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# Management and Care of Malnourished Children: Gaps in their Knowledge Levels of Final-Year Community Health Nursing Trainees

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## Abstract

**Objective:** Community Health Nurses are usually the first to identify malnourished children in the community and refer them to the hospital. Therefore, they should have adequate knowledge about malnutrition in children and be conversant applying WHO's protocol for managing malnutrition. Hence, the aim of this study was to examine the knowledge levels of final-year community health nursing trainees regarding the causes, signs and symptoms, management and prevention of malnutrition in children.

**Methods:** This was a descriptive cross-sectional study in which 200 final-year trainees completed a self-administered questionnaire.

**Results:** Generally, trainees' knowledge about the causes and prevention of malnutrition in children was good. However, their knowledge levels on the management of malnutrition in children were poor. Majority (91%) of the respondents did not know that the first step during the stabilization phase is to prevent hypoglycemia in malnourished children. Again, majority (69%) of the respondents did not know that iron should not be given to malnourished children during the stabilization phase. Most (66.0%) of the respondents did not know that children with severe acute malnutrition should be assessed for appetite, medical complications and oedema.

**Conclusion:** The results of this study indicate that there are gaps in nursing students' nutritional knowledge in the management of malnutrition in children. Findings from this study demonstrate the need to update and strengthen the content of the nutrition curriculum by including specific pediatric nutrition courses or topics in the training of community health nurses.

**Keywords:** Children; Malnutrition management; Knowledge; Nursing trainees

## Introduction

An asset to every nation is healthy citizens and as such healthy adults emerge from healthy children. However, Malnutrition accounts for approximately 35%, more than a third, of under-five deaths worldwide [1,2]. Malnutrition in children is of great public health concern because if it is not detected and treated early, it results in irreversible conditions affecting both the physical and psychological development of children [3,4]. According to UNICEF, malnutrition is the biggest threat to the survival and development of children in the world [5]. Black et al. also assert that childhood under nutrition is a major global health problem, contributing to childhood morbidity, mortality, impaired intellectual development, suboptimal adult work capacity, and increases one's susceptibility to diseases during the adulthood stage of life [6]. Child malnutrition impacts on the cognitive functions and contributes to poverty by impeding an individuals' ability to lead a productive life [7]. Malnourished children experience developmental delays, weight-loss and illness as a result of inadequate intake of protein, calories and other nutrients which are required for growth and development [8]. Therefore, tackling child under nutrition has gained high priority on the international development agenda, since it is regarded as both a maker and marker of development [9].

In Ghana, malnutrition among children still persists and remains one of the major intractable public health problems [10,11]. There are reports that the current prevalence rates of malnutrition in Ghana remain above internationally acceptable levels [12]. Findings from the latest Ghana Demographic Health Survey report indicates that, as at 2014, 19% of children under five years were stunted, 5% were wasted and 11% were underweight [13]. It has been reported based on statistics

from the Ghana Demographic and Health Survey (GDHS, 2014) that in 2012 alone Ghana spent GH¢ 2.7 billion, which represent 6.6% of the country's gross domestic product (GDP), on tackling malnutrition which could have been channeled into other productive areas to the benefit of all Ghanaians [14].

According to a report on the overview of the nutrition situation in Ghana by the deputy director of the Nutrition Division of the Ghana Health Service, inadequate nutrition counseling in health facilities is contributing immensely to the prevailing rates of malnutrition among children in Ghana [15]. Therefore, the prevention and management of malnutrition conditions are increasingly regarded as a fundamental part of both national and international health and development agendas [16]. Consequently, the urgent need to build human capacity in the context of preventing and managing malnutrition particularly among children continues to be emphasized [17]. Gillespie et al. also emphasized the need to give community health extension workers more training to ensure that they are fully competent with community-based

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management of malnutrition protocols, which they described as a neglected issue [18].

Nurses play a pivotal role as far as preventing and managing malnutrition in children is concerned because, globally, they are the largest group of health care professionals capable of providing nutritional advice particularly to mothers during both antenatal and postnatal visits [19,20]. Nurses have the greatest contact with patients, conduct nutritional assessment of patients and are often available as a nutritional education resource in the absence of dieticians [21,22]. However, it has been reported that, generally, nurses do not have adequate knowledge about the management of malnourished children [18,22-27]. Sunguya et al. underscored that professional health workers do not have adequate practical skills to counsel and treat under nutrition in children [20]. In another study where junior nurses who have been working for approximately 6 months in the ward were engaged in a focused group discussion, they indicated that they were not entirely comfortable with the use of the WHO SAM treatment guidelines for severely acute malnourished children. Majority (60%) indicated that they had not been trained on how to use the guidelines [23]. The study of Muzigaba et al. which revealed that junior nurses who have worked for less than 1 year are not conversant with WHO treatment guidelines for Severe Acute Malnutrition (SAM) cases suggests that less attention is given in preparing them in providing nutrition-related health services [23].

With regard to the knowledge levels of community health nursing students who are about completing their training, such studies is almost non-existent in Ghana and no study has elaborately assessed their knowledge levels on the causes, management and prevention of malnutrition in children. The study focused on community Health nursing trainees because they are in charge of community outreach activities like home visits, immunizing children and educating mothers on caring for their children [28]. Another justification for this study is in reference to a paper which was presented as part of a workshop at the 2016 World Public Health Nutrition Conference where it was highlighted that obtaining evidence- base information on the roles and impact of Community Health workers (CHWs) on nutrition- specific outcomes in the area of child health has received less attention. It has been emphasized that obtaining evidence- base information on the impact of CHW programmes for child health programmes has become a timely issue as the World Health Organization is currently leading a process to develop global guidance on community health worker programmes [29]. Therefore, the purpose of this study was to evaluate the knowledge levels of final-year community health nursing (CHN) students with regard to the causes, management and prevention of malnutrition in children. Findings from this study can provide the needed information for the revision of nutrition-related courses taught in Community Health Nursing Training Institutions.

## Methods and Materials

### Study area and period

The study was conducted at two Community Health Nursing Training Colleges, conveniently selected in two regions of Ghana. Data was collected between 21 and 25 February 2018.

### Study design and population

This was a descriptive cross-sectional study. The study population comprised of final-year community nursing students who had about four months to complete their three-year Diploma programme and write their final licensure examinations.

### Study participants and informed consent

Out of the total in the two nursing colleges, 216 gave their consent to participate in the study and were given a questionnaire to complete; but complete data was finally obtained from 200 nursing students, representing a response rate of 92.6% of the population of the final-year CHN students. Informed consent for participation in the study was obtained from all the nursing students. Confidentiality was maintained and anonymity of responses was ensured. Students who agreed to participate in the study were asked to complete the questionnaire in their lecture halls and were not allowed to communicate with other classmates or take the questionnaire out of their lecture halls.

### Research instrument and data collection

Self-administered structured questionnaire was used to collect all data needed in the study. Items on the questionnaires were developed based on the WHO guidelines on the management of malnutrition [2]. Steps were taken to avoid leading, ambiguous, double-barreled, and double negation questions. The questionnaire was developed using only closed- ended questions and was based on the objectives of the study. The test items were given to three registered dieticians for expert advice for evaluation of content validity, test format and item construction. With revisions based on comments from the dieticians, the items were approved by the panel as the content was valid and appropriate. The questionnaire was given to two registered dieticians for expert advice and comments to improve the construct and content validity of the questionnaire. The final questionnaire was piloted on a sample of fifteen nursing trainees in another nursing training school to assess the comprehensibility of the items to participants. All the necessary corrections and modifications were made before administering it finally to the study participants. Information sought from the respondents included demographic data, educational background, knowledge about the risk factors, causes, management and prevention of malnutrition in children.

### Data analysis

The data collected was cleaned and checked for completeness and consistency. The data was coded and entered using Epi Info and exported to SPSS version 22.0 for further analysis. Descriptive statistics such as frequencies and proportions were computed. The results were presented in the form of tables and percentages.

### Ethical issues

Approval for data collection was obtained from the various principals and heads of departments in each participating nurses training institution. The participants were given a cover letter and written information regarding the aim of the study, voluntary participation, and confidentiality of data collected. Confidentiality was again ensured by omitting the names of the respondents from the questionnaire. The students were informed by the researchers that the study was not being conducted to grade them but to obtain an idea about their nutritional knowledge regarding the management of malnutrition for research and academic purposes.

## Results

### Background information of participants

The background information of the respondents is presented in Table 1. Results from Table 1 show that most (81%) of the respondents were within 18-24 years age category. Findings further revealed that majority (83%) of the respondents were females. Also, findings show

that most (91%) of the respondents were Christians. Findings from Table 1 also revealed that majority (96%) of the respondents were single. All the study participants at the time of the study had completed a nutrition-related course, Public Health Nutrition, as part of their training.

### Knowledge levels on causes of malnutrition

The knowledge level of respondents on the causes of malnutrition is summarized in Table 2. A higher proportion (81.0%) of the respondents knew that the major cause of malnutrition in children is under nutrition. Majority (89%) of the respondents knew that a lack of protein in the diet of children leads to Kwashiorkor. Most of the surveyed students also knew the functions of carbohydrates and proteins. However, less than half (43%) of the respondents knew that low educational level of mothers is not one of the underlying causes of malnutrition in children. Again, about 40% of the students did not know that unhealthy environment is one of the underlying causes of malnutrition. The results also suggests that majority of the surveyed students were not conversant with the immediate causes of malnutrition which are inadequate dietary intakes and childhood diseases. As presented in Table 2, majority (66%) wrongly indicated that measles is not an immediate cause of malnutrition.

### Knowledge levels on management of malnutrition

The knowledge level of respondents on the management of malnutrition is summarized in Table 3. As presented in Table 3, generally majority of the students had low or inadequate knowledge regarding the World Health Organization's steps in managing malnourished children less than five years. For example, only 9% of the respondents knew that the first step during the stabilization phase is to prevent hypoglycemia in malnourished children. Again, the findings revealed that only 31% of the respondents knew that iron should not be given to malnourished children during the stabilization phase. Approximately 40.0% of the respondents knew that children with severe acute malnutrition can only be discharged from treatment when their mid-upper arm circumference (MUAC) increased to  $\geq 125$  mm, the weight- for- height z- score was  $\geq -2$  in addition to the absence of oedema for two (2) weeks. The findings further indicate that only 40.0% knew that convulsing children should not be treated at the outpatient care department.

### Knowledge level on prevention of malnutrition in children

The knowledge level of respondents with regard to the prevention of malnutrition among children is summarized in Table 4. Generally, a higher proportion of the surveyed students knew the nutritional

Variable	Frequency	Per cent (%)
<b>Age</b>		
18-24 years	162	81.0
25-30 years	32	16.0
31 and above	6	3.0
<b>Sex</b>		
Female	166	83.0
Male	34	17.0
<b>Religion</b>		
Christian	182	91.0
Muslim	16	8.0
Other	2	1.0
<b>Marital status</b>		
Married	8	4.0
Single	192	96.0

Table 1: Background Information of Community Health Nursing Trainees.

Variable	Frequency	Per cent (%)
<b>Which of the following is most likely to cause malnutrition?</b>		
Anaemia	30	15.0
Exercise	0	0.0
Growth	8	4.0
<b>Undernutrition</b>	162	81.0
<b>Lack of protein will lead to which of the following condition?</b>		
Diarrhoea	0	0.0
<b>Kwashiorkor</b>	178	89.0
Marasmus	22	11.0
Measles	0	0.0
<b>Which of the following diseases occur as a result of lack of carbohydrates?</b>		
Diarrhoea	18	9.0
Kwashiorkor	20	10.0
<b>Marasmus</b>	160	80.0
Measles	2	1.0
<b>Which of the following is not a risk factor in less than five malnutrition?</b>		
Childhood diseases	10	5.0
Family size	18	9.0
Food intake	8	4.0
<b>Growth</b>	164	82.0

Note: The highlighted items in the tables above are the correct answers for the questions

<b>Which one of the following is the major function of protein?</b>		
<b>Body building</b>	176	88.0
Lubrication of joints	14	7.0
Maintain water balance	6	3.0
Supply energy	4	2.0
<b>Which of the following is the major function of carbohydrates?</b>		
Body building	14	7.0
Lubrication of the joints	0	0.0
Maintain water balance	6	3.0
<b>Supply energy</b>	180	90.0
<b>Which of the following maternal characteristics is not responsible for malnutrition?</b>		
Maternal disease	22	11.0
Maternal education	20	10.0
<b>Maternal friendship</b>	144	72.0
Maternal nutritional status	14	7.0
<b>Which of the following is not part of immediate causes of malnutrition?</b>		
Hookworm infestation	50	25.0
Measles	132	66.0
Poor diet	8	4.0
<b>Poverty</b>	10	5.0
<b>Which of the following is not part of the underlying causes of malnutrition?</b>		
Unhealthy environment	80	40.0
Inadequate child care	22	11.0
Insufficient health care	12	6.0
<b>Low mother educational level</b>	86	43.0

Note: The highlighted (in bold) options in the table are the correct answers for the questions

Table 2: Nursing Trainees Knowledge levels on the causes of malnutrition in children.

strategies or measures that can be "employed" to prevent malnutrition in infants and young children. For instance, majority (96%) of the respondents knew that the ideal food for new born babies until they attain six months of age is breast milk. Again, most of the study participants (88%) knew that breast feeding should be initiated within one (1) hour after delivery. The results also indicates that majority - 87% and 84% - were conversant with recommended breastfeeding

Variable	Frequency	Per cent (%)
<b>How soon should a child receive a malnutrition care plan?</b>		
Before end of day	4	2.0
<b>Immediately</b>	166	83.0
Within 12 hours	6	3.0
Within 24 hours	24	12.0
<b>Which of the following is the first step in malnutrition management according to WHO?</b>		
Treat dehydration	84	42.0
<b>Treat hypoglycaemia</b>	18	9.0
Treat hypothermia	40	20.0
Treat infections	58	29.0
<b>Which of the following should not be given with antibiotics in the stabilization phase?</b>		
Iodine	54	27.0
<b>Iron</b>	62	31.0
Magnesium	40	20.0
Potassium	44	22.0
<b>Children with severe acute malnutrition should be assessed for all except ...</b>		
Appetite	76	38.0
Medical complications	8	4.0
<b>Medical emergency</b>	68	34.0
Oedema	48	24.0
<b>Children with severe acute malnutrition should only be discharged from treatment when ...</b>		
MUAC $\geq$ 125 mm	58	29.0
No oedema for 2 weeks	32	16.0
Weight for height $\geq$ -2 Z-score	30	15.0
<b>All the above</b>	80	40.0
<b>All the following signs indicate that the child can be treated at the outpatient department except ...</b>		
Alert	22	11.0
Clinically well	60	30.0
<b>Convulsion</b>	80	40.0
Has appetite	38	19.0

Note: The highlighted (in bold) options in the table are the correct answers for the questions

Table 3: Nursing Trainees Knowledge levels on the management of malnutrition.

Variable	Frequency	Per cent (%)
<b>The ideal food for newborns and infants up to six months is ...</b>		
<b>Breast milk</b>	192	96.0
Cereals	2	1.0
Lacteals	6	3.0
Lactogen	0	0.0
<b>When should breast feeding be initiated after delivery?</b>		
1 hour after delivery	10	5.0
12 hours after delivery	4	2.0
<b>Within 1 hour after delivery</b>	176	88.0
within 12 hours after delivery	10	5.0
<b>What is/are the importance of breastfeeding to the child?</b>		
Provides nutrients for growth and development	42	21.0
Prevents diseases	28	14.0
Promotes mental development	2	1.0
<b>All the above</b>	128	64.0
<b>At what age in months should complementary feeding start?</b>		
Before 4 months	0	0.0
Before 6 months	6	3.0
<b>At 6 months</b>	44	22.0
After 6 months	150	75.0

<b>How many times should a child be breastfed daily after 6months?</b>		
<b>On demand</b>	174	87.0
Once	0	0.0
Twice	2	1.0
Thrice	24	12.0
<b>How long should a child be breastfed?</b>		
6 months	18	9.0
1 year	4	2.0
1.5 years	10	5.0
<b>2 years and beyond</b>	168	84.0
<b>Which of the following interventions are provided to prevent malnutrition among children?</b>		
Immunization	30	15.0
Oral rehydration	14	7.0
Periodic deworming with 6 months intervals	14	7.0
<b>All the above</b>	142	71.0
<b>Which nutrients supply energy to the bodies of growing children?</b>		
<b>Fats and carbohydrates</b>	174	87.0
Fats and vitamins	12	6.0
Minerals and vitamins	12	6.0
Minerals and water	2	1.0
<b>What are the main or major sources of proteins?</b>		
Animal sources	26	13.0
<b>Both plant and animal sources</b>	162	81.0
Plant sources	12	6.0
Do not know	0	0.0

Note: The highlighted (in bold) options in the table are the correct answers for the questions

Table 4: Nursing Trainees knowledge levels on prevention of malnutrition among children.

practices such as breastfeeding on demand and to two(2) years and even beyond respectively. In addition, most (75%) of the respondents knew the recommended age to commence complementary feeding for infants. As presented in Table 4, a higher percentage (71%) of the respondents knew that the interventions that can be undertaken to prevent malnutrition among children include immunization, giving oral rehydration and periodic deworming with six (6) months intervals.

## Discussion

A higher proportion of the respondents knew that lack of proteins and carbohydrates in the diet of children will lead to kwashiorkor and marasmus respectively. In addition, majority of the respondents knew the functions of protein and carbohydrates. This suggests that most of the nursing trainees have adequate knowledge about the functions and deficiencies that can result from lacking these nutrients. The findings in this study corroborates with that of a related study among working nurses in which majority, 75% and 85% knew that a deficiency of carbohydrates and proteins in children results in marasmus and kwashiorkor respectively [30]. These findings implies that generally, nursing trainees may have adequate knowledge on the nutritional causes of malnutrition and suggests that during health education talks at health facilities or community outreach programmes, they are likely to be in a better position to educate caregivers on these causes of malnutrition.

The results indicate that a higher percentage (81.0%) demonstrated a high level of knowledge regarding the most likely cause of malnutrition that is under nutrition or inadequate nutrition among children under five years. This confirms the study of Morge et al. in which 92% of the

study participants knew that under nutrition is the commonest cause of malnutrition in children [30]. In substantiating these findings, Basit et al. also emphasized that under-nutrition is one of the most common causes of malnutrition which accounts for 60% of the 10.9 million mortality cases that occur annually among children under five years of age [31].

A significant proportion of the respondents knew that the potential risk factors of malnutrition in children under five years include maternal education, maternal diseases and maternal nutrition corroborating with the findings of previous studies in which professional nurses obtained high scores on questions that assessed their knowledge levels on the causes of malnutrition in children [25,30]. For example in the study by Morge et al. among professional nurses in Northern Ghana, whereas the surveyed nurses obtained a mean score of 73.7 percent on questions that assessed their knowledge levels on the causes of malnutrition in children, they obtained a lower mean score (46.8%) for questions that evaluated their knowledge on treatment and management of hypoglycaemia and hypothermia in severe malnourished children [30]. The above finding demonstrates the high knowledge levels of professional nurses and nursing students on the causes of malnutrition in children. It has been reported in literature that the greatest contribution to the decline of malnutrition among children under five in the world today has been linked to mother's education [32,33]. In further confirming this assertion regarding the impact of the educational levels of mothers on the nutritional status of children, Flax found out that there is a positive correlation between maternal educational level and child's nutritional status perhaps because the knowledge gained by a mother can be translated into higher income levels and consequently better nutritional status of children [34]. Regarding maternal nutrition, evidence in literature indicates that mothers with a better nutritional status are likely to have children with improved nutritional status [35,36]. For example, the study of Ali et al. which was undertaken in Northern Ghana revealed that wasting was significantly higher among children of underweight (low BMI) mothers [35].

The findings further revealed that majority of the respondents knew that childhood diseases have a strong association with malnutrition in children substantiating the findings of a previous study in South Africa in which the majority of professionals nurses knew that the presence of diarrhoea, pneumonia, measles and malaria can negatively impact on the overall health of children making them more susceptible to malnutrition exhibited as wasting and underweight [26].

The findings indicate that majority of the respondents were of the view that malnutrition can be managed and that the management should start immediately after the child is identified without any delay to prevent any further complications. This implies that respondents will be able to take appropriate actions when cases of malnutrition are identified in their communities. However, a higher proportion of the respondents had low or inadequate knowledge regarding the World Health Organization's steps in managing malnutrition among children less than five years. For example, only 9% of the respondents knew that the first step during the stabilization phase is to prevent hypoglycaemia in malnourished children. This poor knowledge levels of nurses concerning the management of malnutrition among children has been indicated in some related studies [23,30]. In the study of Mogre et al., only 38.5% of the nurses knew that the first essential step of WHO'S guidelines on the management of severely acute malnutrition (SAM) is to treat or prevent hypoglycaemia [30,37,38]. Similarly, in another study in Kenya, it was reported that only 29.9% of malnourished children

admitted to the ward had random blood sugar (RBS) tests performed on them and only 34% of the patients received their initial feed after 19 hours of admission in the treatment and prevention of hypoglycemia [39]. Likewise, in the study of Anthony undertaken in South Africa, health professionals failed to monitor the blood glucose levels of 70% of severely malnourished children who were admitted to the ward [26]. In another study which sought to assess the level of adherence to Ministry of Health guidelines in the management of Severe Acute Malnutrition at Garissa Provincial General hospital, Garissa, Kenya, it was reported that appropriate management was documented in only 14.6% of the admitted children for hypoglycemia [40]. In the study of Warille which was conducted in South Sudan, it was found out that prompt diagnosis, treatment and prevention of hypoglycaemia was inadequately done at the Out Patient Department suggesting the low level of priority given to the urgency in assessing the blood glucose levels of malnourished children [41].

The findings further revealed that a higher proportion of the respondents did not know that iron should not be given to malnourished children during the stabilization phase as it may interfere with the functions of antibiotics during the management of malnutrition among children. Giving iron to SAM children worsens any existing infections and damages the cell membranes. Iron supplementation can only be started during the rehabilitation phase when the child has had time for the antibiotics to work on the pathogens, when micronutrient deficiencies are at least partially corrected and the oedema has cleared [42]. This poor knowledge of nurses concerning the administration of iron medications during the stabilization phase in the management of malnutrition was also demonstrated in the study of Mogre et al. where 57% of the nurses did not know that it is not appropriate to prescribe iron to treat anaemia in the initial phase as it could result in the death of severely malnourished children [30]. In another related study, it was reported that in many hospitals, one of the dangerous practices in managing malnourished children was the giving of iron to treat anaemia in the initial phase [42]. Similarly, in another study conducted among medical officers in South Africa, majority (67%) of the study participants had poor knowledge regarding the stage that an infant with malnutrition and anaemia should be given iron supplements [24].

Most of the respondents did not know that children with severe acute malnutrition should be assessed for appetite, medical complications and oedema. Majority 60.0% of the respondents did not know that children with severe acute malnutrition can be discharged from treatment only after their mid-upper arm circumference (MUAC) has increased to  $\geq 125$ mm and oedema is absent for at least two (2) weeks. The findings further showed that a significant proportion of the respondents (60.0%) did not know that when a child is convulsing he or she cannot be treated at outpatient care. The findings above indicate that the level of knowledge on management of malnutrition among the respondents is low and inadequate and suggests that they may not be in a better position to manage malnutrition cases effectively in their health facilities when they graduate and are given the license to work as professional nurses. This confirms the findings reported in similar studies in which majority of health professionals had poor or inadequate knowledge about appropriate management of malnutrition among children [24-27,30]. The findings from this study further suggest that it is likely that the WHO guidelines for the management of malnutrition among children fewer than five years is not included or extensively covered in the curriculum of the community health nursing training programme.

The results indicate that generally, most of the surveyed nursing

trainees were familiar with the recommendations for appropriate breastfeeding of infants and young children such as exclusive breastfeeding for the first 6 months of life, breastfeeding on demand and until the child attains two years and above. In other related studies, it was indicated that nurses and midwives had adequate knowledge on exclusive breastfeeding [43]. The findings also show that most of the respondents had adequate knowledge on when to initiate breastfeeding after delivery. The findings demonstrate that respondents will be able to encourage and motivate mothers to initiate breastfeeding within 1 hour after they have delivered safely. The results further revealed that most of the respondents (75%) knew that complementary feeding should be started after six months of age. Most of the respondents knew that a child should be breastfed for up to two years or more. These findings are good indications that the respondents would be able to counsel mothers and conduct public health education programmes effectively on recommended breastfeeding and complementary feeding practices in their catchment areas after their training which will help prevent or reduce the prevalence of malnutrition among children. Also, the findings reveal that majority of the respondents had adequate knowledge about interventions that can be implemented to prevent malnutrition among children. Ample evidence in literature indicates that health services such as the use of oral rehydration solution, immunization, vitamin A supplementation, nutrition and health education focusing on exclusive breast feeding up to 6 months of age, complementary feeding after 6 months of age when provided as part of growth monitoring and promotion, helps to reduce malnutrition in children [44,45]. Contrary to findings in this current study, in a related study, it was found out that health workers demonstrated poor knowledge in areas such as prevention of malnutrition and choice of nutritional support in malnourished patients [25].

## Conclusion

Findings arising from this study reveal that community health nurses trainees knowledge levels on the causes and prevention of malnutrition in children less than five years was good. However, findings from this study generally highlight poor and inadequate knowledge levels on the management of malnutrition, which is an indication that community health nurses trainees have not been adequately trained to enable them effectively manage malnourished children after their qualification as professional Community Health Nurses.

Findings from this study also suggest that the management of malnourished children might have been overlooked or given less attention in the community health nursing training curricula and that specific child or pediatric nutrition courses or topics should be included in the curricula. This is particularly important to community health nurses, since they provide direct healthcare services such as being actively involved in community outreach health programmes and also identifying and referring individuals, families and groups at risk for nutritional deficits at the community-level. Findings from this study demonstrate and reiterate the need to update and strengthen the content of the nutrition curriculum in collaboration with experts in nutrition such as dietitians and public health nutritionists. In addition, developing a child nutrition resource toolkit to suit the Ghanaian context which can be approved and adopted for use by all nursing training institutions. The findings also call for the need to conduct regular refresher workshops for nursing tutors who teach nutrition-related courses. It is also worthwhile considering giving community health nursing students and opportunity to apply their theoretical knowledge on the field while being mentored by dietitians or public health nutritionists as part of the curriculum for their training.

## Additional Points

### Data confidentiality and consent to participate

Data were collected using an anonymous self-administrated questionnaire. All respondents provided informed consent and were given assurance of confidentiality that the information gathered will be used exclusively for research purposes. The participants were given a cover letter and written information regarding the aim of the study, voluntary participation, and confidentiality of data. A written consent form was attached to the questionnaire for participants consenting to participate to be signed before completing the questionnaire.

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