Stakeholders’ Perceptions of the Nutrition and Dietetics Needs and the Requisite Professional Competencies in Uganda: A Cross-Sectional Mixed Methods Study

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Abstract

**Background:** Effective implementation of nutrition and dietetics interventions necessitates professionals in these fields to possess the requisite competencies for health systems performance. This study explored the stakeholders’ perceptions of the community nutrition and dietetics needs, the nature of work done by graduates of the Bachelor's degree in Human Nutrition/Human Nutrition and Dietetics (HN/HND), and the competencies required of Nutrition and Dietetics professionals in Uganda.

**Methods:** A cross-sectional mixed methods design was used. Respondents included 132 graduates of the Bachelor's degrees in HN/HND obtained from the Makerere and Kyambogo Universities during the period 2005–2017; 14 academic staff that train HN/HND in the two universities; and 10 HN/HND work/internship supervisors. Data from the graduates was collected through an email-based survey while that from other participants was through face to face interviews using a structured key informant interview guide.

**Results:** Most HN/HND respondents (84.8%) obtained their Bachelor's degrees from Kyambogo University and 61.4% graduated in the years 2013–2017. Most (64.3%) academic staff that responded were females and the majority (57.1%) had doctorate training. All stakeholders viewed communities as facing a variety of nutrition and dietetics challenges some of which fall across different Sustainable Development Goals. The nutrition and dietetics interventions requested, provided, and considered a priority to provide to communities were both nutrition-specific and nutrition-sensitive. Work done by HN/HND graduates encompassed seven main domains; the dominant being organizational leadership and management; management of nutrition-related disease conditions; nutrition and health promotion; research and documentation; and advocacy, communication, and awareness. The knowledge and skills expected of graduates varied but graduates exhibited knowledge and skills gaps in the main areas they are expected to be competent.

**Conclusions:** This study summarises the stakeholders’ perceptions of the nutrition and dietetics challenges faced in Uganda; provided nutrition and dietetic services; nature of work and job roles performed by HN/HND graduates; and the knowledge and skills and related gaps amongst HN/HND graduates practicing in Uganda. We recommend using these findings as a basis for undertaking further stakeholder dialogues towards the development of a competency-based education model suitable for use in strengthening nutrition and dietetics training in Uganda.

**Background**

Malnutrition in its different forms: undernutrition; micronutrient deficiencies; and overweight, obesity, and the associated diet-related non-communicable disease remains a key global health challenge [1, 2] partly due to the multifaceted nature of its causes and the related effects. Despite the widespread recognition that nutrition drives economic growth, social change, and human development [3–6], the United Nations indicated a rise in the number and proportion of undernourished people globally from 777 million (10.6%) in 2015 to 815 million (11.0%) in 2016 [7]. Recent estimates indicate the prevalence of undernourished to have risen to 22.8% in Sub-Saharan Africa [8] and stunting, in particular, has been identified as one of the key barriers preventing African children from attaining their full growth potential [3]. The limited progress in addressing nutrition at the global, continental, and national levels may slow progress towards the attainment of nutrition targets as set in the Sustainable Development Goals (SDGs), the United Nations Decade of Action on Nutrition, and the 2025 Global nutrition targets [6, 8–10]. Nutrition interventions have been differentiated into nutrition-specific and nutrition-sensitive [11] and recommendations made that their implementation is undertaken at multiple levels from the topmost government to local; engage an interplay of multiple stakeholders under the leadership of Governments, with the support of other actors including the civil society, United Nations, academia, donors, and business; and multiple sectors including those from health, education, agriculture, gender, and other sectors [12]. Nevertheless, multisectoral collaborations remain underutilized in middle and low-income countries [13]. In Uganda, addressing malnutrition is high on the national health and social-economic development agenda [14–18].

Nutrition and Dietetics professionals are a key human resource for the delivery of nutrition-related services [19] and should thus possess the requisite competencies, i.e. the nutrition and dietetics knowledge, skills, and abilities necessary to perform in the given national health systems settings. To equip health professionals with the requisite performance competencies necessary for meeting the health systems challenges of the 21st century, countries have been called upon to undertake reforms in their national education systems by adopting competency-based education (CBE) and inter-professional training and development [20]. "A competency-based approach is a disciplined approach to specify the health problems to be addressed, identify the requisite competencies required of graduates for health-system performance, tailor the curriculum to achieve competencies, and assess achievements and shortfalls" [20]. The mastery of professional competencies is important in fostering the impact and sustainability of individual careers [21]. DiMaria-Ghalili et al. [22] found it critical that the nutrition and dietetics health systems performance competencies needed by each type of health professional cadres are identified and evaluated. Palermo, Hughes, and Mccall [23] in particular, support the need to delineate and differentiate the competencies required for the practice of nutrition and dietetics. Presently, emerging consensus on the need to adopt CBE in health professionals training exists, although more in the developed than in developing countries [24]. In Africa, the Continental Education Strategy for Africa 2016–2025 is focussed on fostering competency-based learning [25].

The government of Uganda embraced the multisectoral approach for the delivery of nutrition interventions in 2011 upon the adoption of a National Nutrition Action Plan and has since called upon all concerned ministries to integrate nutrition in their sector policies and plans [14, 15]. Some of the lessons learnt in regards to multisectoral nutrition policy integration in Uganda point to the need for “training nutritionists and seconding them to occupy strategic positions across sectors[26]." It is thus vital that the Nutrition and Dietetics professions trained in Uganda get equipped with the
requisite knowledge and skills for health systems performance-in a multisectoral context. To date, however, limited research has been undertaken to understand the knowledge and skills required of Nutrition and Dietetics professionals to operate in Uganda's multisectoral nutrition implementation context. In our recently published paper, we realised that efforts to develop and adopt CBE in Uganda had mainly been demonstrated in medical training and consequently recommended the need to identify and evaluate the competencies required of Human Nutrition/Human Nutrition and Dietetics (HN/HND) graduates as well as adopt CBE in the training of HN/HND in Uganda [19]. To achieve this, an understanding of the stakeholders’ perceptions is vital [27]. According to Gruppen, Mangrulkar, and Kolars [28], “needs assessments that reflect available health data, input from the community and the public health perspective” can provide valuable information based upon which stakeholder perceptions can be evaluated. Stakeholder evaluations regarding the adequacy of training received in relation to the requirements for practice can be undertaken through surveys that give responsive feedback from graduates, their trainers, and employers [28]. The purpose of this study was to explore the stakeholders’ perceptions of the community nutrition and dietetics needs, the nature of work done by Human Nutrition/Human Nutrition and Dietetics (HN/HND) graduates, and the competencies required of Nutrition and Dietetics professionals in Uganda.

Methods

Study design and setting

This study used a cross-sectional mixed methods design with a rationale to obtain complementary data that would enable the provision of richer information on the study objectives as well as strengthen the study conclusion [29, 30]. The study population comprised graduates of the Bachelor’s degree in HN/HND obtained from the Makerere and Kyambogo Universities of Uganda in the years 2005–2017; academic staff that train HN/HND in the two Universities; and HN/HND work/internship supervisors from selected regional referral hospitals and Non-governmental organizations (NGOs). Qualitative description techniques [31] were in particular applied in sampling and data collection. Using a qualitative descriptive approach allows for the collection of data directly from the persons believed to directly experience the matters under study [32]. Data from HN/HND graduates were collected through a cross-sectional email-based survey while that from the academic staff and HN/HND work/internship supervisors was undertaken through face to face interviews using a structured key informant interview guide. In total, responses were obtained from 132 HN/HND graduates, 14 academic staff, and 10 HN/HND work/internship supervisors. Data collection and analysis were done following an explanatory sequential design [29, 30]; beginning with that from the HN/HND graduates and finally that for the academic staff and work/internship supervisors. The major point of interface for the qualitative and quantitative methods was in data analysis. The whole process for designing the sampling framework, developing the email-based survey tool, and undertaking data collection from the graduates lasted from December 2017 to August 2018. Data collection from academic staff and work/internship supervisors was undertaken from February 2019 to May 2019 after a preliminary analysis of the data obtained from the HN/HND graduates. A results validation workshop was undertaken in October 2019 to obtain general stakeholder insights on the study findings.

Study participants’ selection process

Graduates of the Bachelor's degree in HN/HND: A sampling frame for the graduates was developed from the graduation records of Kyambogo and Makerere University for the years 2005–2017. According to the available records, there were about 607 graduates for the reference period; 493 from Kyambogo University and 114 from Makerere University. The available email and phone contacts for the graduates were obtained from the respective university department records. Starting with these, other contacts were obtained by making phone calls to the known contacts, explaining to them the purpose of the research, the methods that were to be used for data collection, and requesting them to provide the email and phone contacts of their fellow graduates. This process was repeated until no more contacts could be obtained; at which point 450 email and mobile phone contacts of the 607 graduates had been obtained. Given that the participants were widely geographically distributed and given the techniques that were to be used in reaching the participants, a decision was made to consider all the 450 graduates whose contacts had been established as the study sample and to invite all of them to participate in the study. The use of such a strategy is theoretically justifiable and meets the requirements for sampling when a study uses a qualitative descriptive approach in sampling [33] as was in this study.

To collect data from the participants, a Google email-based group account titled “Assessing human nutrition & dietetics competencies in Uganda” comprising of the emails as per the sampling frame was specially created. A cross-sectional email-based survey was then undertaken amongst all the 450 contacts. The email-based survey comprised two variants through which respondents could respond; one was a structured questionnaire sent as an attachment (the questionnaire comprised of both open and closed-ended questions itself having been developed and distributed as a Microsoft word document), the other was a URL link to the web-based version of the questionnaire developed and hosted in Google forms. The options allowed participants to either download the questionnaire sent as an attachment, work offline and send back to the researcher, or to directly fill the questionnaire online and submitting the same by pressing the submit button once the questionnaire had been filled. An automated message acknowledging receipt of the response was received for respondents who filled the questionnaire using the online format, while an email acknowledging receipt of response was written back to however submitted the filled questionnaire as an attachment. The emails were sent from the principal researchers’ email account. The use of email questionnaires was mainly due to the consideration that they are cost-effective in reaching a

1 Respectively refers to Nutrition and Dietetics professionals graduating from the Makerere University and the Kyambogo University of Uganda.
widely distributed population sample and that they are easy to transmit. To improve response rate; several recommended strategies were undertaken including; providing respondents an extended time to respond, sending out repeated reminders, giving assurance that the responses were vital and would be used, giving assurance of anonymity of responses as these would be de-identified, and providing notification for receipt of responses [34].

**Academic staff that train HN/HND:** Names of the full-time academic staff that train undergraduates of the Bachelor's degree in HN/HND in both Makerere and Kyambogo Universities were obtained from the university departments. Since the academic staff different study units, a deliberate decision was undertaken to reach all identified staff and request for their participation in the study. Data collection from the academic staff was done through face to face interviews using the researcher administered questionnaires.

**HN/HND work/internship supervisors:** The majority of the graduates that responded to the study indicated having undertaken part of their internship training from the National and Regional referral hospitals and in several NGOs in different parts of the country. Since the places of internship play a critical role in HN/HND training besides the universities, we purposively selected and reached 10 supervisors of HN/HND interns/employees, seven of these were based in hospitals (one from the national referral hospital, and six from regional referral hospitals), while four worked in the NGO sector (one worked in a humanitarian agency that was employing most of the graduates that responded to the study, one worked in an HIV/AIDS research-based institution, one worked for an agency whose work was mainly in nutrition and livelihoods promotion, while the other was a director for an NGO mainly dealing in nutrition and health promotion).

**Study instruments**

In all cases, the questionnaires that were used comprised of mainly open-ended questions. The questionnaires captured aspects of respondents demographics; training and employment history of the HN/HND Bachelor's degree graduates; and general stakeholder perceptions in regards to the nutrition and dietetic challenges faced by community members; nutrition and dietetic services demanded by communities, those provided, and those considered a priority to provide; the knowledge and skills required of graduates of the Bachelor's degree in HN/HND to competently perform in Uganda's health system; knowledge and skills gaps amongst HN/HND professionals; the knowledge and skills inadequately attained during training; and stakeholder awareness of the nutrition and dietetics minimum training standards in Uganda. All the questionnaires were pretested and revised based on the feedback received before their use.

**Data analysis**

All data received from participants were initially entered into a Microsoft Excel spreadsheet from where initial review and cleaning was done. Data was further explored inductively per question to identify and code emerging themes using the conventional content analysis technique. For the data from HN/HND graduates, further coding was done to create additional sub-themes from the main themes. The created sub-themes were then quantitized and used as new variable categories. Upon quantitizing the data, the data set was exported to the IBM SPSS Statistics version 20 statistical software for analysis. The data was analysed using descriptive tests for the different categorical variables and results mainly reported as frequency distributions. Coded multiple responses by the HN/HND graduates were analysed using the SPSS multiple response analysis techniques.

For the qualitative data from the academic staff and HN/HND work/internship supervisors, upon the initial cleaning in Microsoft Excel, the datasets were exported to the NVivo 12 Plus software where further exploration and line-by-line coding of relevant information was done before further content analysis. The data was coded under the same themes identified from the HN/HND responses.

**Results**

**Demographic, training and occupational characteristics of the HN/HND graduates**

Responses were received from 132 of the 450 participants that were invited to participate in the study; giving a response rate of 29.3%. The demographics, training, and occupation characteristics of HN/HND graduates who responded to the survey are summarised in Table 1. Of the respondents, the majority were females (64.4%) and most (56.8%) were in the age category of 25–29 years.
### Table 1
Demographic, Training and Occupation Characteristics of HN/HND Graduates

| Characteristic                              | N  | Category                  | n (%) |
|---------------------------------------------|----|---------------------------|-------|
| Gender                                      | 132| Male                      | 47 (35.6) |
|                                             |    | Female                    | 85 (64.4) |
| Age categories                              | 132| 20–24                     | 12 (9.1)  |
|                                             |    | 25–29                     | 75 (56.8) |
|                                             |    | 30–34                     | 31 (23.5) |
|                                             |    | 35–39                     | 11 (8.3)  |
|                                             |    | 40 and above              | 3 (2.3)   |
| Institution attended                        | 132| Kyambogo University       | 112 (84.8) |
|                                             |    | Makerere University       | 20 (15.2)  |
| Year of study completion                    | 132| 2005–2008                 | 15 (11.4)  |
|                                             |    | 2009–2012                 | 36 (27.3)  |
|                                             |    | 2013–2017                 | 81 (61.4)  |
| Post-Graduate training                      | 132| None                      | 73 (55.3)  |
|                                             |    | Post-Graduate Diploma/Certificate | 26 (19.7)  |
|                                             |    | Master’s Degree           | 31 (23.5)  |
|                                             |    | Doctorate                 | 2 (1.5)    |
| Category of the place of the first internship| 127| Regional referral hospital | 54 (42.5) |
|                                             |    | District hospital          | 16 (12.6) |
|                                             |    | Donor project              | 1 (0.8)    |
|                                             |    | Other Government hospital  | 4 (3.1)    |
|                                             |    | Non-Government non-profit hospital | 11 (8.7) |
|                                             |    | Research-based institution | 2 (1.6)    |
|                                             |    | National referral hospital | 26 (20.5) |
|                                             |    | Health Center IV*          | 3 (2.4)    |
|                                             |    | Health Center III**        | 3 (2.4)    |
|                                             |    | Non-Government organization| 3 (2.4)    |
|                                             |    | Private for-profit hospital| 4 (3.1)    |
| Region where the first internship was undertaken | 127| Central                   | 70 (55.1) |
|                                             |    | Eastern                   | 18 (14.2) |
|                                             |    | Northern                  | 15 (11.8) |
|                                             |    | Western                   | 24 (18.9) |
| Category of the second place of internship  | 106| Regional referral hospital | 17 (16.0) |
|                                             |    | District hospital          | 11 (10.4) |
|                                             |    | Donor project              | 10 (9.4)  |

HN/HND: Human Nutrition/Human Nutrition and Dietetics; MDAs: Ministries, Departments, and Agencies

* Health Centre IV: A level IV primary care facility in Uganda is one immediately below a district hospital; targets 100,000 people; acts as a referral facility for lower primary care facilities under its jurisdiction; has provisions for in-patient and laboratory services, and an operating theatre. It is usually staffed by qualified clinical officers, nurses, nurse aides, and doctors [35]. ** Health Centre III: In Uganda, a Health Centre III is a mid-level primary care facility; has provisions for basic laboratory services, maternity care, and inpatient care (often for onward referral); and is usually staffed by nurse aides, qualified nurses and clinical officers [35].
| Characteristic                                      | N   | Category                        | n (%) |
|----------------------------------------------------|-----|---------------------------------|-------|
|                                                    |     | Other Government hospital       | 1 (0.9) |
|                                                    |     | Non-Government non-profit hospital | 7 (6.6) |
|                                                    |     | Research-based institution       | 5 (4.7) |
|                                                    |     | National referral hospital       | 5 (4.7) |
|                                                    |     | Health Center IV*                | 6 (5.7) |
|                                                    |     | Non-Government organization      | 32 (30.2) |
|                                                    |     | Private for-profit hospital      | 6 (5.7) |
|                                                    |     | Government Ministry Department/Agency | 6 (5.7) |
| Region where the second internship was undertaken | 105 | Central                         | 63 (60.0) |
|                                                    |     | Eastern                         | 9 (8.6) |
|                                                    |     | Northern                        | 12 (11.4) |
|                                                    |     | Western                         | 21 (20.0) |
| Category of current place of employment           | 115 | NGO                             | 70 (60.9) |
|                                                    |     | District Local Government        | 8 (7.0) |
|                                                    |     | Health Facility                  | 14 (12.2) |
|                                                    |     | Academia                         | 7 (6.1) |
|                                                    |     | Donor Agency/United Nations      | 6 (5.2) |
|                                                    |     | Government MDAs                 | 6 (5.2) |
|                                                    |     | Industry                         | 4 (3.5) |
| Region of current employment                       | 115 | Central                         | 39 (33.9) |
|                                                    |     | Eastern                         | 7 (6.1) |
|                                                    |     | Northern                        | 40 (34.8) |
|                                                    |     | Western                         | 18 (15.7) |
|                                                    |     | Outside Uganda                  | 11 (9.6) |

HN/HND: Human Nutrition/Human Nutrition and Dietetics; MDAs: Ministries, Departments, and Agencies

* Health Centre IV: A level IV primary care facility in Uganda is one immediately below a district hospital; targets 100,000 people; acts as a referral facility for lower primary care facilities under its jurisdiction; has provisions for in-patient and laboratory services, and an operating theatre. It is usually staffed by qualified clinical officers, nurses, nurse aids, and doctors [35]. ** Health Centre III: In Uganda, a Health Centre III is a mid-level primary care facility; has provisions for basic laboratory services, maternity care, and inpatient care (often for onward referral); and is usually staffed by nurse aids, qualified nurses and clinical officers [35].

In regards to training, the majority of respondents (84.8%) obtained their HN/HND Bachelor's degree from Kyambogo University; most (61.4%) were those who completed their studies in the years 2013–2017. Also, close to half of the respondents (44.7%) had undertaken further training at different levels; post-graduate diploma/certificate (19.7%), a master's degree (23.5%), and Ph.D. (1.5%).

In regards to places of internship, regional referral hospitals and the national referral hospital were the main places attended during the first internship at 42.5% and 20.5% respectively. On the contrary, non-government organizations and regional referral hospitals were mainly attended for the second internships at 30.2% and 16% respectively. As per the regions of Uganda where internships were undertaken, most respondents undertook their first internship in the central region (55.1%) followed by the western region (18.9%). The same trend was observed for the second internship with 60% and 20% of respondents respectively.

A total of 115 participants provided information regarding their employment; the majority (60.9%) were employed by non-governmental organizations; followed by healthcare-related facilities (12.2%), district local governments (7%), academia (6.1%), Donors/United Nations agencies and Government Ministries, Departments, and Agencies (MDAs) (5.2% respectively), and industries (3.5%). In regards to the geographical region of Uganda were respondents were employed; the northern and central regions had the most graduates at 34.8% and 33.9% respectively. About 15.7% of
the graduates were employed in the western region while 6.1% were in the eastern region. A small percentage of graduates (9.1%) reportedly worked outside Uganda.

**Demographic characteristics of the academic staff and work/internship supervisors**

A total of 14 academic staff and 11 work/internship supervisors were interviewed in this study as presented in Table 2. The majority (64.3%) were females, 57.1% worked in Kyambogo University, 57.1% held doctorate level of training, and 42.9% had more than ten years of lecturing experience. On the other hand, 63.6% of the work/internship supervisors were males, 63.6% worked in regional referral hospitals, and 54.5% were in the position of a senior nutritionist.

| Participant Category | N | Characteristic | Category | n (%) |
|----------------------|---|----------------|----------|-------|
| Academic staff       | 14| Gender         | Male     | 5 (35.7) |
|                      |   |                | Female   | 9 (64.3) |
|                      |   | University     | Kyambogo | 8 (57.1) |
|                      |   |                | Makerere | 6 (42.9) |
|                      |   | Level of Training | Doctorate | 8 (57.1) |
|                      |   |                | Masters  | 6 (42.9) |
|                      |   | Years of Lecturing Experience | ≤ 5 years | 4 (28.6) |
|                      |   |                |         | 6–10 years | 4 (28.6) |
|                      |   |                |         | ≥ 10 years | 6 (42.9) |
| Work/internship supervisors | 11| Gender | Male | 7 (63.6) |
|                      |   |                | Female | 4 (36.4) |
|                      |   | Category of Employer | Regional referral hospital | 7 (63.6) |
|                      |   |                | Non-government organisation | 4 (36.4) |
|                      |   | Work Position | Director | 1 (9.1) |
|                      |   |                | Program Manager | 2 (18.2) |
|                      |   |                | Senior Nutritionist | 6 (54.5) |
|                      |   |                | Nutritionist | 2 (18.2) |

HN/HND: Human Nutrition/Human Nutrition and Dietetics

**Respondents’ perceptions of the nutrition and dietetics challenges faced by communities**

**Perceptions of the BSc HN/HND graduates on nutrition challenges faced by communities**

A total of 114 respondents provided feedback on their perceptions of the nutrition-related challenges experienced by communities. The perceptions were grouped under 13 broad categories as shown in Table 3.
Table 3
HN/HND Graduates Perceptions on the Nutrition and Dietetics Related Challenges Faced by Communities

| Nutrition and dietetics related challenges faced by the communities                                      | % Respondents (n = 114)* |
|------------------------------------------------------------------------------------------------------|---------------------------|
| Undesirable cultural and religious beliefs and practices                                              | 14.9                      |
| Economic related challenges                                                                           | 6.1                       |
| Food insecurity                                                                                        | 37.7                      |
| Inadequate water, sanitation, and hygiene practices                                                   | 7.0                       |
| Low dietary diversity                                                                                  | 10.5                      |
| Malnutrition in its different forms                                                                     | 60.5                      |
| Misleading information on nutrition                                                                    | 9.6                       |
| Non-communicable/chronic diseases                                                                     | 25.4                      |
| Climatic changes                                                                                      | 4.4                       |
| Inadequate maternal, infant, young child, and adolescent nutrition feeding practices                  | 7.9                       |
| Poor nutrition knowledge                                                                               | 43.0                      |
| Poor post-harvest handling and food quality control practices                                          | 1.8                       |
| Limited access to and utilization of land for production                                               | 5.3                       |

HN/HND: Human Nutrition/Human Nutrition and Dietetics

*Multiple responses

The top five mentioned challenges included malnutrition in its different forms (60.5%); poor nutrition knowledge (43%); food insecurity (37.7%); non-communicable/chronic diseases (25.4%); and undesirable cultural and religious beliefs and practices (14.9%). Other mentioned challenges included low dietary diversity (10.5% respondents); misleading information on nutrition (9.6%); inadequate maternal, infant, young child, and adolescent nutrition feeding practices (7.9%); inadequate water, sanitation, and hygiene practices (7%); economic-related challenges (6.1%); limited access to and utilization of land for production (5.3%); climatic challenges (4.4%); and poor post-harvest handling and food quality control practices (1.8%).

Perceptions of the academic staff and work/internship supervisors on the nutrition and dietetics related challenges faced by communities

The academic staff and work/internship supervisors’ expressed multiple views on the nutrition and dietetics related challenges facing communities. From our observation, the individual views contained a mixture of both nutrition-specific and nutrition-sensitive challenges as expressed in some of the following illustrative quotes:

“90% of all the problems are because of food. Some clients present with obesity, diabetes, asthma, cancer, and constipation. We see people of three categories; those that come for prevention, those who seek curative services, and those seeking treatment for infectious conditions”.

There is a high prevalence of acute and chronic malnutrition in addition to other diseases; inadequate dietary intake; household food insecurity; poor maternal and child health care; drought/occasional floods; sociocultural economic challenges; challenges with the legal framework; and border insecurity/cattle rustling by the Turkana

Disability due to micronutrient deficiencies, severe underweight, high stunting, wasting, anaemia, and non-communicable disease rates ...

Some community members lack knowledge on which foods to eat, how to prepare food, and on the frequency of feeding. Most people only have two meals a day and children are fed the same number of times as adults

Malnutrition because children are underweight; mothers are anaemic; and household food insecurity...

Very few families can afford to eat the recommended minimum dietary diversity...[and] most children are weaned early and left under the care of their grandparents

Limitations in food access and availability...lack of extensive knowledge on cause-effect relation of disease and malnutrition

Inadequate nutritional knowledge...cultural beliefs and food taboos, food insecurity, poor hygiene and sanitation, unhealthy foods on the market, and limited access to information on nutrition & dietetics

Poor access to dietetic and nutrition services...unqualified people falsely working as nutritionists and dietitians

Food insecurity, very low dietary diversity in some communities, [and] poor health-seeking behaviours...
Stakeholders’ perceptions of the nutrition and dietetics services requested and provided to communities

Perceptions of HN/HND graduates on the nutrition and dietetics services requested and provided to communities

The feedback received from HN/HND graduates is as summarised in Table 4 and responses about the nutrition and dietetics services were grouped under seven major domains. In regards to the services requested by communities, 109 responses were received. Services under the domain of nutrition awareness, education, and counselling were the most requested (55% respondents); followed by those in the category of integrated management of acute malnutrition (46.8% respondents); food security (33.9% respondents); management of non-communicable and communicable diseases (26.6% respondents); nutrition screening (22.9% respondents); maternal, infant, young child, and adolescent nutrition (17.4% respondents); and water, sanitation and hygiene (10.1% respondents).

In regards to the nutrition and dietetic services provided by employers, 100 responses were received. The majority of respondents (56%) mentioned nutrition awareness, education, and counselling services as being the main services; followed by integrated management of acute malnutrition (54%); food security and livelihood support (47%); nutrition screening (28%); management of non-communicable and communicable diseases (22.0%); maternal, infant, young child and adolescent nutrition (19%); and water, sanitation and hygiene (14%).

When asked about their views on the would-be priority nutrition and dietetics services to provide, of the 98 respondents, most (64.3%) mentioned nutrition awareness, education, and counselling; followed by food security and livelihood support (41.8%); integrated management of acute malnutrition (31.6%); maternal, infant, young child, and adolescent nutrition (14.3%); management of non-communicable and communicable diseases (12.2%); diet therapy and water, sanitation and hygiene (8.2%).

| Nutrition and Dietetic Services Domains | Requested by communities | Provided by Employers | Considered a Priority to Provide |
|----------------------------------------|--------------------------|----------------------|---------------------------------|
|                                        | %Respondents (n = 109)*   | %Respondents (n = 100)* | %Respondents (n = 98)* |
| Management of Non-communicable/chronic diseases | 26.6 | 22 | 12.2 |
| Food Security and livelihood support | 33.9 | 47 | 41.8 |
| Integrated management of acute malnutrition | 46.8 | 54 | 31.6 |
| Maternal, infant, young child and adolescent nutrition | 17.4 | 19 | 14.3 |
| Nutrition Screening | 22.9 | 28 | 7.1 |
| Nutrition Awareness, Education & Counselling | 55 | 56 | 64.3 |
| Water, sanitation, and hygiene | 10.1 | 14 | 8.2 |

HN/HND: Human Nutrition/Human Nutrition and Dietetics
*Multiple responses

Perceptions of academic staff and work/internship supervisors on the nutrition and dietetics services provided to communities

The responses by academic staff and work/internship supervisors were coded under similar themes as those used for the HN/HND graduates revealed some similarities in the views by the different stakeholders. Under the theme of management of non-communicable and communicable diseases; respondents noted the provision of interventions that largely address the management of nutrition-related problems by ‘fairly’ large hospitals and referral hospitals. Relatedly, services in regards to the treatment of severe acute malnutrition, therapeutic feeding, and supplementation with Ready-to-use-therapeutic feeds for those that meet the required criteria were perceived to be provided under the theme of integrated management of acute malnutrition.
Under the theme of food security and livelihood support; mention was made for the provision of nutrition livelihood programs, food relief, and cash for work interventions. Some of the services perceived to be provided under the theme of maternal, infant, young child, and adolescent nutrition included child health and nutrition services in clinics, antenatal nutrition education, food demonstrations in infant and young child feeding, and health education. Under the theme of nutrition screening, mention was made of nutrition assessment and routine community nutrition screening for children. Some of the services mentioned under the theme of nutrition awareness, education, and counselling included guidance and counselling and community nutrition education. Other mentioned services included water, sanitation, and hygiene; and product development and food processing under the themes of water, sanitation, and hygiene, and business and industry respectively.

| Theme                                           | Illustrative Quotes                                                                                                                                 |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Management of Non-communicable and communicable diseases | “Interventions that largely address management of nutrition-related problems…”  
“Nutrition in illness in fairly larger hospitals and regional referral hospitals…”  
“Diet/meal planning…” |
| Integrated management of acute malnutrition       | “It is mainly the treatment of severe acute malnutrition through hospitals…”  
“Supplementation with ready-to-use-therapeutic feeds for those that meet the required criteria…”  
“Therapeutic feeding…” |
| Food Security and livelihood support              | “Nutrition livelihood programs…”  
“Food relief…”  
“Cash for work intervention…” |
| Maternal, infant, young child and adolescent nutrition | “Child health nutrition services at clinics and hospitals…”  
“Antenatal nutrition education…”  
“Food demonstration in infant and young child feeding…”  
“Health education on infant and young child feeding practices…” |
| Nutrition Screening                               | “Nutrition assessment…”  
“Routine community nutrition screening for children…” |
| Nutrition Awareness, Education & Counselling      | “Guidance and counselling…”  
“Nutrition guidance and counselling…”  
“Mainly nutrition education is provided…”  
“Nutrition education in the community…” |
| Water, sanitation, and hygiene                    | “Water sanitation and hygiene services…” |
| Business and industry                             | “Product development, food processing…” |

Table 5
Illustrative Quotes of the Nutrition and Dietetic Services Provided to Communities Based on the Trainers and Employers Perceptions

**HN/HND: Human Nutrition/Human Nutrition and Dietetics**

**Nature of work and job roles performed by practicing by Nutrition and Dietetics professionals in Uganda**

**Perceptions of Graduates on the nature of work and job roles performed by Nutrition and Dietetics professionals in Uganda**

As per the graduates’ responses, the nature of work done by practicing professionals was categorised under seven major domains (see Table 6). These included organizational leadership and management (68.7%); management of nutrition-related disease conditions at health facility and or community level (59.1%); nutrition and health promotion (57.4%); research and documentation (53%); advocacy, communication and awareness (23%); academia (7.1%); and business/industry (3.6%).
| Work Domain | n   | %Yes* | Identified Work Roles | n   | % Yes* |
|-------------|-----|-------|-----------------------|-----|--------|
| Organizational Leadership and Management | 115 | 68.7  | Leadership            | 80  | 75     |
|             |     |       | Resource mobilization | 80  | 3.8    |
|             |     |       | Project planning, management, and implementation | 80  | 53.8   |
|             |     |       | Budgeting and accountability | 80  | 22.5   |
|             |     |       | Human resources management | 80  | 18.8   |
|             |     |       | Organizational representation and networking | 80  | 16.3   |
|             |     |       | Proposal/report writing | 79  | 6.3    |
|             |     |       | Project monitoring and evaluation | 79  | 30.4   |
|             |     |       | Technical support/guidance | 80  | 3.8    |
| Management of Nutrition Conditions at Health Facility and or Community level | 115 | 59.1  | Community nutrition work | 67  | 16.4   |
|             |     |       | Nutrition screening or assessment | 67  | 76.1   |
|             |     |       | Supplementary feeding | 67  | 52.2   |
|             |     |       | Outpatient therapeutic care | 67  | 58.2   |
|             |     |       | Inpatient therapeutic care | 67  | 58.2   |
|             |     |       | Emergency nutrition | 67  | 6.1    |
|             |     |       | Nutrition education and counselling | 66  | 39.4   |
|             |     |       | Monitoring, supervision and quality improvement | 67  | 19.4   |
|             |     |       | Nutrition supplies management/procurement | 67  | 20.9   |
|             |     |       | Maternal, infant, young child, and adolescent nutrition | 67  | 6.0    |
|             |     |       | Management of other nutrition-related disease conditions | 66  | 7.6    |
| Nutrition and health promotion | 115 | 57.4  | Nutrition and health education | 66  | 62.1   |
|             |     |       | Growth monitoring and promotion | 66  | 3.0    |
|             |     |       | Technical support | 65  | 18.5   |
|             |     |       | Capacity building | 65  | 52.3   |
| Research and documentation | 115 | 53    | Undertaking research | 61  | 45.9   |
|             |     |       | Report writing | 61  | 73.8   |
|             |     |       | Dissemination | 61  | 100    |
Advocacy, Communication, and Awareness 113 23

| Role | Count | Percentage |
|------|-------|------------|
| Proposal writing | 61 | 6.6 |
| Data entry and analysis | 61 | 8.2 |
| Coordinating advocacy events | 26 | 3.8 |
| Community/stakeholder engagements | 26 | 76.9 |
| Resources mobilization | 26 | 3.8 |
| Stakeholder orientation | 26 | 7.7 |
| Networking | 26 | 7.7 |

**Academia**

| Role | Count | Percentage |
|------|-------|------------|
| Research | 8 | 12.5 |
| Lecturing and student supervision | 8 | 87.5 |

**Business/Industry**

| Role | Count | Percentage |
|------|-------|------------|
| Product development | 4 | 25 |
| Product marketing | 4 | 25 |
| Technical Assistance | 4 | 25 |
| Product certification | 4 | 25 |

*Multiple responses; HN/HND: Human Nutrition/Human Nutrition and Dietetics*

**Table 6**

Categories of Work and Related Roles Performed HN/HND Professionals Practicing in Uganda

The roles performed by HN/HND professionals under each of the identified domains however varied. For the undergraduates whose nature of work entailed aspects of organizational leadership and management; the mentioned roles included leadership (75%); project planning, management and implementation (53.8%); project monitoring and evaluation (30.4%); budgeting and accountability (22.5%); human resources management (18.8%); organisational representation and networking (16.3%); proposal/report writing (6.3%); resource mobilisation, and offering of technical support/guidance each at 3.8%.

For respondents with job roles categorized under the domain of management of nutrition conditions at the health facility and community level, nutrition screening or assessment was the main performed role (76.1% of respondents). This was followed by offering inpatient and outpatient therapeutic care each at 58.2%; supplementary feeding (52.2%); nutrition education and counselling (39.4%), nutrition supplies management (20.9%); monitoring, supervision and quality improvement (19.4%); community nutrition work (16.4%); management of other nutrition-related disease conditions (7.6%); emergency nutrition (6.1%); and offering guidance on maternal, infant, young child, and adolescent nutrition (6%).

For the undergraduates engaged in nutrition and health promotion, offering technical support and capacity building was the main role (70.8%); followed by undertaking community awareness activities (62.1%), and growth monitoring and promotion (3%).

For undergraduates engaged in research and documentation, all (100%) reportedly participated in dissemination; followed by 73.8% that undertook report writing, 45.9% that participating in carrying out nutrition surveys, 8.2% that did data entry and analysis, and 6.6% that contributed to proposal writing.

For the undergraduates whose job roles were categorized as falling in the domain of advocacy, communications, and awareness, the majority (76.9%) mentioned carrying out community/stakeholder engagements. This was followed by undertaking stakeholder orientations and networking each at 7.7% and coordinating advocacy events (3.8%).

**Perceptions of academic staff and work/internship supervisors on the work and job roles performed by Nutrition and Dietetics professionals in Uganda**

The views of academic staff and work/internship supervisors were mapped under the same work domains as those created for responses from the HN/HND respondents using the NVivo 12 Plus qualitative software. A word cloud visualization of the top 100 most frequently mentioned words under the domains of management of nutrition conditions; organizational leadership and management; nutrition and health promotion; research and documentation; and academia is as shown in Figure 1. Under the domain of management of nutrition conditions; “nutrition, assessment, counseling, therapeutic, food, meals, dietary, special, planning, feeding, and education” were some of the most frequently mentioned words. The most frequently used words under the domain of organizational leadership and management included “nutrition, monitoring, project, planning, health, support, activities, work, evaluation, plans, and implementation”. Under the domain of nutrition and health promotion, “nutrition, education, outreach, and
support were the most frequently used words. The commonly used words under the domain of research and documentation were “nutrition, research, develop, disseminate, compile, reports, and circulate”. While “nutrition, knowledge, academia, and professional” were the most frequently used under the domain of academia.

Knowledge and skills required of HN/HND Graduates in Uganda

Perceptions of HN/HND respondents on the knowledge and skills they require for health systems performance

Twenty knowledge and skills themes were identified from the multiple responses by the HN/HND respondents. Based on these themes; an evaluation of the respondents’ perceptions in regards to knowledge and skills expected of HN/HND graduates; knowledge and skills gaps amongst individual graduates; knowledge and skills inadequately attained while at university; and the knowledge and skills recommended as a training minimum for HN/HND was done as summarised in Table 7.
| Knowledge & Skills Themes | Expected of HN/HND Graduates | Gaps Amongst Individual Graduates | Inadequately Attained while at University | Recommended as Training Minimum |
|---------------------------|-----------------------------|----------------------------------|------------------------------------------|--------------------------------|
|                           | %Respondents (n=132)*        | %Respondents (n=120)*            | %Respondents (n=100)*                    | %Respondents (n=97)*         |
| Agribusiness              | 8.3                         | 1.7                              | -                                        | 3.1                          |
| Medical/clinical nutrition therapy | 56.8                        | 61.7                             | 61                                       | 44.3                        |
| Nutrition computing       | 24.2                        | 6.7                              | 11                                       | 11.3                        |
| Emergency nutrition       | 1.5                         | 0.8                              | 1                                        | -                           |
| Product development and food safety management | 6.8                         | 5.0                              | 4                                        | -                           |
| Integrated management of acute malnutrition | 75.8                        | 31.7                             | 13.0                                     | 41.2                        |
| Maternal, infant, young child, and adolescent nutrition | 32.6                        | 5.8                              | 1                                        | 9.3                         |
| Leadership and management | 47                          | 11.7                             | 19.0                                     | 19.6                        |
| Nutrition Advocacy        | 34.8                        | 10                               | 10                                       | 13.4                        |
| Nutrition screening and assessment | 47.7                        | 10.8                             | 8                                        | 25.8                        |
| Communication, education, and counselling | 62.1                        | 18.3                             | 13                                       | 27.8                        |
| Professional ethics       | 0.8                         | 3.3                              | -                                        | -                           |
| Project planning, management, monitoring, and evaluation | 37.1                        | 38.3                             | 17                                       | 6.2                         |
| Public health             | 6.8                         | 0.8                              | 1                                        | 3.1                         |
| Quality improvement       | 6.8                         | -                                | 4                                        | -                           |
| Records and data management | 4.5                         | -                                | -                                        | -                           |
| Research, data analysis, proposal, and report writing | 52.3                        | 10.0                             | 23                                       | 19.6                        |
| Water, sanitation, and hygiene | 1.5                         | -                                | -                                        | 2.1                         |
| Internal medicine         | -                           | 0.8                              | -                                        | -                           |
| Human anatomy             | -                           | -                                | 7                                        | -                           |

*Multiple responses; HN/HND: Human Nutrition/Human Nutrition and Dietetics

Table 7
HN/HND Undergraduates Perceptions of the Knowledge and Skills Required for Health Systems Performance
In the domain of anatomy, physiology, pharmacology, pathology, and biochemistry, respondents expressed a need for knowledge and skills in said areas including proposal writing, general research knowledge, and report writing and data collection.

Laboratory-based research; statistical data analysis and interpretation; report writing; and analytical skills. However, knowledge and skills gaps were expected under the domain of research, data analysis, proposal, and report writing related to undertaking field and laboratory-based research; statistical data analysis and interpretation; report writing; and analytical skills. However, knowledge and skills gaps were expected to exist in different areas including proposal writing, general research knowledge, and report writing and data collection.

Concerning the knowledge and skills not adequately attained during undergraduate training, the feedback was received from 100 respondents. The top six themes were medical/clinical nutrition therapy (61%); research, data analysis, proposal and report writing (23%); leadership and management (19%); project planning, management, monitoring and evaluation (17.6%); integrated management of acute malnutrition; and communication, education, and counselling (13% each); and nutrition advocacy (10%).

As relates to the knowledge and skills recommended for minimum training, 97 respondents provided feedback. The top recommended knowledge and skills themes were in the categories of medical/clinical nutrition therapy (44.3%); integrated management of acute malnutrition (41.2%); communication, education, and counselling (27.8%); nutrition screening and assessment (25.8%); leadership and management (19.6%), and nutrition advocacy (13.4%).

Perceptions of academic staff and HN/HND work/internship supervisors on the knowledge and skills required of HN/HND in Uganda

Similar to the responses by HN/HND respondents, the perceptions of academic staff and work/internship supervisors were multifaceted. Illustrative quotes of their responses when coded to the same knowledge and skills domains as was for the HN/HND respondents are summarised in Table 8.

Under agribusiness, the need for knowledge and skills in crop management and backyard farming were mentioned. Under medical/clinical nutrition therapy, it was expressed that Nutrition and Dietetics professionals needed knowledge and skills on how to assess, categorize and apply diet therapy to correct and manage disease abnormalities and dietary recommendations for specific age groups. Relatedly, HN/HND graduates were noted to have knowledge and skills gaps in clinical care and support for clients; management of clients in the absence of medical officers; management of non-communicable diseases; making of proper diagnosis; and dietetic management.

Under the domain of nutrition computing, it was expressed that undergraduates needed to have knowledge and skills necessary for the use of technology, basic computing, and data analysis. Knowledge and skills gaps were noted to exist in the form of inadequate mastery of statistics and limited exposure to the use of modern technology.

Under the broad domain of maternal, infant, young child, and adolescent nutrition, stakeholders expressed a need for knowledge and skills in infant and young child feeding, as well as knowledge and skills in specific areas of maternal, infant, young child, and adolescent nutrition. However, some respondents noted the existence of knowledge and skills gaps in infant and young child feeding.

In the domain of leadership and management, knowledge and skills were noted to be required in team working skills, interpersonal and organizational skills; critical thinking; and the management of human and material resources. Respondents noted the existence of knowledge and skills gaps in leadership and governance, conflict management and negotiation, and mobilization and fundraising.

Some of the knowledge and skills noted as being required in the domain of communication, education, and counselling included nutrition education and counselling, facilitation skills, communication more so as relates to behavioural change, and nutrition education and advocacy. Noted knowledge and skills gaps existed in communication skills and interpersonal skills, confidence talking to the public, education session planning and implementation, inability to effectively communicate with clients, development of IEC materials, and presentation skills.

Under the domain of nutrition screening and assessment, knowledge and skills were said to be expected of undergraduates in nutrition anthropometry, biochemical, clinical, and dietary assessment. The undergraduates were however said to have inadequate skills in nutrition assessment.

In the domain of project planning and management, knowledge and skills were said to be expected of undergraduates in planning, budgeting, policy formulation, and nutrition governance; understanding of multisectorial nutrition programming, and project implementation. Notable knowledge and skills gaps existed in monitoring and evaluation, project planning, budgeting, and writing bidding proposals for organizations.

The expected knowledge and skills under the domain of research, data analysis, proposal, and report writing related to undertaking field and laboratory-based research; statistical data analysis and interpretation; report writing; and analytical skills. However, knowledge and skills gaps were said to exist in different areas including proposal writing, general research knowledge, and report writing and data collection.

In the domain of anatomy, physiology, pharmacology, pathology, and biochemistry, respondent expressed a need for knowledge and skills in anatomy, drug prescription with minimal reliance on medical doctors, understanding of the relationship between foods and the blood system,
pharmacy and pathology, and biochemistry and food microbiology. Some noted knowledge and skills gaps were in the ability to link nutrition and body system functions, and limitations in anatomy and physiology.

In the broad domain of product development and food safety management, knowledge and skills were expected of undergraduates in quality control analysis, food safety in nutrition, and food standards and laws.

Under the domain of professional ethics, respondents indicated the need for undergraduates to exhibit knowledge and skills in ethics and professionalism. However, knowledge and skills gaps were noted in work ethics and client management, and general ethics and professionalism.

An extra domain of laws, policies, and regulations was created based on the trainer's and supervisors’ responses. Under this domain, Nutrition and Dietetics professionals were expected to exhibit an understanding of key policies and guidelines on nutrition at the global and national levels. However, it was echoed that HN/HND professionals exhibited knowledge and skills gaps in nutrition policy and legislation.
| Knowledge and Skills Domain | Illustrative quotes | Knowledge and Skills Gaps |
|---------------------------|---------------------|--------------------------|
| Agribusiness              | “Crop management, backyard farming ...” | |
| Medical/clinical nutrition therapy | “How to apply diet therapy to correct or manage abnormalities ...” | “Clinical care and support for clients ...” |
|                           | “Dietetic management of some disease conditions ...” | “Most lack the ability to manage a client in the absence of a medical officer ...” |
|                           | “Prevention of overweight and obesity ...” | “Nutrition management of non-communicable diseases ...” |
|                           | “Special preparation food skills for various age groups and health conditions ...” | “Inability to make a proper diagnosis of a disease ... and manage it dietetically ...” |
|                           | “Assessment, categorization, and management of patients using therapeutic feeds ...” | |
|                           | “Dietary recommendations for specific age groups ...” | |
| Nutrition computing       | “Use of technology ...” | “Inadequate exposure to the use of modern technology...” |
|                           | “Basic computing ...” | “Statistics was not well mastered ...” |
|                           | “Data analysis ...” | |
| Maternal, infant, young child, and adolescent nutrition | “Integrated management of acute malnutrition; infant and young child feeding; nutrition assessment, counselling, and support ...” | “Infant and young child feeding ...” |
| Leadership & Management   | “Team working skills, good interpersonal, organizational skills” | “Lack of leadership and governance skills ...” |
|                           | “Critical thinking ...” | “Conflict management, negotiation skills, strategies to boost and sustain the performance of the organization ...” |
|                           | “Ability to execute ... duties with minimum or no supervision” | |
| Category                                           | Skills                                                                                           |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Communication, education, and counselling          | *Nutrition education and counselling*                                                              |
|                                                   | Facilitation skills since they are working with people                                           |
|                                                   | Communication skills ... but also need skills that are more specific to behavioural change      |
|                                                   | Nutrition education and advocacy                                                                  |
|                                                   | *Communication skills, interpersonal skills*                                                      |
|                                                   | Confidence talking to the public                                                                 |
|                                                   | Education session planning and implementation                                                     |
|                                                   | Inability to effectively communicate with clients                                               |
|                                                   | Development of IEC materials                                                                    |
|                                                   | Presentation skills                                                                            |
| Nutrition screening and assessment                 | *Nutrition assessment*                                                                          |
|                                                   | Nutrition assessment i.e. anthropometry, biochemical, clinical, and dietary assessment for all people |
| Project planning, management, monitoring, and evaluation | Planning, budgeting, policy formulation and dissemination, nutrition governance                |
|                                                   | Understanding of multi-sectoral nutrition programming                                           |
|                                                   | Project implementation                                                                         |
|                                                   | Monitoring and evaluation                                                                       |
|                                                   | Project planning                                                                               |
|                                                   | Budgeting                                                                                      |
|                                                   | Writing bidding proposals for organizations                                                    |
| Research, Proposal, & Report writing               | Research both field-based and laboratory-based                                                   |
|                                                   | Data analysis and report writing                                                                |
|                                                   | Analytical skills to be able to carry out research and analyse different problems                |
|                                                   | Data collection, statistical analysis, and interpretation                                       |
|                                                   | Proposal writing                                                                               |
|                                                   | General research knowledge                                                                     |
|                                                   | Report writing and data collection                                                              |
| Product development and food safety management     | Quality control analysis                                                                       |
|                                                   | Food safety in nutrition                                                                       |
|                                                   | Food standards and laws                                                                        |
Professional Ethics

- "Ethics and professionalism …"
- "Work ethics, Client management …"
- "Ethics and professionalism …"

Anatomy, Physiology, Pharmacology, Pathology, Biochemistry

- "Anatomy …"
- "Drug prescription with minimal reliance on medical doctors …"
- "Understanding of the relationship between foods and the blood system …"
- "Pharmacy and pathology …"
- "Biochemistry and food microbiology …"

Laws, policies and regulations

- "Knowledge and skills of key policies and guidelines that guide nutrition …"
- "Nutrition policy and legislation …"

HN/HND: Human Nutrition/Human Nutrition and Dietetics

Table 8
Illustrative Quotes on the Knowledge and Skills Required of Nutrition and Dietetics Graduates in Uganda and the Related Knowledge and Skills Gaps Based on the Trainers and Employers Perceptions

Observations from the stakeholder validation workshop

A validation workshop to further review the findings of the HN/HND competency needs assessment was undertaken on the 3rd of October 2019 in Kampala Uganda. The validation workshop was attended by 31 participants (one from the food/business industry, five working with private hospitals, twelve working with universities, two working with district local governments, six working with NGOs, one working with a research-based institution, two working with regional referral hospitals, one working as a private consultant, and one working with the ministry of health). This validation workshop also marked the start of expert Delphi consultations towards the development of a CBE model suitable for use in the training of HN/HND at the undergraduate level in Uganda. The critical observations by participants upon the presentation of the study findings and ensuing participant deliberations were documented and are summarised as follows:

- "The study is critical and timely for it focuses on a critical issue of HN/HND training in Uganda …"
- "Study results will be critical for informing HN/HND curriculum review and design in the country…"
- "The research avoided other undergraduate study programs. It would be important to have levels of competency for different undergraduate programs including certificates, diplomas, and bachelor’s. Focusing on all undergraduate courses is critical given that the Uganda Allied Health Professionals council has proposed nutrition assistant positions”.
- "Competence in clinical nutrition is expected highly of nutrition and dietetics undergraduates; however, the results presented do not clearly show the particular clinical skills that are required”.
- "The results combined knowledge and skills; these need to be unbundled to know what particular knowledge and skills are required by the undergraduates. The theoretical knowledge should be differentiated from the skills because undergraduates have knowledge but lack practical skills in clinical dietetics”.
- "Conditions like human anatomy were lowly ranked yet they fall under medical/clinical nutrition; these need to be merged”.
- "Nutrition in emergency was rated low by undergraduates and yet integrated management of malnutrition was rated highly; these should be merged”.
- "Nutrition in emergencies is not well taught in Uganda to Bachelor’s students of nutrition yet many undergraduates work in emergency contexts and or with humanitarian agencies whose work entails aspects of emergency nutrition…”
- "Patient clerking was missed out in the results yet it is an important competency that has to be mastered by nutritionists and dietitians…”
The undergraduates we have can generate statistics but not use the information yet professionals should be able to interact with the information, generate evidence to guide programming … statistics are basic at the undergraduate level but undergraduates need more than is stipulated for this level. Some levels of training in statistics can be covered at the undergraduate level, but not all. Students don't appreciate the use of statistics to guide programming, this is reflected when they start working”.

"There is a need to improve utilization of HMIS [Health Information Management Systems] data collected from the community by nutritionists”.

"Why was the response rate on professional ethics low? Is it because adherence to ethics is low in professional nutrition and dietetics practice or is it because nutrition and dietetics professionals do not value ethics? The curriculum needs to fully equip trainees with professional ethics because there is still a challenge on which ethics guide nutrition and dietetics practice in Uganda”.

"At what point do the study findings link with the curriculum; is it the issue of competencies not being in the curriculum or is it due to how the teaching is done? How do we link these?”

"At what point does the study link with the current higher education institution curriculum reforms? The new curriculum being used in Kyambogo University has been modified to cater to some of the raised issues and is addressing some of the gaps”.

"Uganda has no National standard stipulating the training and practice requirements for nutrition and dietetics, however, the Allied Health Professionals Council is in the process of developing such a standard. Having such a standard will help in harmonizing HN/HND. We hope this research can be used to inform such process”.

"I am part of the supervisors; is there a difference between Human nutrition and Human nutrition and dietetics? Is it the curriculum design that differentiates between HN and HND? Is it possible to differentiate the skill set for the two?”

"Have you considered looking at the capacity of the different institutions training nutrition undergraduates in Uganda in terms of research, equipment, and human resources...?”

"Many of the challenges presented are in the services sector but not in policy yet challenges exist in the implementation of nutrition-related policies. Nutrition and dietetics related challenges presented have limited focus on policies being implemented yet the government, in terms of systems capacity, under the Ministries of Health and Agriculture focuses on implementing what is stipulated in the policies. I suggest for the need to undertake further reflection on nutrition-related policies in the country and the capacity of concerned ministries to implement nutrition as stipulated in the existing policies and sectoral strategies…”

"Knowledge and skills need to be tailored to the environment in which the undergraduates operate. What challenges are undergraduates facing in the environments they are operating? We should consider the policy and planning environment because these affect professional work”

"Is there a way of getting a community perspective of the services required from nutritionists and dietitians? It would be great to have a community perspective on the demanded and the provided services. The demands here presented may not be representative”

"We need to look at the management of nutrition in a multisectoral approach. Issues like water, sanitation, and hygiene; food security; and livelihood support as reported in the findings are very key as they introduce an element of multi-sectorality. However, caution needs to be undertaken in regards to the nutrition and dietetics training needs under the multisectoral approach. We must be cautious about the knowledge and skills required under the multisectoral setting”.

"We should appreciate that other professions providing services that are supportive of nutrition and dietetics services do exist. We need to know how to link with them to implement multisectoral nutrition and dietetics services”.

"We need to know how other professionals perceive of our profession, and the knowledge and competencies they expect of us. Is it possible to get additional input from other professionals with whom nutritionists work? Coming from a clinical and research setting, I sense others don't know what to expect of nutritionists. Can we collect additional data on this? Getting the perceptions of other professionals that work with nutritionists and dietitians on what they expect of nutritionists and dietitians can enable us to make better curriculum reforms in nutrition and dietetics training”.

"The current transmission of knowledge is insufficient… fresh undergraduates severely lack practical clinical skills…”

"It may be important to consider including family planning, strengthening training in procurement and logistics of nutrition materials and supplies, and adding nutrition leadership and management as these are lacking in the HN/HND Bachelors training curriculum”.

"Consider using the terminology of nutrition-specific, sensitive, and enabling factors in categorizing the key thematic areas of focus in the training of HN/HND”.

Discussion
Demographics, training and occupation characteristics of HN/HND respondents

The response rate by HN/HND graduates was 29.3%; higher than that usually obtained for online/email-based surveys [36]. Amongst the HN/HND respondents; more females than males responded to the survey. This could be attributed to the social behavioural differences in the way males and females engage in online activities; females are reported to engage more in online information exchange than males [37]. Responding to this study involved more of information exchange. Over three-quarters of the HN/HND respondents were graduates of Kyambogo University; this was expected given that Kyambogo University started offering the program for about seven years before Makerere University. Close to half of the HN/HND respondents (44.7%) had obtained additional training at different levels reflecting the value of professional growth and development. In regards to student internships, most of the respondents undertook their first study internships in the regional and national referral hospital(s). The second internships were reported as mainly having been undertaken in non-governmental organizations. The results also showed that HN/HND graduates
were working with different actors and in different sectors both government and non-government across the four regions of Uganda with some undergraduates working outside the country.

Based on these study findings, we observe a need for post-graduate tailored training programs through which HN/HND graduates can obtain higher academic and professional credentials. The observation that regional and referral hospitals and non-government organizations took on high numbers of student interns highlights the emerging relevancy of non-academic institutions to HN/HND training in Uganda. In the short and long run, it may be beneficial for higher academic institutions to have formal partnerships with these institutions to foster closer monitoring and supervision of what students are exposed to during internship training. Forming such partnerships may also necessitate the setting up of standards or criteria based upon which non-academic institutions are selected to host HN/HND student interns. The observation that most internships were undertaken in organizations located mainly in the central region and yet graduates worked across all the different regions of the country calls for initiatives to be undertaken to expose students to the cultural and social welfare conditions prevalent across all regions of the country during training.

The employment of undergraduates by different categories of employers across the different regions of Uganda and with some working outside the country shows a probable increase in employment opportunities for Nutrition and Dietetics professionals in other sectors beyond health and to an extent confirms the multisectoral nature of nutrition that is increasingly creating demand for the same professionals in different sectors within and outside Uganda. The fact that most undergraduates were working in the northern region of the country could be due to the increased presence of NGOs operating in that region due to the increased influx of refugees at the time when data collection for this study was undertaken. The northern region of Uganda has different refugee camps including the Bidi bidi refugee settlement which is currently considered as one of the largest refugee settlements in the world [38]. Given that most organizations have their headquarters in the central region of Uganda; it was not surprising that the central region had the second-highest number of undergraduates employed. From a training perspective, these findings point to the need to ensure that the training received in HN/HND equips undergraduates with the knowledge and skills necessary to work with multiple actors, in a multisectoral setting, within and outside Uganda.

The academic staff and HN/HND work/internship supervisors that participated in the study had varied experiences; academic and non-academic. The targeting of academic and work/internship supervisors was to enable the solicitation of additional views that could then be triangulated with those from the HN/HND respondents so as obtain a broader understanding of the knowledge and skills required of Nutrition and Dietetics professionals in Uganda. Academic staff and immediate supervisors are expected to be able to provide an evaluation of the knowledge and skills exhibited by the HN/HND graduates.

**Stakeholder perceptions on the nutrition and dietetic challenges faced by Ugandan communities**

In general, the trainers’ and supervisors’ perceptions mirrored those of the graduates as all stakeholders viewed communities to be facing a variety of nutrition-specific and nutrition-sensitive challenges. Upon closer scrutiny, a number of the mentioned challenges also fall across the different SDGs, in particular SDG 1,2,3,4,5,6, 12, and 17 reiterating the need to focus on nutrition as an “input to, and an outcome of, the SDGs” [39]. Although the findings are mainly based on the provider perspectives, the study reaffirms that communities across Uganda face multiple nutrition and dietetic challenges as is reported in other literature [14, 40, 41]. The multiplicity of the nutrition and dietetics challenges faced by the different communities of Uganda call for the need to equip Nutrition and Dietetics professionals with a variety of knowledge and skills to address the different challenges. This is substantiated by the fact that all the stakeholders interviewed worked with different agencies and in different regions of Uganda.

**Nutrition and dietetic services requested and provided to communities**

Based on the views of the different stakeholders’, the nutrition interventions requested, provided, and considered a priority to provide to communities included a mixture of both nutrition-specific and nutrition-sensitive interventions. Nutrition interventions in the areas of awareness, education, and counselling; integrated management of acute malnutrition; and food security and livelihoods were perceived to be the main ones demanded by communities, provided by employers, and also considered as a priority to provide. By highlighting the need for both nutrition-specific and nutrition-sensitive interventions, the stakeholders’ perceptions to an extent justify the earlier observation that communities face multiple nutrition and dietetics challenges that call for a multiplicity of interventions to be addressed [42]. Worth noting also is that Uganda embraced the multisectoral model of implementing nutrition interventions through which different actors and sectors were mobilized to address malnutrition at different levels [14, 43, 44]. Given that awareness, education, and counselling are key in influencing behavioural change, findings of this study also substantiate earlier findings by Lubogo and Orach [45] that pointed to community and behavioural nutrition research as one of the most desirable options for addressing undernutrition in Uganda. Using the Lancet series classification of nutrition interventions [11], this study generally highlights the need for Nutrition and Dietetics professionals in Uganda to have competency in the provision of both nutrition-specific and nutrition-sensitive interventions.

**Nature of work and job roles performed by practicing HN/HND graduates in Uganda**

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Knowledge and skills required of HN/HND undergraduates for health systems performance

About 20 knowledge and skills themes were identified based on the stakeholder responses; all were assessed to generally align with what one would require to implement nutrition-specific and nutrition interventions. We observed similarities in the identified themes to what has been proposed for degree-level training in the regional model nutrition curriculum for health workers based in the East, Central, and Southern Africa Health Community [46]. Of the identified knowledge and skills, integrated management of acute malnutrition; communication, education, and counselling; medical/clinical nutrition therapy; research, proposal and report writing; nutrition screening and assessment; and leadership and management comprised the top six knowledge and skills areas mentioned as being expected of graduates. Although highlighted amongst the top six knowledge and skills areas required of HN/HND graduates, medical/clinical nutrition therapy; integrated management of acute malnutrition; communication, education, and counselling; leadership and management; and research, data analysis, proposal and report writing also featured amongst the top six knowledge and skills gaps amongst individual HN/HND respondents. From the findings, it was further observed that HN/HND respondents indicated not having adequately attained knowledge and skills in most of the key areas they are expected to be competent. This finding points to a likely mismatch between the knowledge and skills expected of HN/HND undergraduates to those obtained through training. On the other hand, these findings could also be highlighting the existence of probable inefficiencies in the curricula and inadequacies by higher education institutions to train competent HN/HND in Uganda.

It should be highlighted that the responses were obtained from HN/HND graduates that were trained using earlier versions of the curriculum. Kyambogo University, in particular, adopted a new four-year curriculum in 2016 to replace the three-year curriculum that it had been using. It is possible for the highlighted inefficiencies to have been corrected in the revised curriculum. Hence, the HN/HND responses on the knowledge and skills not adequately obtained during training would likely differ if undergraduates trained using the recent curriculum for Kyambogo were interviewed. However, the fact that responses were obtained from practicing graduates gives a clear indication of the nutrition and dietetics related challenges addressed by the graduates; the knowledge and skills gaps amongst the graduates; and the knowledge and skills required of Nutrition and Dietetics professionals to practice in the varied health systems settings in Uganda. This study provides stakeholders' perceptions of the competencies required of Nutrition and Dietetics professionals to work in Uganda's varied health systems settings. From a broader perspective, the need for competent Nutrition and Dietetics professionals as highlighted in this study aligns with the aspirations by the Government of Uganda to train undergraduates with the necessary skills and abilities to meet Uganda's development needs [15, 16]. Research undertaken in Kenya showed that undertaking curricula review is critical to improving the quality and relevance of health workforce training [47]. Although the possession of knowledge and skills required for health systems performance is key for all health professionals [20], whether undergraduates can possess all the expected/required competencies by the time they graduate is contested. In the United States of America, the development of skills by Nutrition and Dietetics professionals was envisaged to occur in different phases; from one being a novice, progressing to the level of an advanced beginner, to becoming competent, proficient and in the end an expert [19, 48]. Based on this view, it can be assumed that defining who a competent Nutrition and Dietetics graduate depends on what is stipulated in the existing national or institutional training standards/curriculum. However, at the time of undertaking this research, there were no existent national standard curricula for HN/HND in Uganda. Also, as observed in our earlier study [19], the curriculum used to train HN/HND in Uganda were institutional specific and mainly specified learning outcomes instead of the competencies that students are expected to exhibit upon graduation.

Conclusions

This study affirms findings of other studies that nutrition and dietetics challenges in Uganda are multifaceted and require to be addressed by different stakeholders, at different levels, through the implementation of both nutrition-specific and nutrition-sensitive interventions. The findings also reveal that a considerable number of Nutrition and Dietetics professionals had trained and graduated from the Kyambogo and Makerere
Universities of Uganda during the period 2005–2017. Besides the Universities, non-academic institutions including hospitals, government agencies, and non-governmental organisations were instrumental in the training of nutrition and dietetics by offering internship opportunities to the trainees. The HN/HND graduates of Uganda are employed in different sectors by both government and non-government actors, and some were employed outside Uganda. The work done by HN/HND graduates varied but mainly involved aspects of organizational leadership and management; management of nutrition conditions in health facilities and at the community level; nutrition and health promotion; research and documentation; and advocacy, communication, and awareness. The results further show that graduates are expected to possess a variety of knowledge and skills relevant to addressing the multidimensional causes and effects of malnutrition and that they should be able to work with multiple actors in multisectoral settings. Despite this, it was observed that graduates had knowledge and skills gaps even in some of the key areas they are expected to exhibit competency and less than half of the graduates interviewed had undertaken efforts to obtain additional training.

Based on the findings of this study, further research to (1) understand the quality and relevancy of the HN/HND curricula currently used by different Universities to the national job market requirements and (2) the higher education institutional capacity readiness to offer adequate nutrition and dietetics training in Uganda is needed. We also recommend using the study findings as a basis for undertaking further stakeholder dialogues towards the development of a competency-based education model suitable for use in strengthening nutrition and dietetics training in Uganda.

Abbreviations

HN/HND: Human Nutrition/Human Nutrition and Dietetics; SDGs: Sustainable Development Goals; CBE: Competency-based Education; NGOs: Non-governmental organizations; URL: Uniform Resource Locator; HIV/AIDS: Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome; SPSS: Statistical Package for the Social Sciences; Ph.D.: Doctor of Philosophy; MDAs: Ministries, Departments, and Agencies

Declarations

Ethics approval and consent to participate

This study received initial approval from the Kenyatta University Graduate School. Ethical approval was obtained from both the Kenyatta University ethical review board under instrument number KU/ERC/Approval/Vol.1 (129) application number PKU/837/1903 and the International Health Sciences University Uganda (now Clarke International University) Ethical Review Board under instrument number IHSU-REC/0077 for the period April 2018 to April 2019 which was consequently renewed under the same instrument number for May 2019 to May 2020. A research permit was obtained from the Uganda National Council of Science and Technology under reference number HS206ES for May 2018 to May 2019.

All study respondents were provided a detailed consent form explaining the purpose of the study, this form was sent together with the email as an attachment, or printed copies of the consent form were put together with the questionnaire and delivered to the respondents. By responding to the emailed questionnaire, participants were considered to have consented to the study.

Consent for publication

Not applicable

Availability of data and materials

The data sets, questionnaires, and consent forms used for the study can be obtained from the corresponding author on reasonable request

Competing interests

The authors declare that they have no competing interests

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Authors’ contributions
PKK, IO, SO, ANK and PN conceived and designed the study. PKK and TLB undertook data collection under the direct supervision of ANK. All contributed to data analysis and interpretation. PKK drafted the manuscript and all authors contributed to reviewing and giving final approval for the manuscript.

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References

1. FAO, WHO. The Nutrition Challenge and Food System Solutions. 2018. www.who.int/nutrition/publications/globaltargets2025_policybrief_anaemia. Accessed 10 Aug 2019.
2. Sauer AC, Li J, Partridge J, Sulo S. Assessing the impact of nutrition interventions on health and nutrition outcomes of community-dwelling adults: a systematic review. Nutr Diet Suppl. 2018;Volume 10:45–57. doi:10.2147/NDS.S177248.
3. African Development Bank. Multi-Sectoral Nutrition Action Plan 2018-2025. 2018. https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Banking_on_Nutrition_ActionPlan_A4_V1d_single.pdf. Accessed 13 Jun 2019.
4. Baker P, Hawkes C, Wingrove K, Demaio AR, Parkhurst J, Thow AM, et al. What drives political commitment for nutrition? A review and framework synthesis to inform the United Nations action on Nutrition. BMJ Glob Heal. 2018;0:485. doi:10.1136/bmjgh-2017-000485.
5. Fanzo J, Marshall Q, Dobermann D, Wong J, Merchan RI, Jaber MI, et al. Integration of Nutrition Into Extension and Advisory Services: A Synthesis of Experiences, Lessons, and Recommendations. Food Nutr Bull. 2015;36:120–37. doi:10.1177/0379572115586783.
6. United Nations. Transforming our World: The 2030 Agenda for Sustainable Development. 2015. https://sustainabledevelopment.un.org/content/documents/21252030 Agenda for Sustainable Development web.pdf. Accessed 25 Jul 2016.
7. United Nations. The Sustainable Development Goals Report 2018. New York; 2018. https://unstats.un.org/sdgs/files/report/2018/TheSustainableDevelopmentGoalsReport2018-EN.pdf. Accessed 10 Aug 2019.
8. FAO, IFAD, UNICEF, WFP, WHO. The State of Food Security and Nutrition in the World 2019: Safeguarding against economic slowdowns and downturns. Rome, Italy; 2019. www.fao.org/publications.
9. United Nations. United Nations Decade of Action on Nutrition (2016-2025). 2016. http://www.un.org/ga/search/view_doc.asp?symbol=A/70/L.42.
10. World Health Organization. Global Nutrition Targets 2025: Policy Brief Series. Geneva; 2014. http://apps.who.int/iris/bitstream/handle/10665/149018/WHO_NMH_NHD_14.2_eng.pdf;jsessionid=3678535335B670F9AF28034342C0ECB9?sequence=1. Accessed 17 Apr 2018.
11. Ruel MT, Alderman H, Maternal and Child Nutrition Study Group. Nutrition-sensitive interventions and programmes: how can they help to accelerate progress in improving maternal and child nutrition? Ser 536 www.thelancet.com. 2013;382. doi:10.1016/S0140-6736(13)60843-0.
12. Scaling Up Nutrition (SUN) Movement. The importance of good nutrition. 2015. https://scalingupnutrition.org/nutrition/the-importance-of-good-nutrition/. Accessed 12 Aug 2019.
13. Rasanathan K, Bennett S, Atkins V, Beschel R, Carrasquilla G, Charles J, et al. Governing multisectoral action for health in low- and middle-income countries. PLoS Med. 2017;14:e1002285. doi:10.1371/journal.pmed.1002285.
14. Government of Uganda. Uganda Nutrition Action Plan 2011-2016. 2011. https://www.unicef.org/uganda/Nutrition_Plan_2011.pdf. Accessed 18 May 2017.
15. Government of Uganda. Second National Development Plan (NDP II) 2015/16-2019/20. Uganda, Kampala; 2015.
16. National Planning Authority. Uganda vision 2040. Uganda, Kampala; 2010. http://npa.ug/wp-content/themes/npatherme/documents/vision2040.pdf.
17. Ministry of Health. Health Sector Development Plan 2015/16-2019/20. 2015. http://health.go.ug/sites/default/files/Health Sector Development Plan 2015-16_2019-20.pdf. Accessed 17 Jun 2016.
18. Ruel MT, Alderman H. Nutrition-sensitive interventions and programmes: how can they help to accelerate progress in improving maternal and child nutrition? Lancet. 2013;382:536–51. doi:10.1016/S0140-6736(13)60843-0.
19. Kikomeko, Kato P, Ochola S, Ogada I, Kaaya, N. A, Nakitto P. Strengthening Undergraduate Human Nutrition and Dietetics Training in Uganda: The Need to Adopt Competency-Based Education. J Educ Pract. 2019. doi:10.7176/JEP/10-21-08.

20. Frenk, Julio, Chen L, Zulfiquar, A B, Cohen J, Nigel, et al. Health Professionals for a New Century: Transforming Education to Strengthen Health Systems in an Interdependent World. Lancet. 2010. doi:10.1016/S0140-6736(10)61854-5.

21. Suhairom N, Musta‘amal, Hatib A, Amin, Mohd, Fadila N, Kamin Y, Wahid, Abdul, Husna N. Quality culinary workforce competencies for sustainable career development among culinary professionals. Int J Hosp Manag. 2019;81:205–20. doi:10.1016/J.IJHM.2019.04.010.

22. DiMaria-Ghalili, A. R, Mirtallo, M. J, Tobin, W. B, Hark L, Horn, V. L, Palmer, A. C. Challenges and opportunities for nutrition education and training in the health care professions: intraprofessional and interprofessional call to action 1-4. Am J Clin Nutr. 2014. doi:10.3945/ajcn.113.073536.

23. Palermo C, Hughes R, Mccall L. An evaluation of a public health nutrition workforce development intervention for the nutrition and dietetics workforce. Hum Nutr Diet. 2010;23:244–53. doi:10.1111/j.1365-277X.2010.01069.x.

24. Kris-Etherton PM, Akabas SR, Douglas P, Kohlmeier M, Laur C, Lenders CM, et al. Nutrition Competencies in Health Professionals’ Education and Training: A New Paradigm 1-3. Adv Nutr. 2015;6:83–7. doi:10.3945/an.114.006734.

25. African Union. Continental Education Strategy for Africa 2016-2025. 2016. https://www.au.int/web/sites/default/files/documents/29958-doc-cesa_-_english-v9.pdf. Accessed 21 Mar 2017.

26. Namugumya BS, Candel JYL, Talsma EF, Termeer CJAM. A mechanisms-based explanation of nutrition policy (dis)integration processes in Uganda. Food Policy. 2020;101878. doi:10.1016/j.foodpol.2020.101878.

27. Kiguli S, Mubukse R, Baingana R, Kijjambu S, Maling S, Waako P et al. A Consortium Approach to Competency-based Undergraduate Medical Education in Uganda: Process, Opportunities and Challenges. Educ Heal. 2014;27:163–9.

28. Gruppen LD, Mangruulkar RS, Kolars JC. The promise of competency-based education in the health professions for improving global health. Hum Resour Health. 2012;10:43. doi:10.1186/1478-4491-10-43.

29. Zheng M. Conceptualization of Cross-Sectional Mixed Methods Studies in Health Science: A methodological Review. 2015. www.eajournals.org. Accessed 11 Dec 2018.

30. Schoonenboom J, Johnson – R Burke. How to Construct a Mixed Methods Research Design. Springer. 2017;69:107–31.

31. Neergaard MA, Olesen F, Andersen RS, Sondergaard J. Qualitative description—the poor cousin of health research? BMC Medical Research Methodology. 2009;9.

32. Brandshaw C, Atkinson S, Doody O. Employing a Qualitative Description Approach in Health Care Research. Glob Qual Nurs Res. 2017;4:1–8. doi:10.1177/2333393617742282.

33. Colorafi KJ, Evans B. Qualitative Descriptive Methods in Health Science Research. Heal Environ Res Des J. 2016;9:16–25. doi:10.1177/1937586716514171.

34. Nulty DD. The adequacy of response rates to online and paper surveys: What can be done? Assessment and Evaluation in Higher Education. 2008;33:301–14.

35. Republic of Uganda. Uganda Hospital and Health Center IV Census Survey. Kampala, Uganda; 2014.

36. Cunningham N, Pham T, Kennedy B, Gillard A, Ibrahim J. A cross-sectional survey using electronic distribution of a questionnaire to subscribers of educational material written by clinicians, for clinicians, to evaluate whether practice change resulted from reading the Clinical Communicué. BMJ Open. 2017;7.

37. Smith G, Smith WG. Does gender influence online survey participation?: A record-linkage analysis of university faculty online survey response behavior. 2008. https://scholarworks.sjsu.edu/elementary_ed_pub. Accessed 1 Nov 2019.

38. FAO. How SAFE access to energy can make a difference in refugees' lives | FAO | Food and Agriculture Organization of the United Nations; 2019. http://www.fao.org/resilience/news-events/detail/en/c/1073106/. Accessed 7 Nov 2019.

39. United Nations Standing Committee on Nutrition. Nutrition and the Post-2015 Sustainable Development Goals. 2014. http://www.unscn.org/les/Publications/Nutrition__The_New_Post_2015_Sustainable_development_Goals.pdf. Accessed 16 Apr 2018.

40. Uganda Bureau of Statistics, ICF. Uganda Demographic and Health Survey 2016. Kampala Uganda and Rockville, Maryland, USA; 2018. www.DHSprogram.com. Accessed 8 Sep 2018.

41. Pomeroy-Stevens, Amanda, Agostino AD’. Snapshots of Nutrition in Uganda: 2014 Copendium. 2014. www.spring-nutrition.org. Accessed 9 Aug 2019.

42. Reinhardt K, Fanzo J. Addressing Chronic Malnutrition through Multi-Sectoral, Sustainable Approaches: A Review of the Causes and Consequences. Front Nutr. 2014;1. doi:10.3389/fnut.2014.00013.

43. Pomeroy-Stevens A, Agostino AD’, Adeo N, Merchant HF, Muzzoora A, Mupere E, et al. Prioritizing and Funding the Uganda Nutrition Action Plan. Food Nutr Bull. 2016;37:124–41.

44. Republic of Uganda-Office of the Prime Minister. Nutrition Advocacy and Communication Strategy for the Uganda Nutrition Action Plan 2015-2019. 2015; October.

45. Lubogo D, Orach CG. Stakeholder perceptions of research options to improve nutritional status in Uganda. BMC Nutr. 2016;2.
46. East, Central and SAHC. Regional Model Nutrition Curriculum for Frontline Health Workers. 2017. http://ecsahc.org/wp-content/uploads/2017/07/Regional-Model-Curriculum-VersionF.pdf. Accessed 21 Nov 2018.

47. Mumbo HM, Kinaro JW. Assessment of quality and relevance of curricula development in health training institutions: A case study of Kenya. Hum Resour Health. 2015;13.

48. Bruening M, Udarbe AZ, Yakes Jimenez E, Stell Crowley P, Fredericks DC, Ann Edwards Hall L. Academy of Nutrition and Dietetics: Standards of Practice and Standards of Professional Performance for Registered Dietitian Nutritionists (Competent, Proficient, and Expert) in Public Health and Community Nutrition. J Acad Nutr Diet. 2015;115:1699-1709.e39. doi:10.1016/j.jand.2015.06.374.

**Figures**

![Word clouds](image)

**Figure 1**

The 100 most frequently mentioned words based on the perceptions of academic staff and work/internship supervisors on the work done by Nutrition and Dietetics professionals in Uganda.