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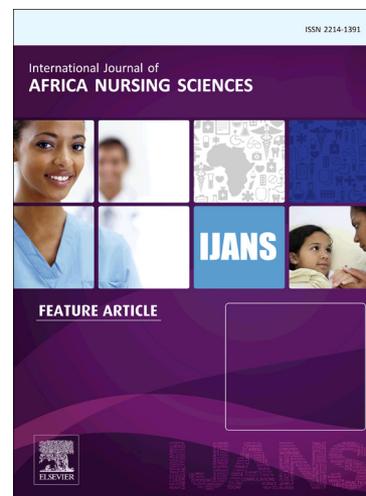
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A Feasibility Study of an Educational Program on Obstetric Danger Signs among
Pregnant Adolescents in Tanzania: A mixed-methods Study

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Abstract

Background: In Tanzania, adolescents have a high lifetime risk of dying from pregnancy and childbirth complications.

Objective: To determine the feasibility of an education program in improving knowledge of obstetric danger signs and promoting appropriate healthcare-seeking behavior, as well as encouraging the development of a peer network support group.

Methods: An embedded mixed-methods design was used. This research was a pilot study conducted in a health facility in rural Tanzania. Quantitative data was collected before and after the education program using questionnaires. Focus group discussion was used to collect qualitative data.

Results: 15 pregnant adolescents between 15 to 19 years of age participated. Their median age was 18.0 years ($SD \pm 1.19$), and 66.7% were ≤ 18 years. There was a significant increase in the scores of knowledge of danger signs during pregnancy between the pre-test ($M = 7.20$, $SD = 2.83$) and the post-test ($M = 9.07$, $SD = 1.67$); $t = 2.168$, $p = 0.048$. There was a significant strong positive correlation between the healthcare-seeking behavior score and social support score variables [$r = .654$, $p = 0.008$]. The education program was feasible in terms of implementation, acceptability, and demand as indicated by its $> 84\%$ score. Four categories were identified from the qualitative data: “supportive family”, “rejection and abortion”, “support from peers”, and “potential barriers to seek care”.

Conclusion: The development of an education program particularly on obstetric danger signs was feasible and helpful for pregnant adolescents in Tanzania.

Keywords: pregnancy, adolescent, obstetric danger signs, social support, healthcare-seeking behavior, antenatal care

ACCEPTED MANUSCRIPT

1. Introduction

There are about 16 million adolescent women aged 15-19 years who give birth every year worldwide, and 95% of these births are from low-income and middle-income countries (WHO, 2014). Pregnancy and childbearing among adolescents bring substantial social and economic costs in terms of immediate and long-term impacts on adolescent parents and their children (Martin, Hamilton, Osterman, Curtin & Mathews, 2015). Complications during pregnancy and childbirth are the second leading cause of death in 15- year-old to 19-year-old adolescent women globally (WHO, 2014).

Tanzania remains to be a low-income country and continues to be burdened with high adolescent fertility and maternal mortality rates (NBS & Macro, 2011). According to the 2015-2016 Tanzania Demographic Health Survey (TDHS), the percentage of pregnant adolescents or those who have already given birth has increased to 27% compared with the 23% reported in the 2010 TDHS. The average prevalence of pregnant adolescents in the community where the survey was conducted was estimated to be 30% (NBS & Macro, 2016). More than 43% of pregnant adolescents in Tanzania have been reported to give birth without professional care (UNICEF, 2011). Adolescent pregnancy is highest among girls from poorer households, living in rural areas, and those who have little or no education (Pradhan, Wynter & Fisher, 2015).

Economic deprivation causes young girls to engage in transactional or

unprotected sex to meet basic needs, or to improve their living conditions (McCleary-Sills, Douglas, Rwehumbiza, Hamisi, & Mabala, 2013; UNICEF, 2011). Consequently, pregnant adolescents become affected by several factors which include lack of social support, low knowledge of reproductive health, poverty, school dropout, sexual and physical abuse, and unfriendly health services (Madeni, Horiuchi & Iida, 2011; Mbelwa & Isangula, 2012; Rukundo, Abaasa, Natukunda, Ashabahebwa & Allain, 2015).

A number of youths from low-income families have insufficient information on reproductive health (Reina et al., 2010). Pregnant adolescents have low knowledge of obstetric danger signs compared with adult women (Pembe et al., 2009). Adolescent girls have limited access to information on reproductive health, and lack knowledge and motivation to use available health services (Aiko et al., 2014; Naigaga et al., 2015). Limited knowledge of obstetric danger signs has also been identified in a study on knowledge of obstetric danger signs and subsequent healthcare-seeking behavior in Tanzania (Mwilike, Nalwadda, Kagawa, Malima, Mselle & Horiuchi, 2018). Mwilike et al. (2018) found that older women were 1.6 times more likely to have knowledge of danger signs than younger women (OR 1.609; 95% CI 1.05-2.46).

Adolescents often do not seek health services because of their lack of knowledge, as well as the inappropriate care they receive from service providers and the community (Hokororo et al., 2015; UNICEF, 2011). Atuyambe et al. (2008) concluded

that adolescents had poorer healthcare-seeking behavior than adult women and experienced increased community stigmatization and violence, suggesting bigger challenges to adolescent mothers in terms of social support. Pregnant adolescents often face stigma and social exclusion (Hokororo et al., 2015; McIntyre, 2006). Nonetheless, unmarried adolescent women are more vulnerable than married adolescent women (Atuyambe et al., 2007).

An education program was developed to support vulnerable adolescent women from the challenges they are facing. As this is a new program that has been introduced into the health facility, its feasibility in terms of acceptability, implementation, and demand needs to be carefully assessed. The main objective of this study was to determine the feasibility of this developed education program in terms of increasing knowledge of obstetric danger signs, promoting healthcare-seeking behavior, and becoming part of a peer network support group among 15 pregnant adolescents between 15 to 19 years of age.

2. Methods

2.1 Design

An embedded mixed-methods design was used for this study. In a one-phase approach, qualitative data were embedded during the intervention phase when a researcher aimed to qualitatively examine the intervention process in addition to the

quantitative outcome. Synthesizing complementary quantitative and qualitative results achieved a more complete understanding of the phenomenon (Creswell & Plano, 2011). The main part of the present project was the quantitative part. The qualitative part was embedded to further clarify and explain the study variables.

2.2 Participants

The inclusion criteria for pregnant adolescents in this pilot study were as follows:

(1) between 15 to 19 years of age and (2) can read and speak Swahili language.

The sample size was estimated to be 12 participants. This estimation was based on the recommendation for a feasibility study (Julious, 2005; Feeley, et al., 2009). This was the initial phase of the study and similar studies were not found. Moreover, no scientific formula was used to estimate the sample size. Therefore, a comparison group was not included in this pilot study phase, although caution was exercised in the interpretation of findings. A control group will be included in a subsequent phase of a similar study.

2.3 Development of research instrument and focused group discussion (FGD)

questions

2.3.1 Quantitative data

One questionnaire that was composed of four unique subscales was administered.

The four subscales included *knowledge of obstetric danger signs, health-seeking behavior, social support, and women's perception about healthcare providers*. The pre-test questionnaire was used to collect sociodemographic data, and to assess knowledge, healthcare-seeking behavior, perception of social support, and women's perception about healthcare providers. This questionnaire was used before starting the education program. Immediately after the education program, the post-test questionnaire which assessed knowledge of obstetric danger signs, healthcare-seeking behavior, and evaluation of the program was administered. The questionnaire was pre-tested among five adolescents in another facility site which was different from the present study site to check for clarity and to ensure validity. Social support measurement was adapted from a validated questionnaire (Gee & Rhodes, 2008).

The items on *social support to pregnant adolescents* were developed by the researcher and the other items were modified from a previous research on social support and social strain measure for minority adolescent mothers (Gee & Rhodes, 2008). A total of 10 items about the perceptions of pregnant adolescents concerning social support were asked using a 5-point Likert-type scale: (1) *strongly disagree* to (5) *strongly agree*. The total score range was from 10 to 50. A higher score indicated adequate social support.

Items on pregnant adolescents' *perceptions of healthcare providers* (i.e., midwives, doctors, nurses, maternal child health aides) were also developed by the

researcher after a thorough literature review. This part included 10 items answered using a 5-point Likert-type scale: (1) *strongly disagree* to (5) *strongly agree*. The total score range was from 10 to 50. A higher score indicated adequate support from healthcare providers.

There were 20 items about knowledge of obstetric danger signs. These items consisted of danger signs during pregnancy (10 items) and after delivery (10 items). These items were developed by the researcher in reference to the studies of Pembe et al. (2009) in rural Tanzania regarding women's awareness of danger signs of obstetric complications and in Ethiopia regarding knowledge of obstetric danger signs among pregnant women (Hailu, Gebremariam & Alemseged, 2010). The items were scored as 1 for 'Yes', 2 for 'No', and 3 for 'Do not know'. If a woman encircled 'Yes' for each item, this means that she is aware of a particular danger sign.

The items on healthcare-seeking behavior of pregnant adolescents were developed by the researcher, and some items were extracted from the study of Pembe et al. (2009). A total of 10 items have been scaled using a 5-point Likert-type scale: (1) *never* to (5) *always*. The score range evaluated was from 10 to 50. A higher score indicated appropriate healthcare-seeking behavior.

As the present research was a feasibility study aiming at obtaining findings that would help determine whether an intervention is acceptable and implementable, a set of post-test questions and FGDs were used for program evaluation (Bowen et al., 2009).

There were ten items for program evaluation which were divided into the following three sections: (1) implementation of the program [six items], (2) acceptability of the program to pregnant adolescents [two items], and (3) demand for peer network support group [two items]. The post-test evaluation of the program focused on the following areas: 1) what the participants learned from the program, 2) usefulness of the program content, 3) convenience of time and venue, and 4) formation of a peer network support group.

2.3.2 Qualitative data

The interviewer had a total of four questions/statements that were developed by the researcher following a review of reports in the literature. The questions focused on social support from the community and healthcare providers, healthcare-seeking behavior, and the participants' views on the idea of developing a peer network support group. The researcher supervised and coordinated the activity, and the research assistants led the discussion in one group.

The following questions were used as guide for the FGDs: 1) "How did your family, partner, or peers react when you first told them or when they discovered that you were pregnant?"; 2) "Who would you go to if you needed advice or information, for example, if you did not know where to get help after having a severe headache?"; 3) "What do you think about the idea of having a peer network support group?"; 4) "What is your experience with healthcare providers and the support that you received from the health

facility?

The discussions were recorded using an IC recorder and the audio recording of the FGDs was transcribed and translated by the researcher and another experienced research personnel.

2.4 Translation process

Quantitative data: Translation and back translation were carried out carefully. The questionnaire was developed in English and then translated to Swahili by the researcher. Back translation was carried out by another experienced researcher to ensure consistency of the intended information. A co-researcher was also asked to translate the questionnaire and then meet with the researcher to discuss and reach a consensus on the correct usage of words (WHO, 2018; Maneesriwongul & Dixon, 2004).

Qualitative data: Discussions were conducted in Swahili language which is the commonly used language for communication in the area. Data were transcribed and then translated into English by the researcher and a professional translation service. The English transcripts were used for further qualitative analysis.

2.5 Education program (See Table 1)

The education program developed was named “**Nipo Nawe!**” (I am with you!). The concept of the program is to help empower pregnant adolescents with

information about obstetric danger signs and to promote appropriate health-seeking behavior during the prenatal period. The program contents were developed by the researcher based on reports in the literature. During the training, the short story booklet entitled '*Nne na Tano*' written by Shimpuku and Madeni (2014) was also used. The specific objectives of the education program were to (1) improve pregnant adolescents' knowledge of obstetric danger signs, (2) promote pregnant adolescents' early and appropriate healthcare-seeking behavior, and (3) encourage pregnant adolescents to develop a peer network support group. **Table 1** shows a summary of the contents, methods, and evaluation for each program goal. The total allocated time for the whole education program and data collection was three hours.

2.6 Data collection and program offering

2.6.1 Recruitment strategy

After obtaining permission to collect data, the researcher (BM) and research assistants displayed posters of the education program at the RCHC (Reproductive and Child Health Clinic) two weeks before starting the program. The poster contained the following information:

"I AM HERE FOR YOU-NIPO NAWE PROGRAM! ...Dear pregnant women,
I would like to ask pregnant adolescent women to receive an invitation card to

participate in an education program. The education program will take about three hours...”.

The researcher and research assistants who were present at the study site were responsible for recruiting the participants. After providing the pregnant adolescents an explanation about the educational program, they were given an invitation card which indicated the date and venue of the education program as well as the contact information of the researcher. For those who voluntarily agreed to participate in the study, a consent form was provided. For those who were under 18 years of age, their parents/guardians were involved and if they agreed, the consent form was signed. When they attended an intervention, they were required to have a signed consent form. However, in Tanzania, adolescents who are already engaged in sexual activities (sexually mature) may also give their consent even if they are under 18, thus some adolescents who were married gave their consent to participate. During the intervention day, the participants were required to bring their signed consent form and identification card.

2.6.2 Program offering

All the participants were informed about the aims, methods, and ethical considerations of the study, and a pre-test questionnaire was administered. After

completing the questionnaire, this was collected by the researcher from the research assistants and sealed in an envelope. The time required for the respondents to complete the questionnaire was 20 minutes, which was administered by an interviewer. After finishing the pre-test questionnaire, the participants took part in the education program. They first had a lecture and discussion about normal pregnancy and obstetric danger signs. Later, they were given time to read the '*Nne na Tano*' booklet which was about two pregnant women with different healthcare-seeking behaviors followed by a discussion on the behaviors. Immediately after the program, they filled in the post-test questionnaire within the allotted time of 10 minutes.

After completing the post-test questionnaire, this was followed by FGD to obtain qualitative data. The group discussions lasted for 40 minutes each. The participants were asked to set group norms that were adhered to during the discussions. Two groups consisting of seven and eight participants each were formed. The researcher led the discussion in one group and a research assistant led the discussion in the other group.

2.7 Data analysis

2.7.1 Quantitative data

For quantitative analysis, descriptive statistics was used to summarize the participants' social demographic characteristics and reproductive history, social

support, and the participants' perceptions of healthcare workers. Frequencies and mean scores were used to summarize the data. Categorical data were analyzed using McNemar's test and correlation coefficient tests. Likert scale-type items were analyzed using the mean score test for each item. The pre-test scores were compared with the post-test scores for knowledge of obstetric danger signs and healthcare-seeking behavior using the paired t-test.

2.7.2 Qualitative data

Qualitative data were analyzed using the content analysis method. The audio recording information was transcribed and transcripts in Swahili language were prepared. Then, the transcripts were translated into English by the researcher and a professional translation service. The researcher carefully read through the translated scripts repetitively and compared them with the original Swahili transcript to check for accuracy. Another co-author (MO) helped in the data analysis to ensure accuracy of the translation. Thereafter, brief notes were written in the margin when interesting or relevant information was found. A list of the meaningful information found was made based on the concepts of the study interest, and codes were assigned. Then, the list was classified into categories and each category was examined in detail to determine whether it is in line with the study purpose. The researcher consistently cross-referenced between the English and Swahili transcripts to ensure the validity of the codes and categories.

The data were then presented in a text form. Content analysis was performed in several steps through many discussions among three authors (BM, OM, and SH). Validity of the qualitative data was based on triangulation, member checking, collaboration with participants, and academic advisor's auditing (Creswell & Miller, 2000). We discussed and analyzed among women's health and midwifery researchers and African adolescents. The process for analyzing the results of the focus groups followed the *consolidated criteria for reporting qualitative research (COREQ)* guidelines (Tong, Sainsbury, & Craig, 2007).

2.8 Ethical consideration

The study was conducted based on the principles of ethics such as harmlessness, voluntarily participation, anonymity, and protection of privacy and personal information. Research approval was obtained from XXXX (SL16-08) and the XXXX Research and Ethics Committee. The participants were given an invitation card to join the program on a voluntary basis. The questionnaires or transcripts did not have names but instead had code numbers to ensure anonymity. The researcher kept all the collected data and stored them securely in a locker to ensure protection of privacy.

3. Results

3.1 Sociodemographic characteristics of participants (Table 2)

A total of 15 pregnant adolescents participated in the study. Their ages ranged from 15-19 years. Their median age was 18.0 (SD \pm 1.19), and 66.7% were 18 years of age or below. Their marital status has been categorized into two types: *in union* (n = 9; 60%) which means married or living with a partner, and *not in union* (n = 6; 40%) which means single. Eighty percent of the participants have completed primary education as their highest level of education. Majority of the participants (n = 10; 66.7%) are engaged in small business activities, whereas the rest of the participants (n = 4; 26.7%) were housewives. More than half of the participants (n = 11; 73.3%) were pregnant for the first time. Eight participants (53.3%) had planned pregnancy whereas 7 participants (46.7%) had unplanned pregnancy. When asked about their plans after delivery, 9 participants (60%) had no specific plans whereas 3 participants (20%) had plans to go back to school. As for antenatal checkup, 14 participants (93.3%) had less than four visits until the time of data collection.

The barriers that were checked included lack of transport either by bus, car, or bicycle; lack of money; no permission to go to the hospital; fear of being seen as pregnant, and fear of being mistreated by healthcare providers. Thirteen (86.7%) of the participants have stated that they never lacked transport to and from the hospital whereas 2 (13%) have either rarely or occasionally missed transport. Eleven participants (73.3%) never lacked money when they needed medical help, 3 (20%) occasionally lacked money, and only 1 (6.6%) always lacked money to go to the hospital. The findings

further showed that 12 (80%) always had permission to go to the hospital whereas 3 participants (20%) had occasionally no permission. Only one woman feared to be seen as pregnant and 14 (93.3%) never felt this as a barrier. Lastly, 2 participants (13%) stated that they rarely feared being mistreated by healthcare workers and 13 (87%) never feared to go to the hospital in view of avoiding mistreatment.

3.2 Knowledge of obstetric danger signs

There was a significant increase in the scores of knowledge of danger signs during pregnancy between the pre-test ($M = 7.20$, $SD = 2.83$) and the post-test ($M = 9.07$, $SD = 1.67$); $t = 2.168$, $p = 0.048$. These findings suggests that there was an improvement in knowledge of obstetric danger signs during pregnancy at the post-test compared with the pre-test. The danger signs that had the highest rate of increase by 20% in terms of correct answer included “swelling of the hands/feet/face” and “blurred vision/dizziness”. The danger signs that had an increase rate of 13% in terms of correct answer were “vaginal bleeding during pregnancy”, “difficulty in breathing”, and “convulsion”.

For danger signs after delivery, however, there was no significant increase in the knowledge scores between the pre-test ($M = 7.93$, $SD = 2.40$) and the post-test ($M = 9.13$, $SD = 1.69$); $t = 1.670$, $p = 0.117$. The danger signs that had the highest increase rate by 20% in terms of correct answer included “swelling of the hands/feet/face” and “loss of consciousness”.

3.3 Perception of pregnant adolescents towards social support and support from healthcare providers

The perception of the participants towards social support and support from healthcare providers was assessed using a 5-point Likert scale. The total scores ranged from 10 to 50 for both variables.

The total mean score for the perception towards social support was 39.33 (SD = 4.56). The item with the highest score was the question about getting good support from the healthcare provider (M = 4.47, SD = 0.52). The item with the lowest score was a question on the partner taking up most of the participants time leaving insufficient time for anyone else (M = 3.27, SD = 1.49). Overall, the findings showed that the participants were receiving support from their family, partner, and friends.

The total mean score on perception towards healthcare providers was 42.00 (SD = 6.57). The item that received the highest score was the slapping of the participant by a healthcare provider (M = 4.47, SD = 0.83). The item that received the lowest score was when the healthcare provider ignored a participant (M = 3.93, SD = 1.28). Both the highest and lowest score items were reverse item questions. Overall, the participants were assessed as receiving good care from the healthcare providers.

3.4 Healthcare-seeking behavior

The items that indicated the possible healthcare-seeking behaviors that pregnant

adolescents would show when they recognized a danger sign were analyzed during the pre-test and post-test. The mean score during the pre-test was 41.33 (SD = 6.76) whereas the mean score during the post-test was 40.60 (SD = 7.84). A paired samples t-test showed no significant difference ($t(14) = 0.41$; $p = 0.69$) in the health-seeking behavior scores between the pre-test and the post-test.

There was a significant strong positive correlation between the variables [$r = .654$, $p = 0.008$]. These results suggest that those who have social support are more likely to have appropriate healthcare-seeking behavior.

3.5 Process evaluation

There were ten items for program evaluation and these items have been divided into three sections: (1) implementation of the program (six items), (2) acceptability of the program to pregnant adolescents (two items), and (3) demand for a peer network support group (two items).

Implementation of the program had six items and the score ranged from 6 to 30. The mean score for this section was 26.00. All six scores reached more than 87% degree of implementation. Almost all of the participants agreed that the education program was beneficial: “the program was helpful for me”, “the program contents were easy to understand”, “The program met educational needs”.

Two questions related to acceptability of the program to pregnant adolescents had a score ranging from 2 to 10 with a mean of 8.14. The mean scores of two questions indicated an 81% degree of acceptability of the program. The participants agreed on the acceptability of the program: “I would like to participate in this kind of program again”, “I would like to recommend this program to other pregnant adolescents”.

Two questions related to the demand for a peer network support group had a score ranging from 2 to 10 with a mean of 8.00. The total mean scores reached an 80% degree of demand for a peer network support group. The participants agreed on the need for a peer network support group: “I would like to be part of a peer network support group”, “I like the idea of having a peer network support group”.

Overall, the program evaluation scores (maximum 50) had a mean score of 42.13 (SD = 1.09), which represented a percentage of more than 84%, indicating that the program was feasible in terms of content, organization, and acceptability.

3.6 Qualitative data (See Table 4)

The qualitative data represented four categories: “Supportive family”, “Rejection and abortion”, “Support from peers” and “Potential barriers to seek care”.

3.6.1 Supportive family

Parents, partner, and friends were happy with the program and received it well

In all of the FGD interviews, the category of supportive family experienced by pregnant adolescents was extensively discussed. The discussions veered towards finding out the family reaction when the parents and partner recognized that the adolescent girl was pregnant:

“I told my husband and he was happy, and both my parents and his parents were also happy. They give me whatever I need and they are always encouraging me that I will deliver well” [number 5]

“The mother agreed and said don’t worry, I will take care of you my daughter and you will deliver safely” [number 8]

Parents and partner were ready to support the pregnancy

The supportive family reaction was more evident among pregnant adolescents who were married or cohabiting than among those who were not married. The families were happy and were ready to provide support to the adolescents. However, some adolescents were afraid of breaking the news to their families when they realized that they were

pregnant. Fortunately, their families expressed support when they recognized their pregnancy:

“...they agreed and I invited my partner and his family, and we discussed and reached a conclusion” [number 10]

Friend’s provided good advice

During further discussions, the reactions of friends were also assessed. When they shared the news about their pregnancy, their friends gave good advice and encouraged them to keep their pregnancy:

“My friends provided me good advice and they encouraged me not to abort but to stay with it” [number 1]

“I told my friend that my partner asked me to abort. My friend advised me not to abort or do anything bad but to keep my pregnancy and God will help me to deliver safely... advising me not to abort [number 8].

3.6.2 Rejection and abortion

Partners rejecting the pregnancy

The issues of rejection and denial of pregnancy as well as advice to perform abortion from the partners were also discussed in the FGDs:

“My partner rejected my pregnancy and he wanted me to have an abortion, but I refused and he has not accepted this up to now” [number 1]

“My partner refused and advised me to have an abortion, but I was not ready to abort and I decided to keep my pregnancy” [number 8]

These statements were mentioned mainly by the unmarried pregnant adolescents whose partners denied the responsibility for their pregnancy. This situation caused profound regret but the pregnant adolescents could cope because of the strong support from their parents and friends.

Some parents were angry and shocked

Some of the participants initially faced rejection from their parents:

“The problem was with my parents, they scolded me. My father was angrier because he did not know the responsible person” [number 11]

Some mothers felt shocked and cried after realizing that their daughter was pregnant.

They felt helpless and ashamed because of the situation:

“...this made my mother worried and since I am her first born it shocked her and she felt there is no more success neither for her nor for me, and no one will take care of my young child and siblings...” [number 2]

3.6.3 Support from peers

Participants welcome the idea of a having a peer network support group

The idea of developing a peer network support group wherein participants will be able to share information and support each other was well received by the participants in both FGDs. They further discussed and agreed on the importance of having a peer network support group particularly in health-related issues and become each other's keeper:

“It is important to have a support group because there are some who are in their first pregnancy so when you meet them you share your experiences with each other and give advice to each other which will help especially for those who are in their first pregnancy to continue.” [number 8]

The peer support group facilitates sharing of health-related information

It was further mentioned that the peer network support group will facilitate sharing of information concerning danger signs during pregnancy and provide guidance on what to do after recognizing the danger signs. Also, it increases awareness of signs of complications that seem to be normal:

“I have heard some issues that I didn't know before and I considered them as normal. Some examples of these pregnancy danger signs are swelling of the legs and face. Regarding the swelling of legs, truly I knew that it was normal because I saw many people with that condition, but I realized that it is one of the problems so today when I was taught this I understand that if a person has swollen feet she has to go to a health facility. Even eclampsia, I saw it as a normal condition as an

individual sickness, but today I have understood a lot of things so support groups are important [number 2]

“Groups are good because they afford education on things I do not know, especially when it feels like I may have reached the delivery time and others advise me that it is not yet time so I have to be strong since I do not know many things being my first pregnancy, and now we realize that we are getting information on many things from support groups” [number 7]

Financial support is possible from peers

Also discussed was the possible financial support from peers when needed.

“When I have a problem, I will explain them to my fellows in the group. They advise me that when I am sick and need to go to a hospital but do not have money, I can loan some money to go to the hospital” [number 12]

“Because you have friends and people of the same age, they can help financially and ideally” [number 13]

3.6.4 Potential barriers to seek care

Consulting family members first

The participants were asked whom they would first seek medical help from in case they have a severe headache. They stated that they would first go to a close family member especially their biological mother and ask for help before deciding to go to a

hospital:

“I will go to my mother first to get advice then I will visit the dispensary” [number 4]

“My mother because she knows everything” [number 3]

Others stated that they would ask their partners first before going to a health facility. They will first check if their condition is serious or not and then they will decide to go to the hospital:

“I will ask advice by telling my partner about my condition and we will see how I feel, and if it is bad we will go to the hospital” [number 14]

Lack of drugs and equipment

Another participant stated that she would go to a nearby pharmacy and ask for help and buy over-the-counter drugs.

“Mostly in the place where we are living, there are some pharmacies that you can visit. You can go there and explain to them what you need and then they will help you” [number11]

Long waiting time to be able to avail of health services

Other potential barriers to seek care include the long waiting time, waiting in

areas with no shade resulting in prolonged exposure to the sun, and the late opening of clinics. Majority complained that despite arriving in the clinic early, much of their time is spent waiting without being served:

“... You can arrive at 7 a.m., take a number and sit in a queue and they start the clinic service at 8 a.m., sometimes they start their tests at 9.30 a.m. and they begin working so you can stay there and actually leave at twelve noon or at one. We wait a lot. We are made to seat at a sunny area. There is no shade” [number 5]

“My advice is that they should shorten the waiting time as we are staying for a long time and we get tired, and we also have some work to do at home...” [number 4]

Some participants have complained about the lack of drugs and equipment at health facilities, resulting in them receiving services that they did not expect:

“We were advised to buy drugs that were not available at all. You arrive at this hospital and they prescribe and tell you that you need to go to the pharmacy to buy drugs” [number 4]

“I see that everything is okay, but they have to improve their equipment so that they can give us more services” [number 11]

4. Discussion

4.1 Knowledge of obstetric danger signs

The present findings showed a significant improvement in the knowledge of obstetric danger signs during pregnancy between the pre-test and the post-test ($p = 0.048$). Relevant lecture contents on pregnancy contributed to the increase in knowledge of danger signs. One possible option for screening participants who have learning needs of antenatal care (ANC) is to conduct a pre-test. This may facilitate the appropriate provision of support according to the learning needs of the participant.

Although the post-test scores were higher than the pre-test scores, there was no statistical significant improvement in knowledge of danger signs after delivery. This might be due to the small sample size used in this pilot study.

Based on the findings from the quantitative and qualitative data, it was surprising that some of the serious danger signs such as swelling of the feet and hands had a 20% gap of scores during the pre-test and post-test. Some of the participants did not consider this as a danger sign and instead perceived it as a normal occurrence during pregnancy. Therefore, empowering pregnant adolescents with this important information about danger signs will increase the likelihood of having early and appropriate healthcare-seeking behavior and prevent obstetric complications (Mbalinda et al., 2014; Okour, Alkhateeb & Amarin, 2012; Pembe et al., 2009). These findings indicate that more education on danger signs during pregnancy should be emphasized particularly in this young childbearing age group who lacks exposure to maternity health. A study in South Africa (Duggan & Adejumo, 2012) has shown that pregnant adolescents need information on danger signs during pregnancy as well as other information concerning pregnancy and childbirth to prepare them to cope and know what to do in case of

complications.

4.2 Healthcare-seeking behavior and its potential barriers

The healthcare-seeking behavior scores were not statistically significant between the pre-test and the post-test. These results suggest that the healthcare-seeking behavior varies depending on the symptom and severity. Also, when interviewed in an FGD, the findings have revealed potential barriers to healthcare-seeking behavior. Incidentally, the healthcare-seeking behavior of pregnant adolescents is quite different from that of adults. Pregnant adolescents tend to first consult their closely related family members whom they trust the most, and this appears to be their biological mother and occasionally their sister or partner. They will not go to a health facility for care unless they have been advised to do so. A study conducted in Tanzania by Gross et al. (2012) has shown a similar situation wherein pregnant adolescents are more likely to receive advice to attend ANC after consulting their mothers or a close person than adult women.

The present study examined possible barriers to healthcare-seeking behavior among pregnant adolescents. The majority of participants in this particular group had not experienced the following: lack of transport, insufficient money, obtaining permission to go to a hospital, and fear of being seen as pregnant or being mistreated by healthcare providers. This is in contrast to the findings of previous studies conducted in Tanzania (Hokororo et al., 2015; Gross et al., 2012) and Uganda (Atuyambe et al., 2008) where these barriers have been detected.

The potential barrier to healthcare-seeking behavior that has been extensively discussed is the long waiting time at healthcare facilities. Qualitative data have shown that pregnant adolescents complain of receiving health services in the late hours despite their early arrival at the facilities. Occasionally, they have to wait in areas with no shade

and without eating for long hours, and this strongly discourages them to seek care. This condition has been consistently reported in Tanzania (Hokororo et al., 2015) and South Africa (Duggan & Adejumo, 2012) whereby the long waiting hours at health facilities affects the healthcare-seeking behavior of pregnant adolescents.

An interesting finding was the strong positive correlation between healthcare-seeking behavior and social support. Those who received adequate support from their families, friends, and partner were more likely to have appropriate healthcare-seeking behavior. Similarly, a study conducted in Uganda (Rukundo et al., 2015) has shown that pregnant adolescent's access and utilization of health services are influenced by social support. In most areas, however, pregnant adolescents tend to lack social support from their families and/or partner, as shown in Uganda (Atuyambe et al., 2008). This greatly affects their healthcare-seeking behavior as even their timing of ANC initiation is negatively influenced (Gross et al., 2012), which places them in danger of having complications and poor pregnancy outcomes.

4.3 Social support and peer network support group

Social support for pregnant adolescents has been mostly qualitatively assessed in FGDs (Atuyambe et al., 2007). Pregnant adolescents who have often faced rejection find themselves in a dilemma on what to do regarding their pregnancy and future. In the present study, although some of the participants were advised by their partners to have an abortion, they decided to keep their pregnancy for fear of greater complications and they were fully supported by their parents and families. Other studies showing consistent findings of being rejected by the partners who were responsible for the pregnancy have reported about pregnant adolescents who faced rejection and were forced to stay with

their parents or grandparents but with limited social and financial support (Rukundo et al., 2015; Chaibva et al., 2010; Atuyambe et al., 2009). Therefore, there is a great and urgent need to advocate communities, families, and individuals regarding the importance of supporting this special group during their pregnancy.

The idea of having a peer network support group was well received by the participants. They were interested in forming a group where they could support each other by sharing information concerning pregnancy and childbirth, as well as provide financial support and have peers who can share the pregnancy experience together. A study in South Africa by Duggan and Adejumo (2012) has similarly examined the need for peer support among pregnant adolescents. Pregnant adolescents have expressed a need for health education that would help them better understand and learn from experience the physical and psychological changes that they are experiencing during their pregnancy. Throughout Africa, there are many successful research outcomes about peer mentors involving women living with HIV (Richter et al., 2014) and the prevention of mother-to-child transmission of HIV with the help of mentor mothers including adolescents (Futterman et al., 2010). Furthermore, a similar study in Colorado showed the real interest of pregnant adolescents in receiving group-based care using the group-based prenatal care (GPNC) model, which integrates health assessment, education, and support components. The study showed that younger participants (aged 16 years or younger) and those who were pregnant for the first time were more likely to be interested in peer group care (Yorga & Sheeder, 2015). Therefore, having peers who can share their personal experience of what they had gone through can be the best method of educating other pregnant adolescents. Forming peer groups and adopting the GPNC model in Africa may eventually lead to the empowering of pregnant adolescents with knowledge and support

that may help them to prevent or manage obstetric complications.

4.4 Feasibility of an education program

The present findings indicate an overall 84% feasibility of conducting an education program on obstetric danger signs that addresses three focus areas: (1) implementation of the program, (2) acceptability of the program, and (3) demand for a peer network support group. The implemented education program was helpful as the contents were easy to understand and met the educational needs of the pregnant adolescents. The participants have shown willingness to participate in this kind of education program and indicated that they would recommend the program to other pregnant adolescents. Moreover, the pregnant adolescents have expressed interest in the idea of establishing a peer network support group. There are apparently no studies that have determined the feasibility of an education program on obstetric danger signs among pregnant adolescents with which to make a comparison, thus this present pilot study lays a foundation for future research in this field.

Study limitations

This carefully prepared pilot study has several limitations and shortcomings. This study focused only on pregnant adolescents living in a rural area. Although the study sample was small at 12 participants, the estimation was based on the recommendation for a feasibility study by Julious (2005) and Feeley, et al. (2009). Also, the study findings cannot be generalized to the population of pregnant adolescents living in an urban area. The present findings can serve as a foundation for further research involving larger samples in this field.

Conclusions

The scores of knowledge of danger signs during pregnancy improved significantly between the pre-test and the post-test. There was a strong positive correlation between the healthcare-seeking behavior and social support scores. The idea of having a peer network support group was well received by the participants and they were interested in forming a group where they can support each other by sharing information concerning pregnancy and childbirth, lend financial support, and have peers who can share the pregnancy experience together. The findings indicate an 84% overall feasibility of successfully conducting an education program on obstetric danger signs that addressed three focus areas: (1) implementation of the program, (2) acceptability of the program, and (3) demand for a peer network support group. The participants have shown willingness to participate in this kind of education program and they would recommend the program to other pregnant adolescents.

Conflicts of interest

The authors declare that they have no conflicts of interest associated with this study.

Authors' contributions

BM and SH were responsible for designing the study protocol and drafting the manuscript. SL was responsible for supervising the data collection and reviewing the manuscript. MI was involved in the drafting and revising of the manuscript. All the

authors have read and approved the submission of this manuscript to IJANS.

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ACCEPTED MANUSCRIPT

References

- Aiko, T., Horiuchi, S., Shimpuku, Y., Madeni, F., & Leshabari, S. (2016). Overcoming barriers to inclusive education: A reproductive health awareness programme for adolescents in rural Tanzania. *African Journal of Midwifery and Women's Health*, 1, 27-3.
- Althabe, F., Moore, J. L., Gibbons, L., Berrueta, M., Goudar, S. S., Chomba, E. & Esamai, F. (2015). Adverse maternal and perinatal outcomes in adolescent pregnancies: the Global Network's Maternal Newborn Health Registry study. *Reproductive Health*, 2, S8.
- Atuyambe, L., Mirembe, F., Johansson, A., Kirumira, E. K., & Faxelid, E. (2007). Experiences of pregnant adolescents-voices from Wakiso district, Uganda. *African Health Sciences*, 5(4), 304-309.
- Atuyambe, L., Mirembe, F., Tumwesigye, N. M., Annika, J., Kirumira, E. K., & Faxelid, E. (2008). Adolescent and adult first time mothers' health seeking practices during pregnancy and early motherhood in Wakiso district, central Uganda. *Reproductive Health*, 5(1), 13.
- Barker, G. (2007). Adolescents, social support and help-seeking behaviour. *Geneva: World Health Organization*.
- Chaibva, C. N., Ehlers, V. J., & Roos, J. H. (2010). Midwives' perceptions about adolescents' utilisation of public prenatal services in Bulawayo, Zimbabwe. *Midwifery*, 26(6), e16-e20.
- Creswell, J.W. & Plano Clark, V.I. (2011). Designing and conducting mixed methods research (2nd ed.) Sage Publication INC.
- Bowen, D. J., Kreuter, M., Spring, B., Cofta-Woerpel, L., Linnan, L., Weiner, D., &

- Fernandez, M. (2009). How we design feasibility studies. *American Journal of Preventive Medicine*, 36(5), 452-457.
- Creswell, J. W. & Clark, V. L. P. (2007). Designing and conducting mixed methods research. pp 67-69.
- Creswell, J.W. & Miller, D.L. (2000). Determining validity in qualitative inquiry. *Theory into Practice*, 39(3), 124-130.
- Clark, V. P. & Creswell, J. W. (2011). Designing and conducting mixed methods research. *vol, 3*, 93-94.
- Duggan, R. & Adejumo, O. (2012). Adolescent clients' perceptions of maternity care in KwaZulu-Natal, South Africa. *Women and Birth*, 25(4), e62-e67.
- Feeley, N., Cossette, S., Côté, J., Héon, M., Stremler, R., Martorella, G., & Purden, M. (2009). The importance of piloting an RCT intervention. *Canadian Journal of Nursing Research*, 41(2), 84-99.
- Futterman, D., Shea, J., Besser, M., Stafford, S., Desmond, W., Comulada, W.S., & Greco, E. (2010). Mamekhaya: A pilot study combining a cognitive behavioral intervention and mentor mothers with PMTCT service in South Africa, *AIDS Care*, 22(9)1039-1100, doi: 10.1080/09540121003600352.
- Gee, C. B. & Rhodes, J. E. (2008). A social support and social strain measure for minority adolescent mothers: A confirmatory factor analytic study. *Child: Care, Health and Development*, 34(1), 87-97.
- Gross, K., Alba, S., Glass, T. R., Schellenberg, J. A., & Obrist, B. (2012). Timing of antenatal care for adolescent and adult pregnant women in south-eastern Tanzania. *BMC Pregnancy and Childbirth*, 12(1), 1.
- Hailu, M., Gebremariam, A., & Alemseged, F. (2010). Knowledge about obstetric

- danger signs among pregnant women in Aleta Wondo District, Sidama Zone, Southern Ethiopia. *Ethiopian Journal of Health Sciences*, 20(1), 25-32.
- Hill, L. M., Maman, S., Groves, A. K., & Moodley, D. (2015). Social support among HIV-positive and HIV-negative adolescents in Umlazi, South Africa: changes in family and partner relationships during pregnancy and the postpartum period. *BMC Pregnancy and Childbirth*, 15(1), 117.
- Holness, N. (2015). A global perspective on adolescent pregnancy. *International Journal of Nursing Practice*, 21(5), 677-681.
- Hokororo, A., Kihunrwa, A. F., Kalluvya, S., Changalucha, J., Fitzgerald, D. W., & Downs, J. A. (2015). Barriers to access reproductive health care for pregnant adolescent girls: a qualitative study in Tanzania. *Acta Paediatrica*, 104(12), 1291-1297.
- Julious, S. A. (2005). Sample size of 12 per group rule of thumb for a pilot study. *Pharmaceutical Statistics*, 4(4), 287-291.
- Kabakyenga, J. K., Ostergren, P. O., Turyakira, E., & Pettersson, K. O. (2011). Knowledge of obstetric danger signs and birth preparedness practices among women in rural Uganda. *Reproductive Health*, 8(1), 33.
- Kingston, D., Heaman, M., Fell, D., & Chalmers, B. (2012). Comparison of adolescent, young adult, and adult women's maternity experiences and practices. *Pediatrics*, 129(5), e1228-e1237.
- Klima, C. S. (2003). Centering pregnancy: a model for pregnant adolescents. *Journal of Midwifery & Women's Health*, 48(3), 220-225.
- Madeni, F., Horiuchi, S., & Iida, M. (2011). Evaluation of a reproductive health awareness program for adolescence in urban Tanzania-A quasi-experimental

pre-test post-test research. *Reproductive Health*, 8(8), 8-21.

Maneesriwongul W. & Dixon J. K. (2004). Instrument translation process: a methods review. *Journal of Advanced Nursing*, 48(2), 175-186.

Martin, J. A., Hamilton, B. E., Osterman, M.J. K., Curtin, S. C., & Mathews, T. J. (2015). Births: Final data for 2013. *National Vital Statistics Reports*, 64(1).

Mbalinda, S. N., Nakimuli, A., Kakaire, O., Osinde, M. O., Kakande, N., & Kaye, D. K. (2014). Does knowledge of danger signs of pregnancy predict birth preparedness? A critique of the evidence from women admitted with pregnancy complications. *Health Research Policy and Systems*, 12(1), 60.

Mbelwa, C. & Isangula, K. G. (2012). Teen pregnancy: Children having children in Tanzania. Retrieved from http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2028369

McCleary-Sills, J., Douglas, Z., Rwehumbiza, A., Hamisi, A., & Mabala, R. (2013). Gendered norms, sexual exploitation and adolescent pregnancy in rural Tanzania. *Reproductive Health Matters*, 21(41), 97-105.

McIntyre, P. (2006). Pregnant adolescents: delivering on global promises of hope. World Health Organization.

Mwilike, B., Nalwadda, G., Kagawa, M., Malima, K., Mselle, L., & Horiuchi, S. (2018). Knowledge of danger signs during pregnancy and subsequent healthcare seeking actions among women in Urban Tanzania: a cross-sectional study. *BMC Pregnancy and Childbirth*, 18(1), 4.

Naigaga, M. D., Guttersrud, Ø., & Pettersen, K. S. (2015). Measuring maternal health literacy in adolescents attending antenatal care in a developing country—the impact of selected demographic characteristics. *Journal of Clinical*

Nursing, 24(17-18), 2402-2409.

National Bureau Statistics, & Macro, I. (2011). 2010 Tanzania Demographic and Health Survey. In T. N. B. o. S. a. I. Macro (Ed.). Dar es salaam, Tanzania: National Bureau of Statistics.

National Bureau of Statistics (NBS) & ORC Macro (2005). Tanzania Demographic and Health Survey 2004-05. Dar es Salaam, Tanzania, National Bureau of Statistics & ORC Macro.

Nove, A., Matthews, Z., Neal, S., & Camacho, A. V. (2014). Maternal mortality in adolescents compared with women of other ages: evidence from 144 countries. *The Lancet Global Health*, 2(3), e155-e164.

Okour, A., Alkhateeb, M., & Amarin, Z. (2012). Awareness of danger signs and symptoms of pregnancy complication among women in Jordan. *International Journal of Gynecology & Obstetrics*, 118(1), 11-14.

Pembe, A. B., Urassa, D. P., Carlstedt, A., Lindmark, G., Nyström, L., & Darj, E. (2009). Rural Tanzanian women's awareness of danger signs of obstetric complications. *BMC Pregnancy and Childbirth*, 9(1), 1.

Pradhan, R., Wynter, K., & Fisher, J. (2015). Factors associated with pregnancy among adolescents in low-income and lower middle-income countries: a systematic review. *Journal of Epidemiology and Community Health*, 69(9): 918-24. doi: 10.1136/jech-2014-205128.

Reina, M. F., Ciaravino, H., Llovera, N., & Castelo-Branco, C. (2010). Contraception knowledge and sexual behaviour in secondary school students. *Gynecological Endocrinology*, 26(7), 479-483.

Richter, L., Rotheram-Borus, M. J., Heerden, A. V., Stein, A., Tomlinson, M.,

Harwood, J.M., RoCHAT, T., Rooyen, H. V., Comulada, W. S., Tang Z. (2014). Pregnant women living with HIV (WLH) supported at clinics by Peer WLH: A cluster randomized controlled trial, *AIDS and Behavior*, 18(4): 706-15. doi: 10.1007/s10461-014-0694-2.

Rukundo, G. Z., Abaasa, C., Natukunda, P. B., Ashabahebwa, B. H., & Allain, D. (2015). Antenatal services for pregnant teenagers in Mbarara municipality, southwestern Uganda: health workers and community leaders' views. *BMC Pregnancy and Childbirth*, 15(1), 1.

Treffers, P. E., Olukoya, A. A., Ferguson, B. J., & Liljestrand, J. (2001). Care for adolescent pregnancy and childbirth. *International Journal of Gynecology & Obstetrics*, 75(2), 111-121.

Tong A., Sainsbury P., & Craig J., (2007). Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*, 19(6), 349-357.

UNICEF (n.d.). [Internet]. The children's agenda on teenage pregnancy. Retrieved from <http://www.unicef.org/tanzania/AdvocacyBrief-TEENAGEPREGNANCY-spread.pdf>

UNICEF (2011). Adolescence in Tanzania. Retrieved from http://www.unicef.org/tanzania/TANZANIA_ADOLESCENT_REPORT_Final.pdf. (accessed on February 2, 2016)

Vogel, J. P., Pileggi-Castro, C., Chandra-Mouli, V., Pileggi, V. N., Souza, J. P., Chou, D., & Say, L. (2015). Millennium Development Goal 5 and adolescents: looking back, moving forward. *Archives of Disease in Childhood*, 100 (Suppl 1),

S43-S47.

World Health Organization. (2011). WHO guidelines on preventing early pregnancy and poor reproductive health outcomes among adolescents in developing countries. Retrieved from http://www.who.int/maternal_child_adolescent/documents/preventing_early_pregnancy/en/ (accessed on March 2, 2016).

World Health Organization. (2014, September). Adolescent pregnancy [Fact sheet]. Retrieved from <http://www.who.int/mediacentre/factsheets/fs364/en/> (accessed on January 26, 2016).

WHO, UNFPA, UNICEF, & W.B. Group. (2003). Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice (Quick Check, Rapid Assessment and Management of Women of Childbearing Age (pp. B2-B7). Geneva, Switzerland: WHO publication library. Retrieved from http://www.jica.go.jp/project/philippines/0600894/04/pdf/pcpnc_who.pdf

World Health Organization (January 2018). Management of substance abuse, process of translation and adaptation of instruments. Retrieved from http://www.who.int/substance_abuse/research_tools/translation/en/# [Date accessed: January 8, 2018].

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The study was conducted based on the principles of ethics such as harmlessness, voluntarily participation, anonymity, and protection of privacy and personal information. Research approval was obtained from St. Luke's International University (SL16-08) and Muhimbili Research and Ethics Committee.

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Table 1. Summary of the education program named "Nipo Nawe!" (I am with you!)

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Goal 1	To improve pregnant adolescents' knowledge of obstetric danger signs (25 min.)
Contents	Provide information about normal pregnancy and obstetric danger signs
Methods	Lecture and discussion
	Demonstration with a Maggie apron ※
Evaluation	20-item questionnaire
Goal 2	To promote pregnant adolescents' early and appropriate healthcare-seeking behavior (25 min.)
Contents	Study the ' <i>Nne na Tano</i> ' story focusing on danger signs and healthcare-seeking behavior
Methods	Lecture and discussion
	Supply ' <i>Nne na Tano</i> ' booklets
Evaluation	10-item questionnaire
Goal 3	To encourage pregnant adolescents in developing a peer network support group (40 min.)
Contents	Develop a peer network support group
Methods	Focus Group Discussion
Evaluation	Observation and analysis of qualitative data

※ A Maggie apron is a material for providing information on reproductive health using an apron

[[Please confirm]]

Table 2. Sociodemographic characteristics of participants (n = 15)

Variable	Description	Frequency	(%)
Age in years	≤ 18	10	66.7
	> 18	5	33.3
Marital status	In union	9	60
	Not in union	6	40
Educational level	Primary	12	80
	Secondary or higher	3	20
Occupation	Housewife	4	26.7
	Small business owner	10	66.7

	Student	1	6.7
Gravidity	1 time	11	73.3
	2 times	4	26.7
Pregnancy plan	Planned	8	53.3
	Unplanned	7	46.7
Plan after delivery	Go back to school	3	20
	Drop school	1	6.7
	Does not have any plans	9	60
	Engage in business	2	13.3
Antenatal checkup	Less than four visits	14	93.3
Barriers to attending a health facility			
Transport	Never lacked transport	13	86.7
Money	Never lacked money	11	73.3
Permission	Never lacked permission	12	80
Being seen as pregnant	Never	14	93.3
Beig mistreated by a healthcare provider	Never feared	13	86.7

Table 3. Comparison of knowledge scores between pre-test and post-test (n = 15)

	Pre-test M (SD)	Post-test M (SD)	t-test	p-value
Danger signs during pregnancy	7.20 (2.83)	9.07 (1.67)	2.168	0.048
Danger signs after delivery	7.93 (2.40)	9.13 (1.69)	1.67	0.117

Table 4. Codes and categories from content analysis of FGD data

Category	Subcategory
Support from family	Parents, partner, and friends are glad and receive the news well

	Parents and partner are ready to support the pregnancy
	Friends provide good advice
Rejection and abortion	Partner rejects the pregnancy and suggests abortion
	Parents angry and shocked
Support from peers	Support the idea of having a peer network support group
	Share health-related information
	Financial support from peers
Potential barriers to seek care	Consulting family members first
	Lack of drugs and equipment
	Waiting for a long time for health services