

# Determinants of Nutrition Care Practice by Midwives and Nurses in the Antenatal and Postnatal Care Settings: A Multi-Site Cross-sectional Survey From Ghana

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## Research Article

**Keywords:** Nutrition education, adequacy, competency, self-efficacy, midwives, nurses, antenatal care and postnatal care

**Posted Date:** April 12th, 2021

**DOI:** <https://doi.org/10.21203/rs.3.rs-376448/v1>

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# Abstract

**Background:** Midwives and nurses are in an opportune position to provide nutrition care to pregnant women and lactating mothers during routine antenatal and postnatal care. However, midwives and nurses may not have adequate competencies and confidence to provide effective nutrition care. We evaluated the adequacy of nutrition education received in nursing and midwifery school; nutrition care competencies; self – efficacy and the nutrition care practice of midwives and nurses during routine antenatal and postnatal care in Ghana. We also evaluated determinants of nutrition care practice among these participants.

**Methods:** This was a multi-site cross- sectional study conducted among midwives and nurses working at antenatal and postnatal contact points in Sunyani Municipality, Ghana. Data was collected using a self-administered questionnaire. Descriptive statistics of mean, standard deviation and frequencies were used to describe the data.

**Results:** Almost 90% (n=267) of the participants received nutrition education during training. More than half of the participants were either unsatisfied or uncertain with: the amount of time allocated for nutrition education during training in school (77.5%); the integration of nutrition content into the curriculum (82.6%); and how nutrition course content was presented (77.4%). Almost 40% of the participants felt inadequately prepared from school to provide nutrition care during routine antenatal and postnatal care. The mean ( $\pm$ SD) knowledge of the participants was 57.46 (8.12) %. Participants attitude towards nutrition care was positive. Self-efficacy level ranged from moderate to low. Factors that had a positive association with nutrition care practice were age of respondents (B = 0.04; p = 0.002), nutrition-related knowledge (B = 0.05; p = 0.016), adequacy of nutrition education in school (0.14; p = 0.006), receipt of nutrition training after school (B = 0.38; p = 0.010) and nutrition care self-efficacy (B = 0.03; p = 0.048).

**Conclusion:** Nutrition education received during nursing/midwifery training was unsatisfying and inadequate, resulting in participants inadequate knowledge in basic nutrition issues, feeling ill prepared, less confident and lacking the key skills to provide nutrition care. Although participants recognised nutrition care to be important and as their responsibility to provide it, they could not provide nutrition care as may be needed by mothers during routine antenatal and postnatal care.

## Background

A healthy childhood translates into a healthy adulthood [1]. Healthy childhood can be achieved through healthy practices and care before, during and after pregnancy [2]. The proper development of the foetus and the health of the mother is dependent on healthy dietary practices during pregnancy [3]. Unhealthy diet during pregnancy is reportedly associated with poor intrauterine growth restriction, low birthweight, gestational weight gain, and other adverse health outcomes in women and their newborn babies [4, 5]. Also, poor nutrition during pregnancy has been linked with a higher risk of developing chronic diseases in adulthood including cardiovascular diseases, diabetes and poor bone health [6-8]. The main causes of the higher rates of maternal and neonatal diseases and death in developing countries were due to poor nutrition [9].

Ensuring good nutrition is essential to sustain the health of a woman during pregnancy, ensure normal healthy delivery and lessen the risks of birth defects, poor development of the foetus and childhood health problems [10].

The antenatal and postnatal care setting is an important medium to help pregnant women and mothers adopt healthy dietary habits. Thus, nutrition education given to mothers by healthcare providers during antenatal and postnatal care/visits can improve upon their nutrition and health status as well as that of their children [11, 12]. Nutrition education and counselling, largely referred to as nutrition care, forms part of antenatal and postnatal services. These services are mainly carried out by nurses and midwives [1, 13-15], who are well placed to provide nutrition care during routine antenatal and postnatal care/visits and during their frequent contacts with pregnant women and lactating mothers. Their role to provide nutrition care is more manifest by the inadequate number of nutrition and dietetic professionals to offer nutrition care to pregnant women and lactating mothers during routine antenatal and postnatal care.

However, there is evidence [16, 17] showing that nurses and midwives who are in-charge of providing healthcare (including nutrition care) at postnatal and antenatal contact points barely provide nutrition care. A study conducted in Australia among midwives reported that midwives find it difficult to provide proper nutrition counselling to mothers [18]. Two systematic reviews that included only articles from developed countries also reported that mothers received inadequate nutrition care during pregnancy [1, 19]. In Ghana, Nsiah-Asamoah [20] investigated gaps in knowledge levels of health workers and reported that counselling caregivers on appropriate infant and young child feeding practices among these health workers was problematic. A number of barriers has been reported to militate the effective provision of nutrition care in the antenatal and postnatal care setting. These include inadequate nutrition training during school, lack of time, lack of resources, poor nutrition-related knowledge, and inadequate confidence in nutrition care [1, 18, 19, 21, 22].

Studies from developing countries investigating the provision of nutrition care during routine antenatal and postnatal care is limited. In our search for literature in this area we only came across information from Australia, New Zealand, the UK and the US [1, 18, 19, 23, 24]. Only one study from Ghana investigated the nutrition-related knowledge levels of health workers during routine growth monitoring and promotion but not during antenatal care for pregnant women [20]. The current study intends to fill these gaps in the literature. We investigated the provision of nutrition care and its determinants among midwives and nurses involved in routine antenatal and postnatal care in Ghana. Contextual findings are needed to inform interventions that aim to improve the provision of nutrition care by midwives and nurses during routine antenatal and postnatal care in developing countries. Evidence from this study will provide such contextual findings.

## **Methods**

### **Study design and setting**

Following an institution-based cross-sectional design, the study was conducted in the Sunyani Municipality of the Bono Region of Ghana. The Municipality is one of the 260 Metropolitan, Municipal and District Assemblies (MMDAs) in Ghana, and forms part of the 12 Municipalities and Districts in the Bono Region with

the capital being Sunyani. It is located at the heart of the Bono Region lying between Latitudes 7°20' N and 7°05' N and Longitudes 2°30' W and 2°10' W and covers a total land area of 506.7 km<sup>2</sup>. The Municipality is advantaged to have the Regional Hospital cited in the capital city of Sunyani. The Municipal Health Directorate (MHD) is responsible for the health administration and coordination of activities of all health providers within the Municipality. It has 31 health facilities and 34 functional Community Based Health Planning and Services (CHPS) zones (3 compounds) in six sub-municipalities. Of these, 20 were selected including CHPS compounds for the study including the Bono Regional Hospital, Sunyani Municipal Hospital, Seventh-Day Adventist (SDA) Hospital, Opoku clinic, Abesim Health Center, Abesim Christian Eye clinic, Fiapre Health Center, Atronie Health Center, Watchman CHPS compound, Owusu Memorial Health Center, Yawhima Health Center, Yawsae Health Center, Antwikrom Health Center, Penkwase Clinic, Monica Maternity Home, Akyerensua CHPS compound, Abuom Rural Clinic, Abrikasu Health Center and Ntotroso Health Center).

### **Participants, recruitment procedures and sample size**

The study participants were health care providers (i.e. nurses and midwives) working at the antenatal and postnatal contact points in the health facilities of the Sunyani Municipality. The health facilities run daily antenatal and Child Welfare clinics (CWCs) for pregnant women and lactating mothers, scheduled to visit monthly to receive antenatal and postnatal care respectively. Participants eligible for the study were healthcare providers who have been working for at least 6 months at antenatal and postnatal contact points in the health facility. Those who had worked for less than 6 months were excluded from the study. A multi-stage sampling method was used for the selection of the health facilities and participants. Sampling was done by allocating numbers to 34 health facilities both private and public including CHPS compounds, and random selection was done to come out with a total of 20 facilities. With the use of a purposive sampling method eligible participants in the selected health facilities were invited to participate in the study. Sample size was estimated at 385 using the formula:  $(z^2 \times p(q)) / ME^2$  (Cochran, 1977) where  $z$  = confidence level at 95% (standard value of 1.96),  $p$  = estimated prevalence of nutrition care practice. Given that the prevalence of nutrition care practice has not been reported in Bono Region previously, 50% was assumed.  $ME^2$  = margin of error at 5%.

### **Data collection procedures**

Through the Regional Director of Health Services of the Bono Region, permission was sought from the management of the selected health facilities to gain access to them. All participants in the selected health facilities were approached by JK during routine antenatal and CWC days to invite them to participate in the study. The purpose of the study was introduced to the participants and all those who agreed to take part were taken through the consent procedures. Voluntary participation was encouraged and participants were assured of confidentiality of their responses. Those who consented were given copies of paper-based self-administered questionnaires to collect data. In order not to interfere with working hours of the participants, consented participants were allowed to fill the questionnaire in a secluded room in the facility while others were allowed to fill it at their own convenient time. Participants spent about 20-30 minutes filling the questionnaire. Ethical approval for the data collection was granted by the Committee on Human Research, Publications and Ethics of the Kwame Nkrumah University of Science and Technology (Approval ID: CHRPE/AP/673/19). All procedures were performed in accordance with relevant guidelines.

## Data collection methods

Data was collected using a self-administered questionnaire. For clarity and comprehensibility of the questions, a pre-test was conducted using five non-participants who were community health nurses and midwives. To determine content validity the items of the questionnaire were assessed by a team of nutritionists and behavioural scientists. The questionnaire was structured consisting of closed ended questions to assess adequacy of nutrition education during school, satisfaction with nutrition education, nutrition care competencies (i.e. Knowledge, Attitude, Skills), self- efficacy in nutrition care and nutrition care practice. Information on the general and background characteristics of the participants were also collected.

### Nutrition education during school

Items that assessed health care providers nutrition education involved a “Yes or No” response. Participants were asked to indicate how they received nutrition education when they were in school, whether they had it as “separate nutrition course”, “lectures on selected topics” or “nutrition concepts integrated into course work”.

- a. **Amount of time spent on nutrition lectures in terms of credit hours per week in school:** In order to assess the number of credit hours spent per week on nutrition lectures when they were in school, an open-ended question was used in which participants were asked the number of credit hours they spent on nutrition education while in school.
- b. **Adequacy of nutrition education:** To assess whether the nutrition education participants received in school was adequate, a 5-point Likert scale was used where participants were asked to indicate how adequately prepared their school has made them to provide nutrition care (1 = not at all adequate; 2 =somewhat adequate; 3 =uncertain; 4= adequate; and 5= more than adequate)
- c. **Nutrition training after school:** Items to find out whether participants had nutrition training after school was assessed with the question “Apart from nursing/midwifery school, have you had any training on nutrition” Yes or No. To determine the kind of training received in nutrition if “Yes” two multiple questions and an open- ended question were used.
- d. **Satisfaction with nutrition education:** To determine participants level of satisfaction with some aspects of learning nutrition during training in school, four items were adapted from a previous study among Ghanaian medical doctors [22]. Participants were asked to indicate how satisfied they were with some aspect of nutrition they learned during training in school using a 5- point Likert scale, rating them as follows (1= not at all satisfied; 2= somewhat satisfied; 3= uncertain 4= satisfied; and 5= more than satisfied). The responses were used to generate a satisfaction score.

### Nutrition care competencies

The nutrition care competencies consisted of items that assessed health care providers knowledge, attitude and skills regarding nutrition care.

- a. **Knowledge:** To test participants nutrition related knowledge level, questions were asked on maternal nutrition during and after pregnancy and nutrition relevant topics. The items of the knowledge scale of the questionnaire were adapted from previously published studies that assessed nutrition knowledge

levels among nurses and midwives at antenatal care [1, 18, 25] and others were author created. The knowledge scale for assessment consisted of 20 multiple-choice questions and 11 true or false questions. Each correctly answered question was scored one mark and summed to generate a total score that was computed out of 100%.

- b. **Attitude towards nutrition care:** Regarding assessment of participants attitude towards nutrition care, an attitude scale was used where seven items were presented as statements and defined on a five-point Likert scale. Participants were required to determine the extent to which they agreed or disagreed to each of the statements by indicating 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree. For instance, to what extent do you agree or disagree to the statement that “Nutrition counselling should be an integral part of routine care for all health care providers”. Items of the attitude scale were adapted from previously published studies [26-28]. Each answered question was scored a mark to generate a total score and computed out of 100%. The items with the higher scores that were closer to 100% were denoted as positive attitude and lower scores being 50% and below were considered poor attitude.
- c. **Nutrition care skills:** The nutrition care skills scale had items that assessed participants degree of agreement or disagreement concerning self-reported skills they use to provide nutrition care during routine antenatal and postnatal care. The assessment scale consisted of seven items in a form of statements defined on a five-point Likert scale. Participants were required to determine the extent to which they agreed or disagreed to each of the statements by indicating 1 = strongly disagree; 2 = disagree; 3 = neutral; 4 = agree; and 5 = strongly agree. For example, to what extent do you agree or disagree to the statement “the nutritional assessment of mothers is performed methodically and professionally”. Similar to the scoring of the attitude scale, each item was scored to generate a total score for each participant.
- d. **Nutrition care self – efficacy:** The nutrition care self – efficacy was assessed with a scale comprising of five items relating to participants level of confidence in the delivery of nutrition care with the use of a 5-point Likert Scale ranging from 1 (Not confident at all) to 5 (extremely confident). For example, “How confident or unconfident are you in discussing with lactating mothers the benefits of exclusive breastfeeding”. Items were adapted from previous study among doctors [26]. Each item was scored and a total score generated for each participant.

### **Nutrition care Practice**

Nutrition care practice was assessed with the question “What proportion of your clients/attendees do you actually provide nutrition care to”. A 5-point Likert response was provided in which 1= less than 20%; 2 = 20-40%; 3 = 41-60%; 4 = 61-80% and 5 = 81-100%. The responses were scored to yield a nutrition care practice score. In addition, the following were also assessed using the questionnaire: kind of nutrition care participants provided, proportion of clients, participants believed will benefit from nutrition care, the time participants spent providing nutrition care such as counselling and the number of times they referred mothers for specialist nutrition care in the last 6 months. These were assessed using “Yes” or “No” responses. Assessing whether participants referred mothers to dieticians/ nutritionist for specialist care was carried out using a “Yes or No” response. Open- ended questions were used to determine how many times

they referred mothers in the past 6 months. Similarly, their reasons and kind of conditions for referral were also assessed.

### **General and background characteristics**

A total of 12 questions were used to assess the general and background characteristics of the participants. These included their age, sex, type of practice, type of facility of practice, duration of practice, and level of education.

### **Statistical analysis**

The questionnaires were coded, entered and analysed using the International Business Machines Corporations - Statistical Package for Social Sciences (IBM SPSS) version 25.0 software. For easy description of the analysed data, descriptive statistics of mean, standard deviation, and frequencies were used. Pearson correlation was used to determine univariate associations among continuous variables (satisfaction with nutrition education, adequacy of nutrition, nutrition care competency, self-efficacy and levels of nutrition care practice). One – way ANOVA and student t- test were used respectively to assess univariate associations among continuous variables (levels of nutrition care practice) and categorical variables (sex, having nutrition as a separate course, lectures on selected nutrition topics; ever had training on nutrition and nutrition concepts integrated into course work). To determine factors associated with nutrition care practice, a multiple linear regression was conducted. A p-value of < 0.05 was considered significant in all analyses.

## **Results**

### **General and background characteristics of the participants**

Table 1 presents the general and background characteristics of the participants. Complete data was obtained from 300 participants out of an estimated sample size of 385; yielding a 78% response rate. As shown in Table 1, 73.3% (n=220) of the participants were females; 49.7% (n=149) had diploma certificate and 62% (n=186) were community health nurses. The participants mean (SD) age in years was 30.11 ± 8.50 and participants had been working for a mean (SD) duration of 61.30 ± 53.09 months.

**Table 1:** General and background characteristics (n=300)

<b>Variables</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Gender</b>		
Male	80	26.7
Females	220	73.3
<b>Level of education</b>		
Certificate	115	38.3
Diploma	149	49.7
Bachelor degree	33	11.0
Masters	3	1.0
<b>Type of practice</b>		
Midwife	114	38.0
Community Health Nurse	186	62.0
<b>Type of facility</b>		
Regional Hospital	66	22.0
District Hospital	61	20.3
Public Clinic	38	12.7
Private Hospital	64	21.3
CHPS Compound	70	23.3
Other	1	0.3

### **Satisfaction level and adequacy of nutrition education received during training in school**

Almost all participants (n=287, 95.7%) received nutrition education during training in school in the form of lectures. Mean hours per week used for nutrition education during training was 3.31 ±1.66 hours. More than half of the participants were either unsatisfied or uncertain with: the amount of time allocated for nutrition education during training in school (77.5%); the integration of nutrition content into the curriculum (82.6%); and how nutrition course content was presented (77.4%). Participants had a mean (SD) satisfaction score of 10.01 (3.73). With a mean (SD) adequacy score of 3.31 (1.24), 61.4% (n = 184) of the participants said they felt adequately prepared from school to provide nutrition care during routine antenatal and postnatal care.

### **Participants' nutrition-related knowledge, attitude towards nutrition care and self-reported nutrition care skills during routine antenatal and postnatal care**

Participants had total mean (SD) nutrition-related knowledge of 57.46(8.12) %. Regarding the different areas; participants had a mean (SD) knowledge score of 72.48(12.47) % for maternal nutrition during pregnancy

and 51.46 (9.21) % for infant and young child feeding practices. Over 80% of the participants knew that: balanced diet is important during pregnancy; energy requirements of pregnant women differ from non-pregnant women; the nutrient needs for iron and folic acid is higher during pregnancy; nutrient deficiencies and being underweight can impact negatively on pregnancy outcomes; obesity during pregnancy can increase one's risk of several pregnancy complications. However, majority of the participants did not know: that iron is not a vitamin; the recommended daily intake of iron and folic acid for pregnant women; the recommended weight gain during pregnancy; that rich sources of iron and folic acid. Only 26% of the participants correctly answered that breastmilk only is adequate to meet the nutrient needs of infants aged less than 6 months; 47% said babies should be breastfed on demand; and 98% said babies younger 6 months could digest other foods. Less than 40% of the participants had knowledge on the benefits of exclusive breastfeeding to the baby and to the mother. Almost all participants knew the age of at which complementary breastfeeding should begin. Regarding foods that could added to enrich the diets of young children; 43% said animal sourced foods such as meat and eggs; 49% pulse and nuts, groundnut flours and other legumes; 30.7% vitamin A rich fruits and vegetables such as carrots; 90.7% green leafy vegetables; and 13% energy rich foods such as oil and butter. Regarding attitudes towards nutrition during pregnancy and lactation; participants had mean  $\pm$  SD attitude score of  $23.00 \pm 4.56$ . Majority (81.7%, n=241) of the participants agreed that nutrition during pregnancy was very important; 72.4% said nutrition should be part of routine antenatal and postnatal care; and 63.9% believed that if mothers are counselled, they will adopt healthy dietary practices. However, 56.1% felt that midwives and nurses should also focus on nutrition support during routine antenatal and postnatal care. Also, 44.1% (n=130) of the participants agreed that dietitians rather than the nursing staff were solely responsible for nutritional support during routine antenatal and postnatal care as 37.9% (n=112) disagreed with that statement. Participants had a mean (SD) nutrition care skill score of  $18.58 (5.71)$ . Less than half of the participants reportedly had skills to: perform nutrition assessment of mothers (41.7%); effectively communicate nutrition information to mothers (42.1%); accurately measure and record anthropometric measures of mothers (49.5%); and identify mothers and children with nutrition deficiencies (46.9%). Also, slightly above half of the participants reportedly said they had the skills: to perform nutritional screening (50.9%) and to provide nutrition care to improve the dietary intake of pregnant women (54.1%).

### **Self – efficacy in nutrition care**

As indicated in Table 2, 53.9% of the participants said they were confident having discussions with mothers on the importance of exclusive breastfeeding for both mothers and babies; 58.9% (n=174) were confident in discussing healthy eating guidelines with mothers; and 42.6% in discussing with mothers the number of calories per gram of protein, carbohydrates and fat including their basic metabolic roles. Participants had a mean  $\pm$  SD self-efficacy score of  $16.16 \pm 4.60$ .

**Table 2:** Participants' level of self- efficacy in nutrition care during routine antenatal and postnatal care

Level of Self- efficacy items	Not confident	Neither confident nor unconfident	Confident	Mean $\pm$ SD
Discuss with mothers on the importance and challenges of breastfeeding (n=297)	81(27.3%)	56(18.9%)	160(53.9%)	3.34 $\pm$ 1.31
Using the food guide pyramid during counselling to show examples of a serving size of certain foods to mothers' (n=296)	70(23.6%)	76(25.7%)	150(50.7%)	3.37 $\pm$ 1.16
Discuss with pregnant and lactating mothers on healthy eating habits (n=295)	59(20%)	62(21.0%)	174(58.9%)	3.63 $\pm$ 1.22
Discuss with mothers the content of calories per gram of protein, carbohydrates, fat and their basic metabolic roles (n=296)	93(31.4%)	77(26.0%)	126(42.6)	3.13 $\pm$ 1.25
Ability to provide nutrition education for mothers recently diagnosed with HIV (n= 296)	131(44.3%)	32(10.8%)	133(44.9%)	3.09 $\pm$ 1.42
<b>Total mean (SD) self- efficacy score</b>				<b>16.16 <math>\pm</math> 4.60</b>

*For easy rating of results, "Not very confident at all" and "not very confident" were combined to yield not confident whiles "confident" and "extremely" confident were combined to yield Confident.*

### **Nutrition care practice during routine antenatal and postnatal care by the participants**

Figure 1 shows the proportion of mothers, participants believed would benefit from nutrition care and the proportion of mothers that actually received nutrition care from participants (A) and the amount of time they spent doing so (B). Participants provided nutrition care at an average of 3.16(1.09) corresponding with 41-60% of the mothers they believed would benefit from nutrition care. There was a poor level of agreement between the proportion of mothers, participants believed would benefit from nutrition care and the proportion that actually received nutrition care (Kappa statistic 0.131, S.E = 0.039, p < 0.001). With the time participants spent on nutrition care, 43.9% (n=130) spent 21-30 minutes of their time providing nutrition care whiles only 3.4% (n= 10) spent above 40 minutes. Among the participants, 66.2% referred mothers to nutritionists/dieticians for specialised nutrition care and they did so for an average of 4.35 times in the last six months.

### **Association between background characteristics of participants, level of satisfaction with nutrition education, adequacy of nutrition education and self-efficacy with levels of nutrition care practice**

As shown in Table 3, adequacy of nutrition education (r=0.155; p<0.001) and participants level of satisfaction with nutrition education (r= 0.135; p= 0.020) correlated positively with levels of nutrition care practice. Attitudes correlated positively with nutrition care skills (r=0.523; p<0.001), level of self-efficacy in

nutrition care ( $r=0.368$ ;  $p<0.001$ ) and nutrition knowledge ( $r=0.215$ ;  $p<0.001$ ). Age correlated negatively ( $r=-0.120$ ;  $p=0.041$ ) with nutrition-related knowledge of the participants but positively with levels of nutrition care practice ( $r=0.285$ ;  $p<0.001$ ).

**Table 3:** Pearson correlation of participants age, working experience, adequacy, satisfaction, and self-efficacy with levels of nutrition care practice

Variable	WE	CH	ANE	SNE	ATN	NCS	SNC	NK	NCP
Age	0.725**	0.136*	-0.002	-0.004	0.044	-0.114	-0.036	-0.120*	0.285**
Work experience (WE)		-0.006	0.077	0.147*	0.049	-0.057	0.042	-0.065	0.213**
Credit hours (CH)			0.175**	-0.053	0.055	-0.006	-0.051	0.013	0.090
Adequacy of nutrition education (ANE)				0.246**	0.003	0.113	0.061	-0.089	0.155**
Satisfaction with nutrition education (SNE)					0.139*	0.082	0.059	0.069	0.135*
Attitude towards nutrition education (ANE)						0.523**	0.368**	0.215**	0.036
Nutrition care skills (NCS)							0.609**	0.134*	-0.079
Self-efficacy in nutrition care (SNC)								0.071	0.058
Nutrition knowledge (NK)									0.134*

**\*\*.** Correlation is significant at the 0.01 level (2-tailed). **\*** Correlation is significant at the 0.05 level (2-tailed). **NCP:** Nutrition care practice.

#### Levels of nutrition care practice stratified by sex and format of nutrition education received during school

As shown in Table 4, level of nutrition care practice was significantly higher among participants who reportedly had: selected topics on nutrition (3.19 vs. 2.50;  $p=0.030$ ), nutrition concepts integrated into their

course work (3.21 vs. 2.57;  $p=0.006$ ) and ever received training on nutrition after school (3.48 vs. 2.89;  $p<0.001$ ).

**Table 4:** Mean levels of nutrition care practice stratified by gender and format of nutrition education received during school

Variable	Mean (SD)	95% CI	p-value
<b>Gender (n = 296)</b>			
Male	3.19 (1.05)	2.82 – 3.35	0.494
Female	3.09 (1.19)	3.04 – 3.33	
<b>Nutrition as a separate course (n = 295)</b>			
Yes	3.17 (1.10)	3.03 – 3.30	0.719
No	3.09 (1.00)	2.73 – 3.45	
<b>Lectures on selected nutrition topics (n = 290)</b>			
Yes	3.19 (1.07)	3.06 – 3.32	0.030
No	2.50 (1.17)	1.76 – 3.24	
<b>Nutrition concepts integrated into the course work (n = 291)</b>			
Yes	3.21 (1.07)	3.08 – 3.33	0.006
No	2.57 (1.04)	2.12 – 3.01	
<b>Ever had training on nutrition after school (n = 289)</b>			
Yes	3.48 (1.05)	3.30 – 3.66	<0.001
No	2.89 (1.02)	2.73 – 3.05	

### Multivariate analysis of factors associated with levels of nutrition care

Table 5 presents a multiple linear regression of factors associated with levels of nutrition care practice. Having nutrition topics integrated into course work was significantly associated with increasing levels of nutrition care practice ( $B= 0.55$ ,  $r= 0.147$ ,  $p=0.025$ ). participants who reported to have received nutrition training after school recorded higher levels of nutrition care practice compared to those who said they did not receive training ( $B = 0.38$ ,  $r = 0.169$ ,  $p = 0.010$ ). Increased level of self-efficacy in nutrition care was associated with increased levels of nutrition care practice ( $B = 0.03$ ,  $r= 0.131$ ;  $p=0.048$ ).

**Table 5:** Multiple linear regression of factors associated with levels of nutrition care practice

Variable	B	95% CI	Partial correlation	p-value
Male	-0.13	-0.39 – 0.14	-0.061	0.356
Nutrition as a separate course	-0.04	-0.50 – 0.42	-0.012	0.858
Had nutrition training after school	0.38	0.09 – 0.67	0.169	0.010
Nutrition concepts integrated into course work	0.55	0.07 – 1.02	0.147	0.025
Selected nutrition topics	0.57	-0.16 – 1.29	0.102	0.124
Age	0.04	0.02 – 0.07	0.205	0.002
Number of credit hours in nutrition	0.04	-0.04 – 0.11	0.058	0.379
Adequacy of nutrition education	0.14	0.04 – 0.25	0.180	0.006
Satisfaction with nutrition education	0.03	-0.01 – 0.06	0.088	0.183
Attitudes towards integration	-0.00	-0.04 – 0.03	-0.003	0.960
Nutrition care skills	-0.03	-0.06 – -0.00	-0.144	0.029
Self-efficacy in nutrition care	0.03	0.00 – 0.07	0.131	0.048
Nutrition knowledge	0.05	0.01 – 0.09	.159	0.016
Work experience	-0.04	-0.08 – 0.01	-.101	0.125

**F= 4.55 Adjusted R square = 0.17**

## Discussion

An important finding of this study was that majority of the participants were unsatisfied with and inadequately prepared during their training in nursing and midwifery school to provide nutrition education in the antenatal and postnatal care setting. This finding is consistent with those reported in the international literature [1, 18, 19]. The phenomenon of inadequate pre-service nutrition education is not peculiar to only nurses and midwives but other healthcare professionals such as doctors. Medical students and doctors from Ghana [21, 22] and other parts of the world have reported dissatisfaction with their nutrition education during medical school and feeling inadequately prepared to provide nutrition care in the general setting. These findings demonstrate that healthcare professionals including nurses and midwives will benefit from further training in nutrition education. A number of factors have been identified for the inadequate nutrition education received during training in school including low priority for nutrition education; an already overcrowded curriculum; poor collaboration among dietitians/nutritionists and nursing and midwifery educators among others[1, 18, 19]. Our finding in this study that participants who felt adequately prepared provided nutrition care to a higher number of mothers compared to those who reportedly felt inadequate to do so, demonstrate further that adequacy of nutrition education during training is crucial for improving upon nutrition care practices among health care providers. To buttress this point further we also found that participants who said nutrition concepts were integrated into their course work during nursing/midwifery

training, were significantly more likely to report providing nutrition care to a higher proportion of mothers they believed would benefit from nutrition care. A possible explanation for our findings could be that improving adequacy of nutrition education may result in improved competency in nutrition care and self-efficacy that are required for an effective provision of nutrition care. One of the ways of making nutrition adequate in nursing and midwifery training is by integrating nutrition throughout the pre-service curriculum as this has been shown to be an effective way of improving nutrition education and subsequent nutrition care practice [1, 29].

Participants had a mean knowledge score of 54.00%, demonstrating suboptimal nutrition-related knowledge during pregnancy and lactation. A number of nutrition-related knowledge deficits of the participants were identified. These were inadequate knowledge regarding food sources for micronutrients such as iron, folic acid and vitamin A; and the appropriate weight gain during pregnancy. Other areas of knowledge deficits were poor knowledge regarding feeding recommendations for infants younger than 6 months; benefits of exclusive breastfeeding and how to enrich foods for appropriate complementary feeding in young children. These findings are consistent with those of Arrish et al [18] who reported inadequate knowledge of midwives regarding weight gain during pregnancy, recommended intake for iodine and food sources of iron. In addition, a systematic review [1] of studies from the international literature showed that midwives lacked basic knowledge on nutrient requirements, recommended weight gain, increased energy requirements, risk of iron-deficiency anaemia and folic acid requirements during pregnancy. Although these findings are concerning and may impact on the quality of nutrition care provided to mothers during routine antenatal and postnatal care, they provide important areas that could be mapped to inform pre-service curricula review and the content of in-service training programmes to improve nutrition-related knowledge among nurses and midwives.

We also found that nutrition-related knowledge was associated with nutrition care practice as an increased nutrition-related knowledge corresponded significantly with increased nutrition care practice. Nutrition-related knowledge is an important first step required to help healthcare providers effectively communicate nutrition and dietary information to mothers that would enable them adopt healthy dietary practices [1, 19]. Consistent with our findings, Yalcin et al., [30] found that nurses who carried out nutrition assessment activities had a greater knowledge score than those who did not. Crogan and Evans (2001) [31] also found a positive correlation between nutritional assessment activities and nutrition knowledge of nurses. However, it is important to note that knowledge is necessary but may not be sufficient to improve the nutrition care practice behaviour [32]. Other variables such as favourable attitudes, self-efficacy and adequate skills may also have to be considered in designing interventions to improve nutrition care during routine antenatal and postnatal care [1, 32].

Generally, participants had a positive attitude towards the provision of nutrition care during routine antenatal and postnatal care. It is commendable that majority of the participants recognised that nutrition care should be part of routine care; that it is their responsibility to focus on providing nutrition support to mothers and they also believed that mothers will adopt healthy dietary practices if counselled to do so. These findings are consistent with those of previous findings conducted among midwives and nurses from Australia, New Zealand, the UK and the US [1, 18, 19, 23]. The positive recognition of nutrition care suggests that

participants will be willing to provide nutrition care to mothers if an enabling environment is provided and if they also feel adequately prepared to do so. It is however concerning that majority of participants did not think that nutrition counselling is an effective use of their professional time. This presents an interesting conundrum and suggests that participants have varying attitudes and inconsistent appreciation of the role of nutrition in maternal and child health outcomes and may negatively impact nutrition care during routine antenatal and postnatal care.

Another important finding of this study was that participants generally lacked important skills to effectively provide nutrition care to mothers. We found that majority of the participants reportedly lacked skills to perform anthropometric measurements and interpret the results; provide nutrition counselling and communication; and perform nutrition screening to identify nutrition deficiencies and those at risk. This could be due to participants report of inadequate nutrition education received during school.

The self-efficacy levels of the participants were relatively average with most participants ranging from moderate to low level of confidence in discussing a number of nutrition issues. Participants felt less self-efficacious to provide nutrition care in a number of areas including encouraging mothers to exclusively breastfeed; counselling mothers to adopt healthy dietary habits; and the use of the food pyramid. These findings are comparable to those of previous findings and were not surprising given that participants reported inadequate nutrition education received during nursing and midwifery training [1, 18]. Nutrition care self-efficacy of participants affected the nutrition care practice as we found that increased self-efficacy was associated with increased nutrition care practice among participants. Comparable to our findings, Fisher et al [29] reported that nurses' self-efficacy was related to knowledge and relevant clinical behaviour which suggests a possible mediation effect of self-efficacy on the relationship between knowledge and behaviour. Another study also reported a positive association between self-efficacy scores and the weight management practices of nurses [30].

Another important finding of this study was that, although participants provided nutrition care to mothers during routine antenatal and postnatal care, the proportion of mothers that received the nutrition care did not correspond with the proportion of mothers they believed would benefit from nutrition care. This presupposes that there were a number of mothers that needed nutrition care but participants were unable to provide. This could be as a result of participants reportedly feeling less self-efficacious and inadequately prepared to provide nutrition care during routine antenatal and postnatal care.

In this study we did not find a positive association between nutrition care skills and participants nutrition care practice behaviour. This finding is contrary to our assumption that health care providers who perceived themselves to have adequate skills should carry out nutrition care practices. A possible explanation for this could be due to the inadequacy of nutrition education reported by the participants. This probably resulted in poor nutrition-related knowledge and acquisition of nutrition care skills and subsequently inadequate provision of nutrition care. Another explanation could be that the nutrition education received during nursing training in schools focused largely on theory with less emphasis on the practical aspect of nutrition care. There is also evidence that skill-based training or education for health professionals can help improve their self-efficacy and enhance their clinical performance including nutrition care practice [32].

In-service training is another avenue to improve the nutrition care competencies and the dietary counselling skills of nurses and midwives to enable them effectively provide nutrition care (Fletcher & Carey, 2011; Jefferies, Johnson & Ravens, 2011). We found that participants who reported receipt of nutrition training after school significantly reported providing nutrition care to a higher proportion of mothers, they believed would benefit from nutrition care compared to their counterparts who did not receive such training. These findings are similar to those reported from previous studies [1, 18, 19, 33, 34]. These findings, thus demonstrate the positive effect of in-service nutrition training on health workers' nutrition knowledge, counselling skills, and management of nutrition related conditions and underscores the need for relevant authorities to institute in-service training programmes in the form of continuous professional development programs (CPDs) on nutrition for health professionals to refresh their knowledge and to also build their confidence and the required attitude to provide nutrition care.

Another important finding of this study was that the age of participants was positively associated with nutrition care practice. This probably suggests that the older a person becomes, the more experienced he/she becomes regarding nutrition care, given that they were more likely to receive nutrition training at the work place, which has been shown in this study to be associated with nutrition care practice. Health care providers who are older may also feel more comfortable discussing health issues with their clients as they are perceived to be more knowledgeable and reliable source of nutritional information. As a result mothers are likely to presume them to be more experienced and provide accurate nutrition care, and will tend to rely on them for nutrition services as compared to the younger ones [35]. Similar to the current study, an Australian study among practice nurses by Martin et al., (2013) [24] showed that majority of older practice nurses who were above the age of 50years were perceived to be more experienced to provide nutrition counselling as compared to the younger practice nurses. Older healthcare providers could thus act as role models in the provision of nutrition care for the younger ones to emulate same. This is an important area that could be harnessed to improve the provision of nutrition care during routine antenatal and postnatal care.

This study has a number of strengths and limitations worth noting. It is one of its kind to investigate nutrition care practice during routine antenatal and postnatal care in a developing country like Ghana thus laying a foundation for future studies with similar interests. It has also provided evidence regarding the inadequacy and the unsatisfactory nutrition education experiences of nurses and midwives during training in school and brought to bear important points for curricula planning

and change. Notwithstanding these strengths, the cross-sectional nature of the study made it difficult to establish causality. The generalisability of its findings is also limited due to the use of purposive sampling to select the study participants. The use of a questionnaire also increased the likelihood of social desirability as well as recall biases.

### **Implications to practice and further research**

The findings of this study have increased our understanding of the situation of nutrition education in nursing and midwifery schools in Ghana and that the nutrition care competencies of nurses and midwives is inadequate due to inadequate nutrition education received during training. A suggestion for further research is to find out whether nutrition information given to mothers by health care providers during their routine

antenatal and postnatal services influence their health and nutritional status as well as that of their children. There is a need for future studies to explore further to identify the reasons for the inadequate nutrition education received by nurses and midwives during training in school. In addition, there is also the need for future studies to unravel the reasons for the negative association between self-reported skills and the level of provision of nutrition care in the current study. Also, future studies should investigate whether a nutrition training programme will improve the nutrition practice behaviour of nurses and midwives during routine antenatal and postnatal care.

## **Conclusion**

Nutrition education received during nursing or midwifery training was unsatisfying and inadequate, resulting in participants reporting sub-optimal nutrition-related knowledge, feeling ill prepared and less confident in providing nutrition care. Participants also lacked key nutrition care skills needed to effectively provide nutrition care in antenatal and postnatal care settings. Despite participants recognising nutrition care to be important and perceiving it to be one of their responsibilities they could not provide nutrition care to meet the needs of mothers during routine antenatal and postnatal care. As an initial step towards improving nutrition education and subsequently improving the provision of nutrition care by nurses and midwives, more research focusing on exploring barriers and enablers of nutrition education are needed. This would enable the identification and subsequent implementation of appropriate educational interventions to improve nutrition care competencies, self-efficacy and nutrition care practice in the antenatal and postnatal care settings.

## **Abbreviations**

ANC: Antenatal Care

ANE: Adequacy with nutrition education

ANE: Attitude towards nutrition education

ANOVA: Analysis of variance

CH: Credit hours

CHPS: Community Based Health Planning and Services

CPDs: Continuous Professional Development

CWC: Child Welfare Clinic

GDHS: Ghana Demographic and Health Survey

GHS: Ghana Health Service

ME: Margin of Error

MHD: Municipal Health Directorate

MMDAs: Metropolitan, Municipal and District Assemblies

NCE: Nutrition care skills

NK: Nutrition knowledge

PNC: Postnatal Care

S.E: Standard Error

SDA: Seventh-Day Adventist

SNC: Self-efficacy in nutrition care

SNE: Satisfaction with nutrition education

WE: Work experience

WHO: World Health Organisation

## **Declarations**

### **Ethics approval and consent to participate**

All data collection procedures, methods and informed consent procedures were approved by the Committee on Human Research, Publications and Ethics of the Kwame Nkrumah University of Science and Technology. Written informed consent was obtained from all participants. The data was handled anonymously and confidentially. All methods were carried out in accordance with relevant guidelines and regulations.

### **Consent for publication**

Not applicable

### **Availability of data and material**

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

### **Competing interests**

The authors declare that they have no competing interests

### **Funding**

Not applicable

### **Authors' contribution**

JK conceived the study, designed it and collected data; VM designed the study, interpreted the data, performed data analysis, drafted the manuscript; SAA partly performed data analysis; AA & PA jointly undertook critical revision of the manuscript. All authors approved the manuscript for publication.

## Acknowledgement

Authors wish to thank the administration of the health sector and facilities of the Bono Region and Municipality for granting them permission to the health facilities.

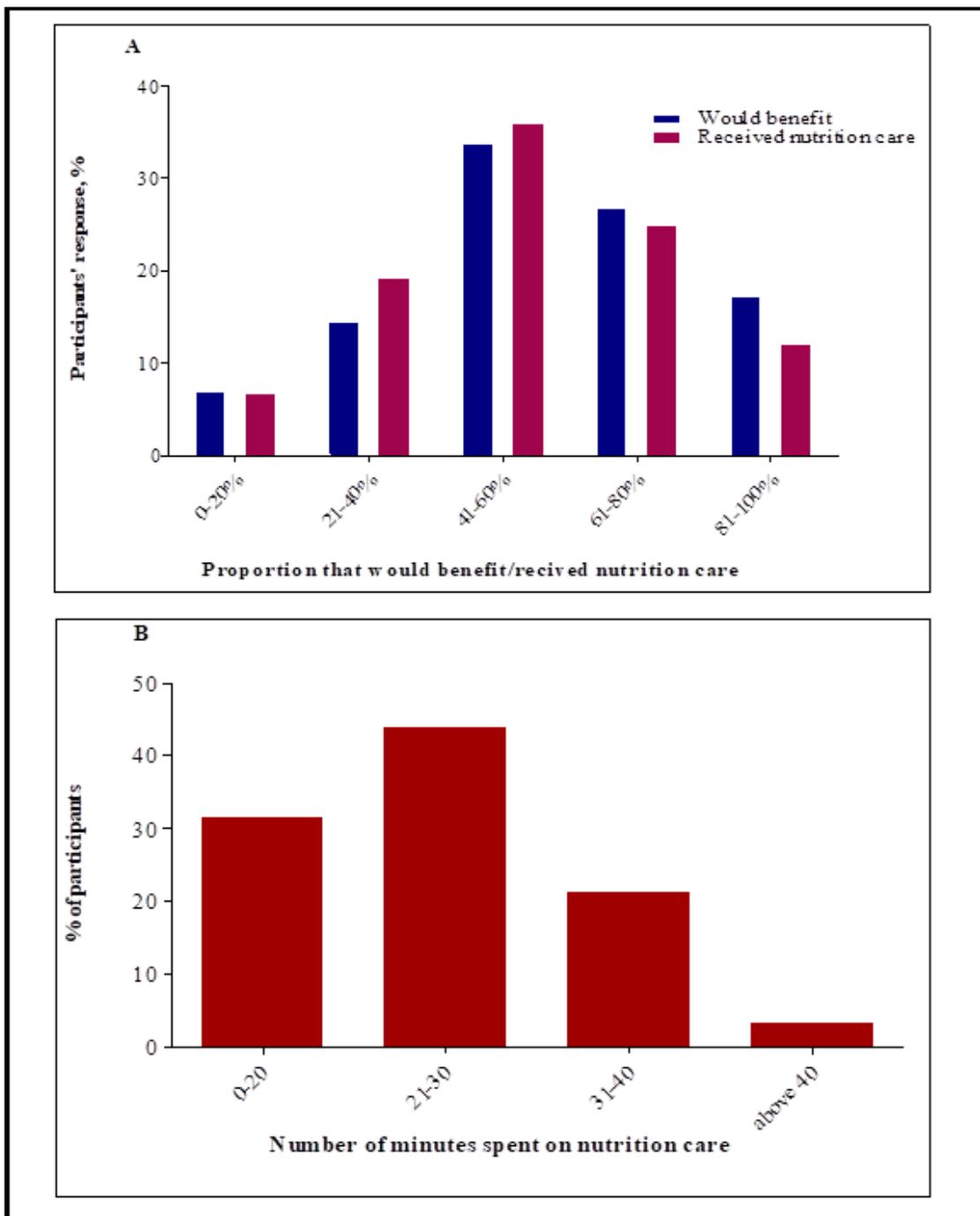
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## Figures



**Figure 1**

Proportion of mothers' participants believed would benefit from nutrition care, the proportion of mothers that actually received nutrition care from participants (A) and the amount of time they spent doing so (B) during routine antenatal and postnatal care.