographic variables were significant predictors of competency rankings for these 15 competencies, multinomial logistic regression analysis was conducted for each competency, but no significant predictors were found.

Timeline

Month	IRB Approval	Data Collection	Analysis	Writing, Submission and Defense
March	X			
April	X			
May		X		
June		X		
July			X	X
August				X
September				X

Specific Aims

The study hypothesis for this study is the categorization of public health nutrition (PHN) competencies as “essential for advanced practice only”, “essential for entry level practice” or “non-essential for entry level practice” may differ due to: years of experience, education level, current position, professional association and intent to retire. The objective of the study is to determine concordance of the essentiality rankings among PHN practitioners by randomly sampling practitioners from publicly available PHN-related membership registries.

Aim 1: Determine essentiality of 58 entry-level PHN competency statements by administering a survey to a random sample of 408 PHN professionals.

Aim 2: Provide research for consensus among PHN professionals of entry-level PHN competence objectives.

Appendix B: Chapter One Figure

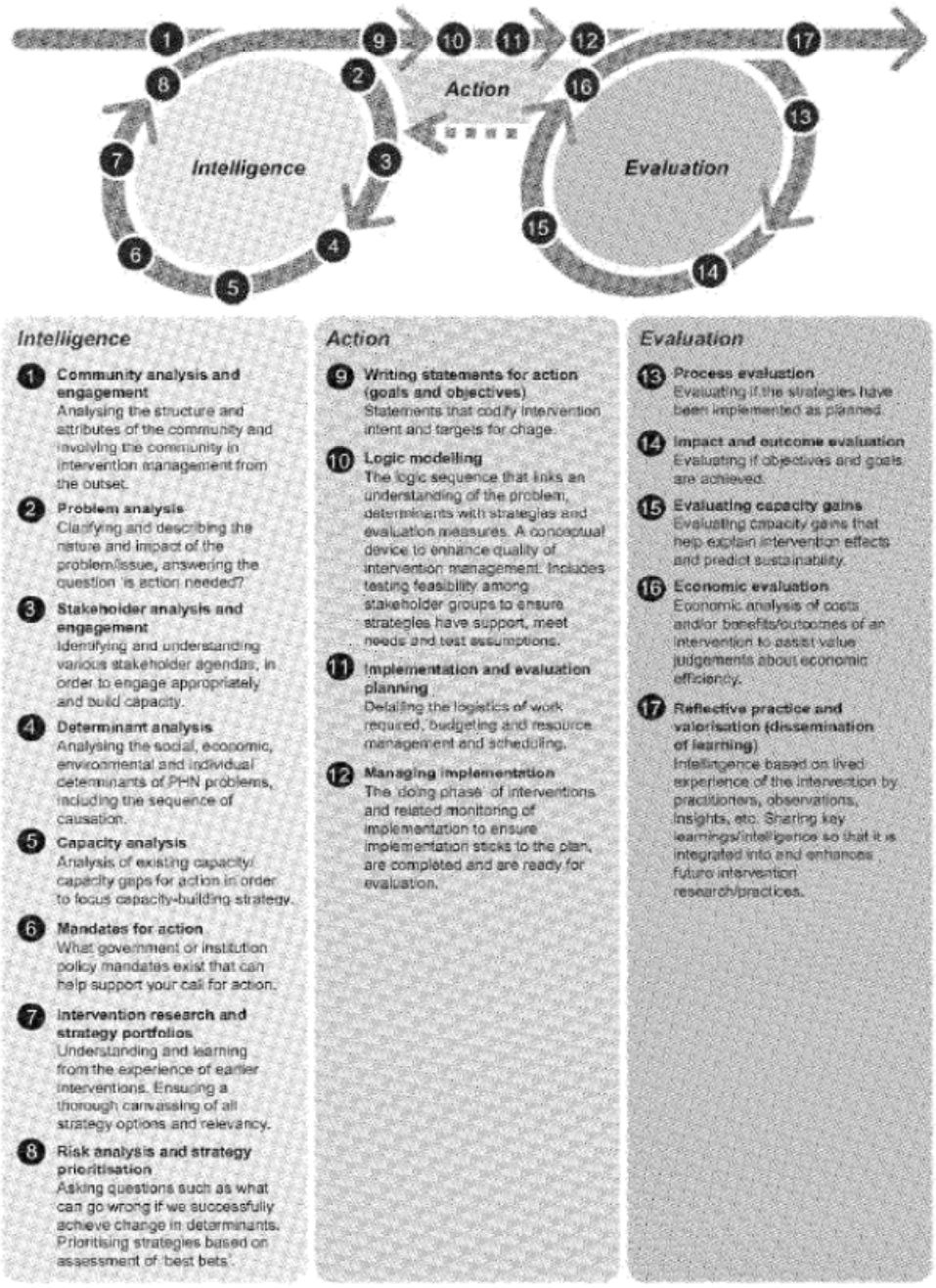

Figure 1. Roger Hughes' Bi-cycle Framework for Training and Practice Improvement in PHN. Extracted from The public health nutrition intervention management bi-cycle: a model for training and practice improvement. Public Health Nutr. 2012; 15(11):1981-1988 [32]

Appendix C: Proposed Competency Statements

Association of Graduate Programs in Public Health Nutrition
Strategies for Success: Curriculum Guidelines
(Didactic and Experiential Learning)
Competency Statements (Draft 07/15/13)[51]

Food and Nutrition Science Competency Statements

Uses principles of food and nutrition science (preparation, food safety, and management) to meet the food and nutrition needs of target individuals, populations, and environmental settings across the life course.

Recognizes the relationship of biological, chemical, and physical factors in food systems to food and nutrition, such as new products, manufacturing processes, food modifications, genetically modified foods, and sustainable agriculture.

Identifies factors that impact the accessibility, adequacy and safety of the food system (production, processing, distribution and consumption) and their relationship to community food systems and the desired outcomes of health promotion and disease prevention.

Identifies and uses current, appropriate methods to assess, analyze, and interpret individual- and community-level nutritional status to determine priority nutritional problems of target populations across the life course.

Describes processes, rationale, and issues related to establishing nutrient requirements, dietary guidance, national health objectives, food and nutrition policy, and food and nutrition program regulations.

Describes local, state, and federal governmental structures and the political processes involved in the development of public policy, legislation, regulations and delivery of services that influence food systems and subsequently food intake, nutritional status, and population health.

Adheres to the use of evidence-based practice guidelines for target populations.

Identifies and relates economic, cultural, and societal trends that have implications for the health and nutritional status of populations to advocate for the promotion of public health nutrition.

Collaborates with and maintains partnerships with colleagues and public health stakeholders, including community, professional, and grassroots organizations in public, private, and voluntary sectors.

Articulates the linkage between physical activity and nutrition in public health programs and identifies key physical activity personnel and community physical activity stakeholders as collaborators.

Describes basic concepts and application of behavioral economics in public health nutrition.

Identifies and applies the concepts of life course perspective, social determinants of health, social justice, social capital, and health equity.

Applies appropriate conceptual models, such as the socio-ecological model, to the development of logic models and interventions to promote health.

Identifies the different components within the food system, including food production, food distribution, sustainable agriculture practices, food marketing, consumption, and waste management.

Identifies food and nutrition safety net programs for individuals and families with limited economic resources.

Identifies nutrition-related disaster planning and response and identifies partners within the disaster planning network such as stores, environmental agencies, and emergency response organizations.

Advocacy Competency Statements

Advocates for and promotes evidence-based public health nutrition programs, services, and policies at individual and systems levels.

Advocates for and promotes physical activity and fitness in public health nutrition programs and policies at individual and systems levels.

Relates governmental nutrition-related policies and implications to advocacy.

Research and Evaluation Competency Statements

Identifies and uses skills in biostatistics, including principles of data collection and management, statistical analysis and interpretation.

Recognizes and identifies statistical findings and conveys them appropriately without misrepresentation.

Uses and interprets the principles of the epidemiological approach (odds ratios, relative risk, application to populations) to describe health, food and nutrition status.

Identifies methods to assess, design, implement, and evaluate nutrition programs and behavioral interventions, systems, and policies.

Uses information technology to collect, gather, store, and retrieve data to critically evaluate current nutrition-related issues and to apply evidence- and best practice-based research findings to food and nutrition programs and policies.

Describes and applies appropriate qualitative methodologies used in public health nutrition research and evaluation.

Describes and applies appropriate quantitative research method used in public health nutrition research and evaluation.

Describes the historical development of public health and public health nutrition and the development of the public health core functions.

Communication and Cultural Competency Statements

Conveys food and nutrition information effectively and uses full range of media, including TV, radio, print, newspapers, internet, social media, and geographic information systems.

Recognizes and responds to the communication preferences of diverse populations so that the food and nutrition communications are appropriate for all audiences, including individuals, families, communities, health professionals, media, policy and decision makers, members of food systems, and businesses.

Participates in the development, dissemination, implementation, and evaluation of culturally appropriate food and nutrition interventions, programs, events, and resources for health promotion/disease prevention.

Identifies mechanisms to assess, tailor, apply and/or evaluate interviewing and counseling techniques for behavior changes at the individual or interpersonal levels.

Accurately and effectively conveys appropriate and relevant demographic, statistical, programmatic and scientific food and nutrition information to professionals, consumers, government officials, policy makers, and the community.

Incorporates strategies for interacting sensitively, effectively, and professionally with persons from diverse cultural, socioeconomic, educational, and professional backgrounds, and with persons of all ages and lifestyle preferences.

Recognizes the role of cultural, social, environmental and behavioral factors in determining disease, disease prevention, health promoting behavior, and food and nutrition program organization and service delivery.

Identifies principles of marketing for use in the food and nutrition components of health promotion/disease prevention programs and services, including social marketing, messaging/counter-messaging, behavioral economics, and electronic social networks.

Communicates with linguistic and cultural proficiency using appropriate, effective, professional, and ethical forms of written, oral, and electronic communication, including social media.

Management and Leadership Competency Statements

Applies the principles of community assessment, planning, marketing, implementation, and evaluation to community-based public health, food and nutrition programs, policies, and services.

Describes principles of management and evaluation for community-based public health nutrition programs.

Identifies community assets, social capital and other community resources to support and/or enhance public health food and nutrition programs.

Describes components of and potential funding opportunities for grant proposals for public health and food/nutrition programs and services.

Identifies mechanisms to develop, implement, and evaluate a food and nutrition program plan with goals and measurable objectives.

Identifies the principles of human resource management by adhering to organizational policies and procedures.

Describes the principles of financial management in the operation of food and nutrition programs and services.

Describes organizational policies and procedures related to reimbursement for nutrition services.

Describes human relation skills needed to lead and build coalitions and collaborations and to participate in agency, professional, and/or community boards, committees, work groups, and task forces.

Applies communication and group dynamic strategies, such as nominal group process techniques, facilitation, brainstorming, discussion, consensus building, negotiation, and conflict resolution.

Describes management principles in the administration of nutrition programs and services.

Adheres to legal and ethical principles in the collection, maintenance, use and dissemination of data and information, and describes how data are used to address scientific, political, ethical, and social public health issues.

Understands concepts of conflicts of interests and situational analyses that may arise from funding sources, public/private partnerships, and lobbying and advocacy.

Describes the role of governmental and non-governmental organizations in the promotion and delivery of nutrition- and physical activity-related community programs and services.

Identifies and participates in the development of short- and long-term priorities and makes adjustments to programs and/or policies.

Identifies and describes the importance of the overall vision, mission, goals, and plan of official and voluntary health agencies and other health partners in the community.

Describes the principles of social determinants of health, health disparities, and health equity related to community-based nutrition programs and services.

Describes strategies to enhance consumer participation in health and food and nutrition programs and services, including collaborating with public/private sectors, participating in outreach and referral systems, and working with voluntary and community organizations.

Describes how to partner with public health professionals, community leaders, and other stakeholders for the delivery of services, such as summer meals, Expanded Food and Nutrition Education Program, Supplemental Nutrition Assistance Program education, etc.

Identifies mechanisms to monitor and evaluate programs and policies for their effectiveness and continuous quality improvement.

Develops realistic, measurable objectives and outcomes when planning and evaluating community-based nutrition program and services.

Appendix D: Informed Consent and Email Protocol

Appendix D.1

Informed Consent

Strategies for Success: Curriculum Guidelines
(Didactic and Experiential Learning)

Strategies for Success: Curriculum Guide (Didactic and Experiential Learning) consists of the competency statements developed by the Association of Graduate Programs in Public Health Nutrition (AGPPHN). This guide serves as a foundation for the development of Public Health Nutrition (PHN) graduate curriculum and as a reference point for the accreditation of graduate programs. These programs are responsible for training future PHN personnel who are well-qualified and capable of evidenced-based practice for health promotion and disease prevention at local, state, regional, and national levels.

As a current PHN professional, you possess a unique understanding of the training needs of the future workforce prior to becoming an entry-level PHN professional. This information is invaluable for the selection of competencies for the development of graduate level curriculum. The AGPPHN invites you to participate in a survey to determine the competencies that will be most crucial for an entry-level PHN professional to provide feedback, read each competency and indicate whether or not it will be essential for entry-level practice for PHN professionals during the next ten years. Alternatively, if you think that a competency is beyond entry-level practice and describes advanced practice knowledge and skills, please select the corresponding button. If you have general comments, please leave them in the space provided at the end of the survey.

This survey takes about 30 minutes and can be saved and accessed at a later time by using the code provided. By continuing to the survey, you imply consent for your selections and comments to be read and used in the process of competency development. There are no risks associated with completing this survey. Any personal information is coded and known only by the survey designers and will not be shared with any other parties. For every participant, one name will be randomly selected to receive a $30 gift card to Amazon.com.

Please complete this survey by XXXXXXXXX upon IRB approval. Thank you in advance for your time.

Appendix D.2

Email Protocol for Strategies for Success: Curriculum Guide update

This protocol will describe the content and management strategy of the specific email communications occurring during this project. The Co-PI (CS) will be responsible for checking and managing these email communications during the designated time survey is live.

A random sample will be generated from the publically available membership directories. If, after random selection, a member-leader name appears on more than one list, the name will be removed from all but one of the lists, so the individual only receives one email invitation.

Each individual name on the sample list will be linked to a randomly-generated access code (using the RAND function in excel). The participants randomly selected will be sent an announcement of the opportunity to participate (D.3). The code will then be sent, along with a link to the survey, to the individual's email address, using the text included in D.3.

Reminder emails (D.5)

Researchers will monitor the survey site on a daily basis. Three business days after the initial invitational email (D.4) is sent, a Follow-up email (D.6) will be sent to those who have never logged in or who have logged in but not yet completed the survey.

The same email will be sent to these potential/current participants two more times: One at Day 7, post-initial invitation, and one at Day 12, post-initial invitation.

After 14 days those who fail to complete the survey after initial log in will be considered lost to follow-up, and those who never access the survey will be considered non-responders.

When the survey closes, the names associated with codes will be deleted from the file.

Emails with comments, concerns or questions will be directed to Courtney Schand (cschand@utk.edu) or Dr. Marsha Spence (mspence@utk.edu).

Appendix D.3

Email Protocol: Initial Email

Subject: Strategies for Success Survey

Hello,

I am writing to inform you of an opportunity to join with the Association of Graduate Programs in Public Health Nutrition in the selection of competencies for graduate curriculum in Public Health Nutrition. As a current public health nutrition professional and member of _____ (organization) you possess an understanding of future workforce needs; specifically, the training entry-level PHN professionals will need to possess at graduation. You will receive another email from Strategies@utk.edu inviting you to participate in a survey to update the *Strategies for Success: Curriculum Guide for Graduate Programs in Public Health Nutrition with Didactic and Experiential Learning*. Please consider contributing your valuable opinion as we assess what necessary knowledge and skills future PHN professionals will need.

Thank you in advance

Appendix D.4

Email Protocol: Invitational Email

Hello,

The Association of Graduate Programs in Public Health Nutrition is currently updating the *Strategies for Success: Curriculum Guide for Graduate Programs in Public Health Nutrition with Didactic and Experiential Learning*. The survey consists of potential competencies to be strengthened, updated, or newly incorporated into graduate curriculum for future Public Health Nutrition (PHN) professionals. As a current PHN professional, you possess a unique understanding of the training needs of the future workforce, specifically the needs of entry-level PHN professionals. Responses to this survey will provide information necessary to revise and update graduate level curricula.

Should you agree to participate in the survey, you will be asked to carefully read each competency and then indicate if you believe it is essential to the curriculum for entry-level professionals. This survey takes about 30-40 minutes to complete, but can also be saved and accessed repeatedly for two weeks after initial log in. Each time you log into the survey, you will need to use the access code provided below as the login and password CODE: (paste assigned code here)

By continuing to the survey, you imply consent for your selections and comments to be used in the process of competency development. There are no risks associated with completing this survey. Any personal information will be coded and the coding scheme will be known only by the survey designers and will not be shared with any other parties. Your email information will be deleted once the survey is closed and you will not receive reminder emails upon completion of the survey. However, for every 25 participants completing the survey by [MM/DD/YEAR], one participant will be randomly selected to receive a $30 Amazon gift card. Therefore, your email address will remain on file until this drawing is complete. After that point, it will be deleted. If you have any questions or concerns please contact Courtney Schand at Strategies@utk.edu

Thank you in advance for your time

Appendix D.5

Email Protocol: Follow up Email (sent on Day 4, Day 10, and Day 17 post-invitational email)

Subject: Strategies for Success Survey

Hello,

This is a reminder to please complete the *Update of Strategies for Success: Curriculum Guide for Graduate Programs in Public Health Nutrition with Didactic and Experiential Learning* survey by [MM/DD/YEAR]. The link to the survey and the randomly-assigned access code are included below.

(Insert link here)

CODE: (paste assigned code here)

If you have any questions or concerns please contact Courtney Schand at Strategies@utk.edu

Thank you in advance for your time

Appendix E: Analysis of Results

Appendix E.1

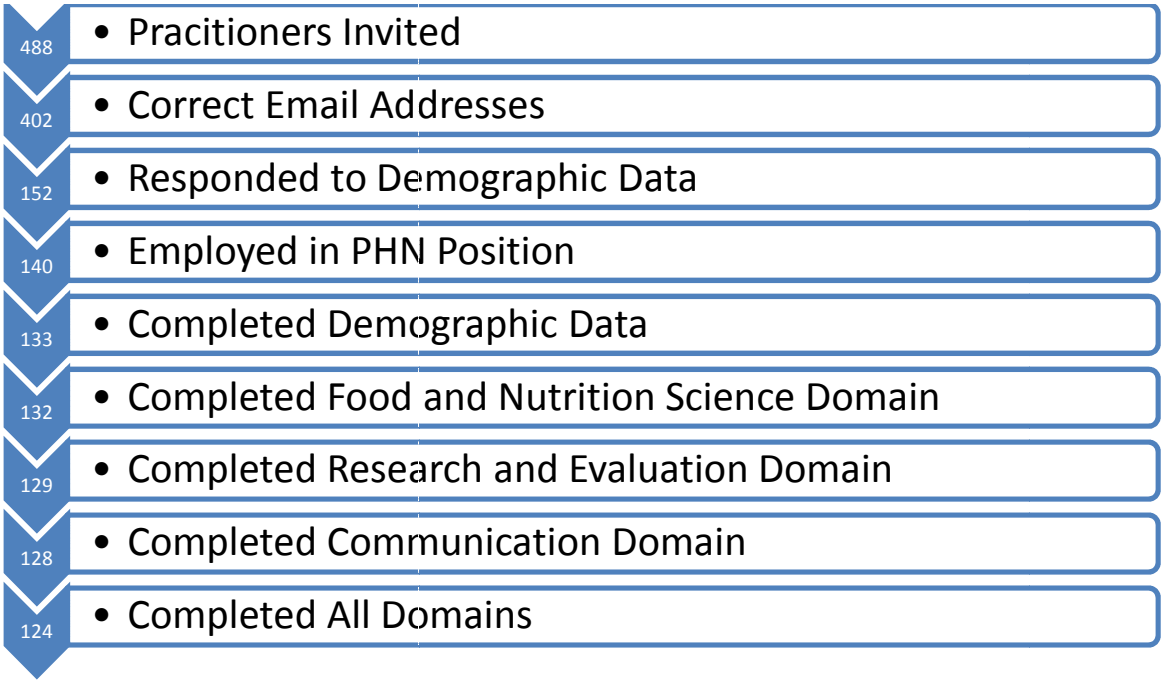

Figure 2. Flowchart of Respondents from Practitioner Survey, 2013

Appendix E.2

Analysis Codebook

Employed

1. No
2. Yes

Employment

1. Federal Government Agency
2. State Health Department
3. Local Health Department
4. State Education Agency or Board
5. University or College
6. Non-Profit Organization
7. Rural/Urban Health Clinic
8. Outpatient
9. Industry/Business
10. Other

Registered Dietitian

1. No
2. Yes

Education

1. Bachelor's Degree
2. Master's Degree
3. Doctorate

Years Worked

1. 1-2 years
2. 3-7 years
3. 8-10 years
4. 11-15 years
5. >15 years

Professional Associations

1. Academy of Nutrition and Dietetics
2. American Public Health Association
3. Association of Graduate Programs in Public Health Nutrition
4. Association of State and Territorial Public Health Nutrition Directors
5. Society of Nutrition Education and Behavior
6. National WIC Association
7. International Lactation Consultant Association

8. State Association
9. Schools/children
10. Breastfeeding/infants
11. Other
12. None

Retirement

1. <5years
2. 5-9 years
3. 10-15 years
4. 16-20 years
5. >20 years

Classification

1. PHN Director
2. Assistant PHN Director
3. PHN Supervisor
4. PHN Consultant
5. PH nutritionist
6. Clinical Nutritionist
7. Nutritionist
8. Nutrition Educator
9. Nutrition Technician
10. Community Nutrition Worker
11. Academic

Multinomial Codes

Employed

1. No
2. Yes

Employment
Recode
1=Not State
2=State

1. Federal Government Agency
2. State Health Department
3. Local Health Department
4. State Education Agency or Board
5. University or College
6. Non-Profit Organization
7. Rural/Urban Health Clinic
8. Outpatient
9. Industry/Business

10. Other

Registered Dietitian

1. No
2. Yes

Education
Recode
1=BS
2=≥MS

1. Bachelor's Degree
2. Master's Degree
3. Doctorate

Years Worked
Recode
1=≤10 yrs
2=>10 yrs

1. 1-2 years
2. 3-7 years
3. 8-10 years
4. 11-15 years
5. >15 years

Professional Associations

1. Academy of Nutrition and Dietetics
2. American Public Health Association
3. Association of Graduate Programs in Public Health Nutrition
4. Association of State and Territorial Public Health Nutrition Directors
5. Society of Nutrition Education and Behavior
6. National WIC Association
7. International Lactation Consultant Association
8. State Association
9. Schools/children
10. Breastfeeding/infants
11. Other
12. None

Retirement
Recode
1= <10 yrs
2=≥10 yrs

1. <5years
2. 5-9 years
3. 10-15 years
4. 16-20 years

5. >20 years

Classification
Recode
1= Management
2= Professional

Appendix E.3

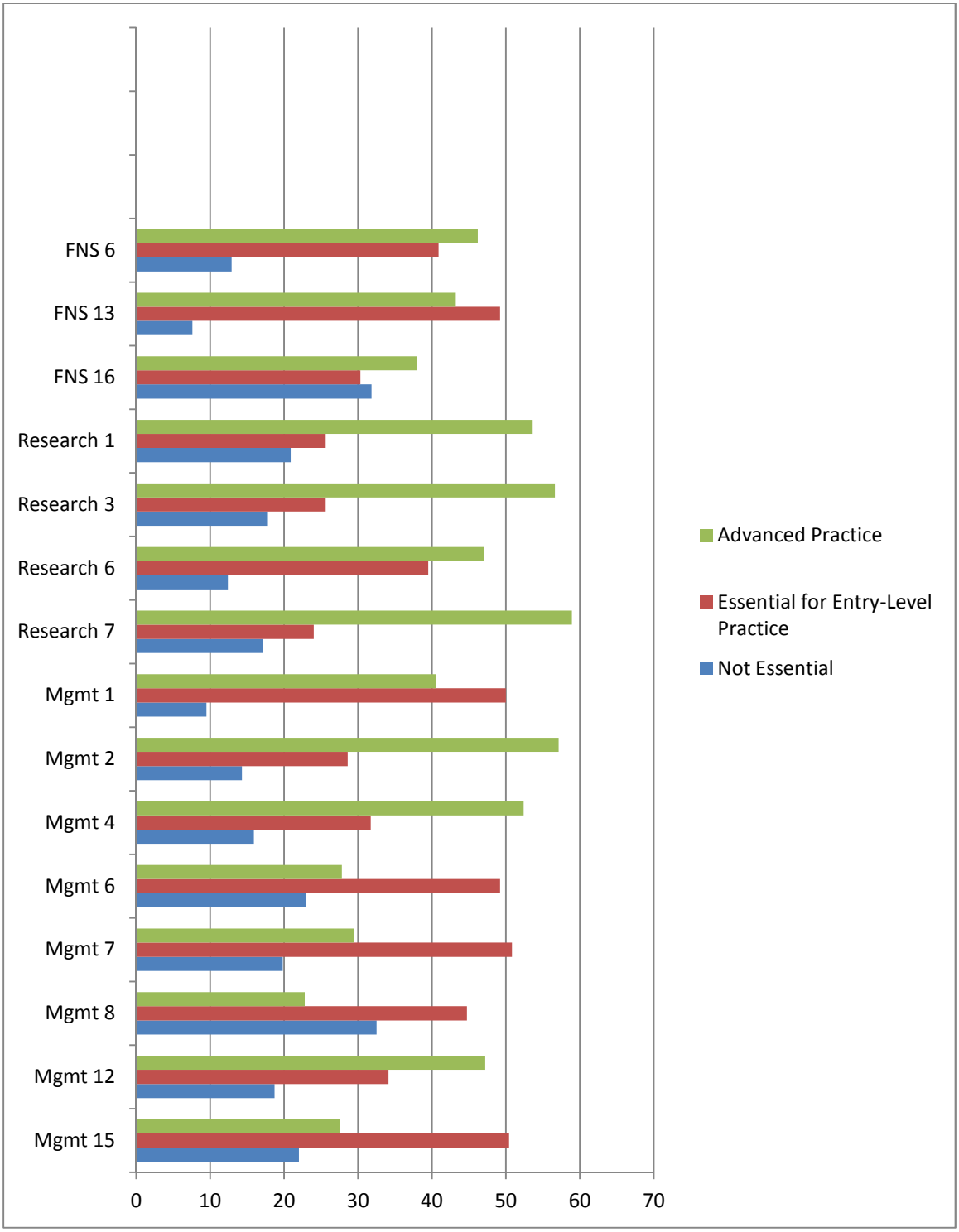

Figure 3. Percentage of Respondents that Selected Not Essential, Essential for Entry-Level Practice and Advanced Practice for the Proposed Competencies with ≤51% Agreement of Essentiality

VITA

Courtney Schand was born and raised in Chattanooga, Tennessee. This is where she first developed her sense of community and her love for nutritious food and a healthy lifestyle. She moved to Cookeville, Tennessee to attend Tennessee Technological University and pursue a Bachelor of Science in Human Ecology with a concentration in Food, Nutrition, and Dietetics, which she completed in May of 2011. It is through this program that she gained a further understanding of and appreciation for the influence of a person's environment on his/her nutrition status and overall health. She decided to pursue further development of her knowledge of community nutrition practices and was accepted in graduate school studying Public Health Nutrition at the University of Tennessee, Knoxville. Throughout her time in graduate school, she had many opportunities to investigate the effects of policy, system and environmental changes at a local level. Once she completes her dietetic internship and graduates with a Master of Science degree in Public Health Nutrition, she plans to focus her career on making healthy choices the easiest choice for all members in the community through policy and environment changes.