Research Articles

Knowledge, confidence and skills of midwives in maternal nutrition education during antenatal care

Joyce Nankumbi¹, Tom D Ngabirano¹, Gorrette Nalwadda¹

¹ Department of Nursing, college of Health science, Makerere University, Kampala, Uganda

Keywords: antenatal care, pregnancy, maternal nutrition

<https://doi.org/10.29392/001c.12886>

Journal of Global Health Reports

Vol. 4, 2020

Background

Maternal nutrition during pregnancy affects the health of the mother and baby. Midwives are suitably well placed to offer nutrition education to pregnant women, however they may not be equipped with the necessary skills to deliver nutrition education to pregnant women. The aim of this study was to explore the midwives knowledge, confidence and skills to conduct maternal nutrition education (MNE) in an antenatal care clinic, Kampala, Uganda.

Methods

The study employed an exploratory qualitative design. Six in depth interviews, 6 direct observations for group education, and 12 observations of one-on-one midwife- pregnant woman interaction were conducted. The transcribed interviews and field observation notes were analyzed using latent content analysis.

Results

The midwives demonstrated good communication/facilitation skills during the sessions, and highlighted the nutrient rich dietary sources, increased nutrient demand, as well as food safety and hygiene requirements. Overall midwives' MNE knowledge and skills were limited and had moderate confidence in performing the MNE. Midwives were ignorant about the maternal nutrition guidelines. Relevance of appropriate weight gain during pregnancy, guidelines for healthy habits, avoidance of substance abuse and nutrition precautions in special circumstances were missing in MNE. Information given to the pregnant women, MNE resources, infrastructural, and health systems gaps were identified.

Conclusions

There is need for alternative innovative MNE delivery models, and strengthening capacity of midwives in MNE.

Good nutrition care during pregnancy is important for the health of the mother and the growth of the fetus. Pregnancy is a crucial time to promote health behaviors and parenting skills. The incidence of dietary inadequacies as a result of dietary habits and patterns is higher during pregnancy than at any other stage of the life cycle.¹ Nutrition knowledge is predictive of positive change in dietary habits and health advices encourage expectant women to advance their food intake.² Despite the evidence that maternal nutrition education approach is associated with positive pregnancy outcome, research has shown that pregnant women might not be receiving nutrition advice from the midwives during antenatal care yet midwives are in a strategic position to offer nutrition education and counseling to pregnant women.³ This could be due to the fact that midwives lack a basic knowledge of nutrition requirements during pregnancy.⁴ Lack of knowledge could be linked to inadequate spe-

cific training for the midwives regarding nutrition.^{5,6} Since nutrition education is considered to have an impact on the health of the pregnant women. The role of midwives in maternal nutrition education during pregnancy is increasingly being recognized.⁷⁻⁹ There is also a compelling need to significantly improve nutrition education for health care professional and to establish curricular standards and essential nutrition competencies in the education, training, and continuing education for health care professionals including midwives.⁹

On the other hand, in Uganda ninety five percent of pregnant mothers receive antenatal care (ANC) from a skilled attendant, 80% of women receive the antenatal care from a midwife or a nurse and 48% of women attend antenatal care clinic for four times or more.¹⁰ This high ANC attendance provides a missed opportunity for nutritional education to such women. In fact, pregnant women are very inter-

ested in receiving such information.^{11,12} The confidence of midwives in providing nutrition education has been shown to be a powerful predictor of the maternal nutrition education behavior. Inadequate nutritional training of midwives reduces their confidence to provide nutrition education to pregnant women.¹³ Further still, the Uganda maternal and child nutrition guidelines emphasize that pregnant women should be educated on; the importance of adequate nutrition during pregnancy, relevancy of weight gain during pregnancy, increased nutrient requirements, nutrient rich dietary sources, importance of micronutrient supplementation during pregnancy, appropriate food preparation, safety and hygiene methods.¹⁴ With such existing guidelines on maternal nutrition to inform midwives, there is scanty literature about their implementation and how such interventions can best be delivered to pregnant women. The midwives' knowledge and skill set in the provision of nutrition care to pregnant women are not well documented. Therefore this study gives a reflection of the identified knowledge, confidence and skills of the midwives in conducting MNE to pregnant women during antenatal care.

METHODS

Under this section, the paper describes the methods that were undertaken to conduct the research.

STUDY DESIGN

Non participant structured observations of the nutrition education sessions with pregnant women during antenatal were conducted. Midwives were observed giving the group education as well as one-on-one midwife- pregnant woman interaction. We also conducted in-depth interviews with the midwives who are involved in direct care of the pregnant women. In-depth interviews are useful and appropriate especially when detailed information about a person's thoughts and behaviors is needed. Interviews are often used to provide context to other data.^{15,16} We conducted structured observations because they are ideal for the explanation of information behavior.¹⁶ We conducted six indepth interviews, six direct observation for maternal group education and 12 observation of the one on one midwife and mother interaction.

In this study a nutrition education session was defined as any set of planned educational activities that involves teaching pregnant women about nutrition, providing educational materials that reinforce messages about health eating, teaching nutritional skills essential for making dietary change and providing information on how to sustain the dietary behavior. Group nutrition education sessions included all sessions where the midwife gave nutrition education to a group of pregnant women attending ANC. One on one interaction was defined as an interface between a midwife and a pregnant woman with the intention of antenatal care service provision including nutrition education. An explorative qualitative study approach was adopted because it was the most appropriate research design for a study with a high levels of uncertainty and ignorance about the subject, as well as scanty literature on the subject matter.¹⁷

STUDY SETTING

The study was conducted at an urban ANC clinic in Kampala, Uganda. This hospital has one of the busiest maternity units in the world with about 60 deliveries in a day. The ANC offered care to pregnant women of various ethnicities, social-economic classes and religions. This clinic operates on weekdays from Monday to Friday starting at 8.00 am up to 5.00 pm. The clinic offers a number of services including; HIV counseling and testing, syphilis screening, health education, screening and examination of pregnant women and referral services. The clinic is majorly manned by midwives. According to the hospital records, a total of 2155 mothers attended antenatal between January and March 2015 and the clinic had a capacity of 29 midwives at the time of the study.^{18,19}

DATA COLLECTION PROCEDURE

Observations for the group sessions were conducted during the morning hours and the one-on-one interactions continued during the clinical examination of the pregnant women by the midwife. The observations focused on the conduct of the sessions, content of the nutrition education, planning and preparations for the education activities, documentation of the nutrition education activities as well as resources and material available at the clinic including information, education and communication (IEC) materials. The observations also included verbal behavior, body language and physical objects or resources used during the education sessions. Midwives who were educating the pregnant women on maternal nutrition were observed during the teaching sessions and during the one-on-one midwife and pregnant woman interaction. The observations were sequential where by the researcher moved to the clinic on consecutive days during the period of data collection. Each midwife was observed at least twice giving the group nutrition education.

Data were collected between January and February 2016. The purpose and procedure of the study were explained to the midwives in order to obtain permission to conduct the study in the clinic. After informed consent, the researcher together with each midwife identified the appropriate time and venue for conducting the indepth interviews. A structured observation checklist and an open ended in depth interview guide were used to collect data. The in-depth interview lasted between 30-60 minutes and each interview was tape recorded and notes were also taken. A structured non-participant observer method was used for the observations. This allowed looking out for specific behavior without interference with the sessions. This involved the researcher getting into situations where behavior, interactions, organizational practices was observed first hand.¹⁶ The observer was visible and known to the study participants.

SAMPLING

The research team utilized a systematic approach in the identification of the study participants

Data collection procedure. We approached the midwives for an introduction to the midwives that were working in

the clinic during the data collection period. Midwives who were directly involved in the day to day care of the women with a focus on health education including nutrition education were included in the study.

DATA ANALYSIS

Before data was analyzed, the recorded data was transcribed verbatim. The process of transcribing allowed the researchers to be acquainted with the data.²⁰ Microsoft word files for the interviews and observations notes were created. The files were protected by setting a password and they were saved in a portable computer which can only be accessed by the researchers. The data were analyzed manually using latent content analysis approach. The researchers used an interview and observation as the unit of analysis for coding. This means that the data was not coded sentence by sentence or paragraph by paragraph but coded for meaning.²¹

The transcripts were read and re-read by the researchers to develop coding categories and a code book was developed to ensure consistent application of the final coding categories. The data was then coded independently by the three researchers. The codes were later reviewed by all the researchers to ensure agreement and consistency of meaning in situations where differences arose. The agreed upon codes were synthesized and grouped into exhaustive sub categories which were then merged into themes. These represented the most common issues that emerged in the interviews and observations.²²

ETHICAL CONSIDERATIONS

Ethical review and approval was obtained from the School of Health Sciences research ethics committee (REF: 2015-026). The ethics committee housed in the college of Health sciences, Makerere University, Kampala Uganda. Administrative clearance was also sought from the hospital administration and clinic in-charge. Consent was sought from the study participants after provision of the study information. Confidentiality and privacy was maintained throughout the study period. The data collected was strictly for the research purpose and anonymity was maintained.

RESULTS

There were 3 major themes that arose from the data including; education skills of the midwives, nutrition knowledge of the midwife and the maternal nutrition education confidence of the midwife.

SOCIODEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS

The midwives who participated in the in-depth interviews were all females. Their ages ranged between 35 to 50 years and most of them were married. Four of the midwives interviewed were registered midwives with a diploma in midwifery, one midwife was at the enrolment level with certificate in midwifery and a midwife with a bachelors degree. In addition to the midwife's qualifications some had also

received additional training in health management as well as other professional development trainings. Only one midwife had received inservice training on nutrition. The experience of the midwives in antenatal care ranged between five and 13 years (Table 1).

MATERNAL NUTRITION EDUCATION SKILLS OF MIDWIVES

Most midwives demonstrated control of the environment despite interference from various sources and they were adequately audible. The midwives demonstrated good communication skills during the sessions. They demonstrated a good command of the information given to pregnant women however the information was limited in depth and scope. Much of the information was not given to the pregnant women and the midwives spent a limited time talking about maternal nutrition.

In most circumstances, midwives did elicit prior knowledge of the pregnant women about nutrition and checked their understanding at the end of the session. However it was also noted that in many circumstances, women did not actively participate in the education sessions. In this, women did not ask any questions at the end of the session which sometimes could imply that the women did not understand what had been communicated to them. Some midwives never participated in the education sessions due to a language barrier since the sessions were conducted in the local language that they were not familiar with. Some midwives spent as only as 5 minutes talking about nutrition in the entire session yet the sessions were only given on the first antenatal visit for each attending pregnant woman. This gave a doubtful effectiveness of the maternal nutrition education. Some midwives were not sure of what to do during the nutrition education.

Some midwives demonstrated time management were for each session and most of them did not exceed 30 minutes while giving the entire education session. In one of the in depth interview the midwife reported that;

MATERNAL NUTRITION EDUCATION KNOWLEDGE OF THE MIDWIVES

The following sub-categories merged from the data; diet composition and reasons for nutrition, maximizing locally available foods, food handling, hygiene and preparation, breastfeeding and its importance (Table 2) According to the maternal nutrition guidelines for Uganda, the midwives left out other information such as; information on importance of adequate nutrition during pregnancy, weight gain during pregnancy, guidelines for healthy habits, appropriate food preparation methods, avoidance of substance abuse such alcohol, drugs and smoking and nutrition precautions in special circumstances such as chronic diseases and medication. The information they educated the women about was limited to the subcategories described below.

DIET COMPOSITION, REASON FOR NUTRITION, AND FREQUENCY OF THE MEALS

The midwives educated women on having a balanced diet

Table 1. Sociodemographic characteristics of midwives at the hospital ANC

Interview Number	Sociodemographic Characteristics
Interview 1	Age: 56 years , single, Double trained, nurse midwife, started as Enrolled Midwifery, upgraded to Registered Midwife, training in Management
	Received extensive training in nutrition ;specifically Integrated Management of Acute Malnutrition(IMAM) trainer of trainees, International Baby Food Action Network (IBFAN) trainer
	20 years of experience as a midwife
	Six years in antenatal care
Interview 2	Age: 45 years, married, Bachelor trained midwife, started as a diploma midwife. Has training in management worked in midwifery
	5 years of experience in antenatal care
Interview 3	Age: 35 years old, married, Enrolled midwife with a certificate training
	Has not received any in-service training in nutrition except preservice training
	10 years of experience in antenatal care
Interview 4	Age: 47 years, married, Registered Midwife with a diploma
	Training in nutrition was related to breastfeeding in HIV positive mother
	7 years of experience in Antenatal care
Interview 5	Age: 43 years, single, Registered Midwife with a Diploma
	Received in service training on nutrition in HIV children , breastfeeding in HIV
	Has worked in Antenatal Clinic for 13 years
Interview 6	Age: 40 years, married, Registered midwife with a Diploma
	Only received pre-service training in nutrition
	Has worked in antenatal for 7 years

and increase on the number of meals in a day. They reported educating women on the various food groups in their diet; proteins, carbohydrates, fats, minerals and vitamins.

".....we tell them that every day they should be eating in each food group.... not only looking at one thing because they should have a colorful" (Interview with graduate midwife).

"I do tell them to eat foods which are rich in calcium and foods that they can easily access like the millet porridge, the mukene (silver fish), and milk " (Interview; midwife with diploma training).

"When it comes to fruits, we encourage them not to eat all fruits at the same time, like when they use a pawpaw today, tomorrow they can eat a mango, the other time they eat a water melon so that it becomes like a decoration in a family" (Interview; midwife with 10 years' experience in ANC).

"I tell them what type of food they are supposed to eat during pregnancy and after delivery and I also emphasize that that diet should be taken as early as possible before the person conceives" (Interview; midwife with 13 years' experience).

Midwives reported educating pregnant women on the importance good nutrition during pregnancy. However the importance was only limited to increasing body demand during pregnancy. One of the midwives pointed out;

"We tell them that when you are pregnant the nutrient

demand is increased – so you need also to have increased intake – because you are feeding two people – you are feeding yourself and the baby" (Interview; midwife with 6 years' experience in ANC).

MAXIMIZING NUTRITION USING LOCALLY AVAILABLE FOODS

Midwives encouraged women to consume food that are available and affordable to them. The midwives reported that the use of locally available foods was emphasized during the sessions. This was also evident from the observation of the maternal nutrition education. The account of the topic is given below.

We usually do not tell them to buy the expensive foods, we advice on the locally available food – It is only the variety which matters" (Interview with a graduate midwife).

We encourage them to eat foods which are rich in calcium; however we encourage them to eat foods that they can easily access like the millet porridge, mukene,(silver fish) the milk itself if a person can afford milk" (Interview; midwife with 7 years' experience in ANC).

FOOD HANDLING AND HYGIENE AND PREPARATION

Food handling, food hygiene and preparation practices were often included in the maternal nutrition education session. This was evident from the observations of the nutrition ed-

Table 2. Maternal nutrition knowledge and confidence of the midwives

Codes	Category	Theme
Increased demand during pregnancy	Reason for nutrition	Maternal nutrition knowledge of midwives
Eat the different food groups	Diet composition	
Nutrient rich dietary sources	Frequency of meals	
Foods rich in calcium		
Variety on the plate		
Eat 4-5 times a day		
Have three food groups at ago		
Use locally available foods	Locally available foods	Maternal nutrition knowledge of midwives
Women to eat what you can afford		
Mixing the foods available		
Wash hands before food and after toilet	Food handling	
Store food in clean container	Food hygiene	
Prepare food in a clean environment	Food preparation	
Wash all fruits with plenty of water	Breast feeding and importance of breast feeding	
Use little cooking oil		
Breast feed exclusively for six months and continue up to two years		
Importance of breast feeding to the baby and mother		
Capable of giving information		
Can deliver the information		
Am not well versed with the information	Ability to provide nutrition education	Confidence of the midwives
	Uncertainty about educating women	

ANC- Antenatal care clinic, MNE- maternal Nutrition Education

education sessions. The sentences below gave a reflection of education component.

"...hand washing and washing of the fruits is poor among women. Most of the time –women eat the fruits immediately they buy them from the vendors without washing . But we emphasize that whatever they buy, they should wash them and they should wash your hands with soap before and after eating" (midwife with 13 years' experience).

I usually talk about food handling because it is very important. If you do not tell them about food handling, then their nutritional status will be affected. We usually talk about – how they should handle and store food, the cleanliness, the environment – where they are preparing from and storing the food" (Interview; midwife with diploma training).

BREASTFEEDING AND ITS IMPORTANCE

Breast feeding and its role or importance was also included in some of the maternal nutrition education sessions and omitted in the others. However the midwives reported its emphasis as depicted from the in-depth interviews.

"....we start educating women on breastfeeding when

they are pregnant in order to prepare the mother, because breast milk is the best food for the infant for the first six months that is the only nutrition they need because it is balanced it has all the nutrients in it" (Interview; midwife with training in nutrition).

During the one on one interaction, midwives routinely asked women whether they were taking the iron-folic combination and were quick to prescribe the combination, however they barely mentioned to the women the importance of supplementation during pregnancy or asked women whether they were compliant or had challenges taking the supplements.

Form the finding, midwives have limited knowledge of the components of the nutrition education that should be offered during pregnancy in relation to what is recommended by the maternal nutrition guidelines. Even with the information they provided, the depth varied from individual to individual. All midwives had information gaps related to maternal nutrition education.

MIDWIVES CONFIDENCE TO CONDUCT NUTRITION EDUCATION

During the in depth interviews, midwives were asked to describe their confidence in providing nutrition education

to pregnant women and their spouses attending the clinic. They reported that they are able to educate women about nutrition although not sufficiently enough according to their own evaluation. Some attributed their ability or inability to the challenges they encounter in providing the nutrition education to pregnant mothers and their families. Among the challenges mentioned were language barrier, lack of resources and inadequate knowledge about certain aspects of maternal nutrition and education as well as large numbers of women turning up for the antenatal clinic. The following quotes give a reflection of the midwives' confidence in the nutrition education provision.

"I am not all that knowledgeable, but I can use the little knowledge I have". (Interview; midwife with 5 years' experience in ANC).

"I feel I can deliver the knowledge, however I have language barrier problem" (interview; midwife with 20 years' experience).

"May be I am capable but there are some challenges such as language barrier....that is where the gap is" (Interview; midwife with 7 years' experience in ANC).

"I may not be very confident now but if, I have been sensitized and educated on what to do and the resources are there, I can do the work" (Interview; midwife with 13 years' experience in ANC).

DISCUSSION

The study set out to identify the midwives knowledge, skills and confidence in the provision of maternal nutrition education. The study identified that in most of the sessions, midwives had good communication skills despite limited information. Communication during the education has to be effective in order to pass on the relevant messages to the women. Studies have shown that pregnant women are most receptive to educational messages about behavioral change. However most midwives are not well educated about nutrition for pregnancy.²³

The results showed that midwives had basic knowledge on nutrition but lacked the essential knowledge in regards to maternal nutrition education. The midwives had moderate confidence competent to provide maternal nutritional education to pregnant women. As proposed by Bandura is his self-efficacy theory, if individuals believe that they are not capable, they are less likely to even try a behavior.²⁴ This partly explains why the midwives in this study felt inadequately competent in the provision of comprehensive nutritional education to pregnant women. Individuals including midwives tend to select activities in which they feel confident and avoid those in which they do not feel confident. At the same time one of the midwives who had nutrition training mentioned that she had a language barrier that inhibited her confidence in providing the education. The level of confidence was not surprising given the knowledge that the midwives have about maternal nutrition education and nutrition in pregnancy in general. In a study done among Australian midwives in relation to knowledge, attitudes and confidence in the provision of nutrition education during pregnancy showed similar results were re-

ported.²⁵ In another systematic review, various studies reported that that midwives lacked basic knowledge and skills to provide reliable advice to pregnant women.²⁶ One's confidence is associated with knowledge about a particular aspect.²⁶ Therefore continued in-service education to improve midwives nutrition knowledge is essential for the realization of improved maternal nutrition during pregnancy. More so, in developing countries like Uganda where nutrition education is seen as one of the interventions to improving maternal nutrition and pregnancy outcomes.²⁷⁻²⁹

In most pre-service training, nutrition is not emphasized and midwives barely get any in service training yet midwives are in a strategic position to offer the maternal nutrition education. There is need to emphasize the powerful role of nutrition in nursing training and service.³⁰ Formal training of the midwives needs to be considered. It is also quite challenging to implement nutritional guidelines without adequate training in nutrition. These guidelines which are country specific form a basis for packaging and delivery of the nutrition messages. In another study conducted in Denmark, lack of knowledge among nurses was identified as one of the main barriers to nutrition practice including nutrition education.⁷ It is probable that the lack of appropriate nutrition education observed in this study can be partly explained by lack of nutrition education knowledge expressed by the midwives. As urged by²⁶, low nutrition knowledge leads to inappropriate nutritional practice. On the contrary, in a study done in New Zealand the midwives were knowledgeable about nutrition issues related to pregnancy and they also reported a high level of confidence on educating women about nutrition.³¹

Despite being aware of the ideal approach for the delivery of maternal nutrition messages, midwives were limited by resources. In this they lacked demonstration materials, visual aids, reading materials for continuous learning, this shows that the midwives had information on the best approaches to teach such larger groups. In a recent book by Bastable similar findings have been documented; the major barrier to patient education and among them are lack of resources, lack of confidence and competence, documentation difficulties and negative influence of the environment.³² It is important that the midwife creates an environment conducive for learning and makes it possible for the mothers to learn. More still, the midwives need to be reminded of their role in education of clients because they are important in the motivation for the healthy lifestyle during pregnancy. With sufficient dietary knowledge and teaching skills they can help pregnant women effect dietary changes by providing guidance and support in early in pregnancy.³³

LIMITATIONS FOR THE STUDY

In assessing the midwives confidence in the conduct of nutrition education, given that they were being asked about what they do, they could be a possibility of bias in reporting their confidence. However this was offset by adequate sampling as well as indepth analysis of the data. Reactivity by the study participants was also difficult to rule out given that the consent of the midwives was obtained before the observations. However we conducted more than one observation which gives an opportunity for the midwives to go back to

the routine activities. The topic under study had scanty literature specifically pertaining to the midwives, however, we did access and utilize the available information on the subject area. For future research, it would be relevant to conduct the study in different facility and focus on quality improvement issues as well.

CONCLUSION

The midwives good facilitation skills in conducting MNE however their knowledge was limited and this made the MNE inadequate. The midwives had a low conviction to conduct nutrition education due to facility related challenges. The results of the study highlight gaps in the maternal nutrition education in a hospital setting that can be improved to provide better services.

Acknowledgements: We appreciate the midwives who participated in the study and the hospital administration for the support throughout the study.

Funding: None.

Authors contributions: JN conceived the study, collected data, data analysis, and wrote the first draft of the manuscript. TDN and GN provided mentorship through out all stages of the study. All authors contributed to refinement of the study protocol and approved the final manuscript

Competing interests: The author completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available upon request from the corresponding author), and declare no conflicts of interest.

Correspondence to:

Joyce Nankumbi
Department of Nursing, College of Health Sciences
Makerere University
P. O. Box 7072
Kampala
Uganda
joynankumbi@chs.mak.ac.ug

This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY-4.0). View this license's legal deed at <http://creativecommons.org/licenses/by/4.0> and legal code at <http://creativecommons.org/licenses/by/4.0/legalcode> for more information.

REFERENCES

1. Merchant KM. Women's Nutrition Through the Life Cycle. In: *Women in the Third World: An Encyclopedia of Contemporary Issues*. ; 2014:165.
2. Becker GE, McCormick FM, Renfrew MJ. Methods of milk expression for lactating women. Becker GE, ed. *Cochrane Database of Systematic Reviews*. October 2008. doi:10.1002/14651858.cd006170.pub2
3. Labiner-Wolfe J, Fein SB, Shealy KR, Wang C. Prevalence of breast milk expression and associated factors. *Pediatrics*. 2008;122(Supplement 2):S63-S68. doi:10.1542/peds.2008-1315h
4. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 2006;3:77-101. doi:10.1191/1478088706qp063oa
5. Black RE, Alderman H, Bhutta ZA, Gillespie S, Haddad L, Horton S, et al. Maternal and child nutrition: Building momentum for impact. *Lancet*. 2013;382:372-375. doi:10.1016/S0140-6736(13)60988-5
6. Mazumder M, Hossain M. Duration of breastfeeding and its determinants in Bangladesh. *International Journal of Natural Sciences*. 2012;2:49-53. doi:10.3329/ijns.v2i2.11385
7. Biro MA. What has public health got to do with midwifery? Midwives' role in securing better health outcomes for mothers and babies. *Women Birth*. 2011;24:17-23. doi:10.1016/j.wombi.2010.06.001
8. El-mani SF. Knowledge, behaviour and practices of pregnant women in Wollongong regarding folic acid and iodine nutrition after the introduction of a mandatory fortification program. 2013.
9. Kris-Etherton PM, Akabas SR, Bales CW, et al. The need to advance nutrition education in the training of health care professionals and recommended research to evaluate implementation and effectiveness. *The American journal of clinical nutrition*. 2014;99(5):1153S-1166S. doi:10.3945/ajcn.113.073502
10. Uganda Bureau of Statistics (UBOS), ICF. *Uganda Demographic and Health Survey 2016*. Kampala, Uganda, and Rockville, Maryland, USA: UBOS and ICF; 2018. <https://dhsprogram.com/pubs/pdf/FR333/FR333.pdf>. Accessed May 12, 2020.
11. Kish L, Frankel MR. Inference from complex samples. *Journal of the Royal Statistical Society Series B (Methodological)*. 1974;1-37. doi:10.1111/j.2517-6161.1974.tb00981.x
12. Aubel J, Touré I, Diagne M. Senegalese grandmothers promote improved maternal and child nutrition practices: The guardians of tradition are not averse to change. *Soc Sci Med*. 2004;59(5):945-959. doi:10.1016/j.socscimed.2003.11.044
13. Black RE, Cousens S, Johnson HL, Lawn JE, Rudan I, Bassani DG, et al. Global, regional, and national causes of child mortality in 2008: A systematic analysis. *Lancet*. 2010;375:1969-1987. doi:10.1016/S0140-6736(10)60549-1
14. Ministry of Health Uganda. *Guidelines on Maternal Nutrition in Uganda*. Kampala: MOH; 2010.
15. Johnson JM. In-depth interviewing. *Handbook of interview research: Context and method*. 2002:103-119. doi:10.4135/9781412973588.n8
16. Legard R, Keegan J, Ward K. In-depth interviews. *Qualitative research practice: A guide for social science students and researchers*. 2003:138-169.
17. Reiter B. The Epistemology and Methodology of Exploratory Social Science Research: Crossing Popper with Marcuse. 2013.
18. Mulago Hospital. Antenatal Register. 2015.
19. Mulago Hospital. Mulago Records, Antenatal Records 2015. 2015.
20. Riessman CK. *Narrative Analysis*. Newbury Park, CA: Sage; 1993.
21. Kondracki NL, Wellman NS, Amundson DR. Content analysis: Review of methods and their applications in nutrition education. *Journal of nutrition education and behavior*. 2002;34:224-230. doi:10.1016/S1499-4046(06)60097-3
22. Stake RE. *Multiple Case Study Analysis*. New York: Guilford Press; 2013.
23. Bookari K, Yeatman H, Williamson M. Nutrition during pregnancy-exploring women's knowledge and models of nutrition communication. 2014.
24. Bussey K, Bandura A. Social cognitive theory of gender development and differentiation. *Psychological Review*. 1999;106:676. doi:10.1037/0033-295X.106.4.676

25. Arrish J, Yeatman H, Williamson M. Australian midwives and provision of nutrition education during pregnancy: A cross sectional survey of nutrition knowledge, attitudes, and confidence. *Women Birth*. 2016;29:455-464. [doi:10.1016/j.wombi.2016.03.001](https://doi.org/10.1016/j.wombi.2016.03.001)
26. Arrish J, Yeatman H, Williamson M. Midwives and nutrition education during pregnancy: A literature review. *Women Birth*. 2014;27:2-8. [doi:10.1016/j.wombi.2013.02.003](https://doi.org/10.1016/j.wombi.2013.02.003)
27. Girard AW, Olude O. Nutrition education and counselling provided during pregnancy: Effects on maternal, neonatal and child health outcomes. *Paediatr Perinat Epidemiol*. 2012;26(s1):191-204. [doi:10.1111/j.1365-3016.2012.01278.x](https://doi.org/10.1111/j.1365-3016.2012.01278.x)
28. Adhikari K, Liabsuetrakul T, Pradhan N. Effect of education and pill count on hemoglobin status during prenatal care in Nepalese women: A randomized controlled trial. *J Obstet Gynaecol Res*. 2009;35:459-466. [doi:10.1111/j.1447-0756.2008.00970.x](https://doi.org/10.1111/j.1447-0756.2008.00970.x)
29. Ahrari M, Houser RF, Yassin S, Mogheez M, Hussaini Y, Crump P, et al. A positive deviance-based antenatal nutrition project improves birth-weight in Upper Egypt. *J Health Popul Nutr*. 2006:498-507.
30. Devries S, Dalen JE, Eisenberg DM, Maizes V, Ornish D, Prasad A, et al. A deficiency of nutrition education in medical training. *Am J Med*. 2014;127:804-806. [doi:10.1016/j.amjmed.2014.04.003](https://doi.org/10.1016/j.amjmed.2014.04.003)
31. Elias S, Green T. Nutrition knowledge and attitudes of New Zealand registered midwives. *Nutrition & Dietetics*. 2007;64:290-294. [doi:10.1111/j.1747-0080.2007.00177.x](https://doi.org/10.1111/j.1747-0080.2007.00177.x)
32. Bastable SB. *Essentials of Patient Education*. Jones & Bartlett Publishers; 2016.
33. Wennberg AL, Lundqvist A, Högberg U, Sandström H, Hamberg K. Women's experiences of dietary advice and dietary changes during pregnancy. *Midwifery*. 2013;29:1027-291034. [doi:10.1016/j.midw.2012.09.005](https://doi.org/10.1016/j.midw.2012.09.005)