# Women's awareness of obstetric danger symptoms: is there a need to promote a preconceptional educational program?

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**Background/aim**
Awareness towards the symptoms of obstetric complications will lead to timely access to appropriate emergency obstetric care. The aim of the study was to assess and compare the awareness towards obstetric danger symptoms among never-pregnant and ever-pregnant women and to identify predictors of their awareness as a measure for the need to promote a preconceptional educational program in Egypt.

**Participants and methods**
This study was conducted in selected villages of Alfayoum and Benisuef governorates as a comparative study between 173 newly married never-pregnant women and 827 ever-pregnant women who were randomly targeted by a structured interview during a period of 8 months. The questionnaire included personal data, social data, and data related to awareness of obstetric danger symptoms, complications, and action taken on having any of these symptoms. The scoring system was designed for women's awareness, with one degree allocated for a correct answer.

**Results**
The study revealed that the percent of women who gained a score of knowledge of at least 50% was higher among ever-pregnant women than among never-pregnant women (43.9 and 19.1%, respectively). Although bleeding is the highest reported cause for obstetric complications and is one of the reported causes of maternal deaths in the studied villages, only 26.6 and 20.2% of the never pregnant and 43.9 and 34.3% of the ever pregnant groups, respectively, knew that bleeding is a danger symptom during delivery and the postnatal period. Meanwhile, better awareness about obstetric danger symptoms and exposure to health educational messages was significantly higher among ever-pregnant women (OR = 3.08 and 2.28, respectively) ($P < 0.001$).

**Conclusion**
This study reflects the need for intensifying antenatal health educational messages given to pregnant women and the need for the implementation of preconceptional health education programs.

**Keywords:**
awareness, delivery complications, obstetric danger symptoms, preconception

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## Introduction

Pregnancy is a normal process that results in a series of both physiological and psychological changes in expectant mothers. However, normal pregnancy may be accompanied by some problems and complications that are potentially life threatening to the mother and/or the fetus [1]. Globally, every minute, at least one woman dies from complications related to pregnancy or childbirth, which means 529 000 women per year [2]. A total of 99% of all maternal deaths occur in developing countries, where 85% of the population lives [3,4]. Five direct complications account for more than 70% of maternal deaths in Egypt: hemorrhage (25%), infection (15%), unsafe abortion (13%), eclampsia, very high blood pressure leading to seizures (12%), and obstructed labor (8%) [5].

Ever-pregnant women are supposed to be educated and counseled regarding pregnancy-related danger signs during antenatal visits. Counseling on pregnancy danger signs is to be conducted according to focused antenatal care guidelines, which include signs such as vaginal bleeding, severe headache or blurred vision, severe abdominal pain, swollen hands and face, fever, baby stopped or reduced movement, and excessive tiredness/breathlessness [6].

In contrast, regarding never-pregnant or newly married women, a prepregnancy planning visit in the months before conception has been recommended to improve preconception (PC) health and knowledge [7]. This could be achieved through the PC health, which refers to women's health before pregnancy. Improved PC health can have positive influences on the developing fetus and on birth outcomes [8], and also reduces maternal mortality [9]. Prevention of some conditions, complications, and behaviors can happen only before conception [10]. PC counseling is different from

antenatal care and should not be confused with it. In particular, it is more important than antenatal care, as 30% of pregnant women begin traditional antenatal care in the second trimester and after the period of maximal organogenesis (between 3 and 10 weeks of gestation) [11].

The Preconception Care Work Group of the Centers for Disease Control USA recommends that PC care should be an essential part of primary and preventive care, which involves good communication and liaison between the primary and the secondary care providers [10,12,13].

PC care is not applied in primary healthcare centers of Egypt as the women do not visit these centers before they get pregnant. Women in the childbearing period are not informed about the importance of PC.

The research questions addressed are whether newly married women are well prepared for the pregnancy process and they have enough knowledge about obstetric danger symptoms or do they have to enrich their awareness through PC health education given during a PC care program and what are the priority predictors for women's awareness.

The aim of the current study was to assess and compare awareness towards obstetric danger symptoms among never-pregnant and ever-pregnant women and to identify predictors of their awareness as a measure for the need to promote a PC Educational Program in Egypt.

## Participants and methods

### Study settings

This study was community based, conducted in 23 selected villages of Alfayoum and Benisuef governorates. The study was conducted in two of the governorates of Upper Egypt that ranked the poorest as declared in the Egypt report of 2008. The selection of districts and villages for the study conduction was performed through a participatory approach with local governmental authorities. The study was conducted during a period of 8 months starting from August 2010 till March 2011.

### Study design

It was a cross-sectional comparative study. Two-stage random samplings were used; households were randomly selected from the four village directions, and 173 newly married never-pregnant women and 827 ever-pregnant women were selected randomly. Written consent was obtained from each woman before the study. This study was conducted through a project that was supported financially by the Science and Technology Development Fund (STDF), Egypt, Grant No. 358.

### Sample size

The basis for the sample size are as follow: the proportion of the sample from the unexposed (ever-pregnant) population was 80%, the proportion of the sample from the exposed (never-pregnant) population was 20%; the ratio of unexposed to exposed women was 5 : 1; the odds ratio (OR) was around 1.7. The mean true proportion of awareness in the unexposed population was 36.2% and the true proportion of awareness in the exposed population was 25% as obtained from the literature review [14–16]. The two-sided significance level ($1-\alpha$) was 95%, the power ($1-\beta$, % chance of detecting) was 80, and the nonresponse rate for the questionnaire was 10%. The sample size was calculated by using Epienfo version 7 [17]. Accordingly, the sample size for the exposed (newly married) will be 164 and the sample size for the unexposed (ever pregnant) will be 825 with a total sample of 990 participants.

### Sampling technique

The targeted women were selected after obtaining the map of each village. First, we determined the four directions surrounding the catchment areas of the targeted rural health units. Second, the number of streets, the area and boundaries in each direction, and the list of village promoters in each area were determined. The targeted sample size was divided per village promoter: for every five ever married women, one newly married woman was selected.

Through the participatory approach with the village promoters and nurses of the health units of the targeted villages, the field work was conducted under the supervision of community medicine research staff members in the National Research Center.

### Tools

A structured questionnaire was tailored from that of the Centers for Disease Control and Prevention (CDC) (2007) and from the information given to the pregnant women having the pregnancy card during their antenatal care (ANC) visits, which was designed and authorized by the Maternity and Childhood section in the Ministry of Health in Egypt. A structured interview was conducted to collect the necessary data. It included questions about sociodemographic data such as age, the level of education, the occupation, and exposure to health educational messages, obstetric characteristics such as parity, and questions related to the knowledge about signs of obstetric complications (antenatal, natal, postnatal), complaint of any obstetric

complications, and what to do if the woman has any of these signs. We developed and used eight indicators to detect women's awareness about ANC and pregnancy complications, six indicators to detect women's awareness about delivery care and complications, and three indicators to assess women's awareness about postpartum care and complications. One hundred and seventy-three newly married never-pregnant women and 827 ever-pregnant women with a total sample of 1000 targeted women completed the interview.

The eight ANC indicators included the percent of surveyed women who knew the following:

(1) At least two causes of direct maternal mortality out of the following direct causes: heavy bleeding, puerperal fever, pre-eclampsia, abortion, prolongation of delivery, and ruptured uterus.
(2) At least two of the following danger symptoms of pregnancy complications: no increase in body weight, feeling very weak or tired (anemia), swelling of hands and face, severe and continuous headache, severe abdominal pain (pain in the belly), severe and continuous vomiting, bleeding from the vagina, fever, blurred vision.
(3) That a weight gain of more than 10–12 kg is a risk during pregnancy.
(4) At least two health problems as a risk for pregnancy, of which anemia was one problem, and the other problems were hypertension, heart diseases, kidney diseases, or diabetes.
(5) At least two symptoms of anemia out of the following symptoms: shortness of breath and tiredness, dizziness, headache, or nail problems.
(6) At least two types of food to treat or prevent anemia out of the following types: meat, liver, dates, vegetables such as spinach.
(7) At least two ways to treat anemia out of the following measures: taking iron capsules and folic acid tablets, going for ANC visits once a week, or eating food rich in iron.
(8) Whom to contact upon having pregnancy complications out of the following points of contact: hospital, private or governmental doctor, trained nurse, rural or urban health unit or center.

The six natal indicators included the percent of the women who knew the following:

(1) At least two symptoms of labor out of the following symptoms: rupture of membranes, increased contractions, rigidity of the abdomen, severe colic in the lower abdomen, doctor informed her of delivery time or she feels something squeezed inside her.
(2) At least two emergency symptoms for referral to hospital out of the following symptoms: severe headache and blurred vision, increase in the body temperature, convulsions, exit of foul smelling secretions from the vagina, bleeding from the vagina even if it is minor or without pain, stopping of fetal movement (after the fourth month), or premature rupture of membranes before the date of delivery by 3 weeks.
(3) At least two danger symptoms of delivery out of the following symptoms: a large amount of bleeding, the appearance of the umbilical cord or the buttocks before the head, rupture of membranes and no delivery of more than 12 h, the placenta is not delivered within half an hour after the delivery of the baby, loss of consciousness, or convulsions.
(4) At least three ways for safe delivery out of the following measures: availability of needed tools such as a sterilized razor, an umbilical clamp, sterilized gloves, clean and well-ventilated room, tools for cleaning and sterilizing women's lower abdomen such as soap, warm water, and clean towels, clean clothes and cover for the woman's bed and for the newborn or referral of the woman to the nearest hospital in case of complications.
(5) At least two reasons that require delivery at the hospital out of the following reasons: previous cesarean section, if the woman is diabetic, if the woman is hypertensive, if delivery occurs before its due date, if there is any pelvic problem.
(6) Whom to contact upon having delivery complications out of the following points of contact: hospital, private or governmental doctor, trained nurse, rural or urban health unit or center.

Regarding postpartum indicators, they included three indicators for the percent of the women who knew:

(1) At least two symptoms of puerperal sepsis out of the following symptoms: an increase in temperature, foul smelling discharge from the vagina, dizziness, nausea, severe headache.
(2) At least two danger signs during the postnatal period out of the following symptoms or signs: a high body temperature (puerperal fever), increasing bleeding, seizures or loss of consciousness, severe lower abdominal pain (increasing over time), bloody foul-smelling vaginal discharge, edema of one leg with severe pain, severe chest pain and shortness of breath, pain or swelling or discharge from the operation wound in case of cesarean section or episiotomy (after returning to the house), vomiting, or diarrhea.
(3) Whom to contact upon having complications during the postnatal period out of the following points of contact: hospital, private or governmental doctor, trained nurse, rural or urban health unit or center.

### Data management and analysis

Pregnant women who spontaneously mentioned at least two correct answers for each indicator were considered as knowledgeable for the respective indicator. The score of knowledge was calculated as the sum of the correct responses, where one degree was given for each correct answer. Then, we put the women into two groups: either knowledgeable or not knowledgeable. The nonknowledgeable group got a score of less than 50% of the total knowledge score and the knowledgeable group got a score of at least 50**%** of the total knowledge score.

Data entry and analysis were performed using the statistical package for social sciences software program version 18. Frequency tables were used to describe qualitative data and the $\chi^2$ was used as the test of statistical significance

The response variable has two categories: knowledge less than 50% (coded 1) and knowledge at least 50% (coded 0). The odds ratio was calculated to compare the odds of exposure to different risk factors in the nonknowledgeable group with the odds of the knowledgeable group. Logistic regression was performed to significantly predict risk factors to the level of women's awareness. Factors found in the univariate analysis to be significantly associated ($P < 0.05$) with the main outcome of interest (a low level of awareness) were included in a multivariate model. The $P$ value was considered statistically significant when $P$ less than 0.05 and considered statistically highly significant if $P$ less than 0.01.

**Table 1 Demographic and information exposure characteristics of the studied women**

| Characteristics | Never pregnant ($N = 173$) [$n$ (%)] | Ever pregnant ($N = 827$) [$n$ (%)] | $P$ value |
|---|---|---|---|
| Current age (years) | | | |
| <20 | 120 (69.4) | 219 (26.5) | 0.00 |
| 20–29 | 52 (30.1) | 433 (52.4) | |
| ≥30 | 1 (0.6) | 175 (21.2) | |
| Mean of the women's current age | 19.7 ± 2.8 | 24.4 ± 5.7 | |
| Type of residence after marriage | | | |
| In a house alone with her husband | 44 (25.4) | 271 (32.8) | 0.06 |
| In a house with relatives | 129 (74.6) | 556 (67.2) | |
| Wife's education | | | |
| Illiterate or can read and write | 54 (31.2) | 458 (55.4) | 0.00 |
| Preparatory or more | 111 (64.2) | 340 (41.1) | |
| Higher education | 8 (4.6) | 29 (3.5) | |
| Wife's employment | | | |
| Working | 13 (7.5) | 50 (6.0) | 0.47 |
| Housewife | 160 (92.5) | 777 (94.0) | |
| Husband's employment[a] | | | |
| Lower middle income | 36 (20.8) | 211 (25.5) | 0.19 |
| Upper middle income | 137 (79.2) | 616 (74.5) | |
| Exposure to health educational messages | | | |
| Yes | 22 (12.7) | 202 (24.4) | 0.00 |
| No | 151 (87.3) | 625 (75.6) | |
| Source of exposure ($n = 200$) | | | |
| Media (radio, TV) only | 1 (4.5) | 15 (7.4) | 0.30 |
| Non media only | 1 (4.5) | 7 (3.5) | |
| Both | 20 (91.0) | 180 (89.1) | |

Upper middle income: husband is employer, professional, or dealer; [a]Lower middle income: Husband is unemployed, day by day worker, farmer, or laborer.

## Results

Table 1 shows the sociodemographic background and information exposure of the studied women. More than half of the never-pregnant women were in the age group of less than 20 years, with a mean age of 19.7 ± 2.8, but the age was obviously higher among the ever-pregnant women (24.4 ± 5.7), with a statistically significant difference. More than 50% of the ever-pregnant women were illiterate compared with 31.2% of the never-pregnant women ($P < 0.001$). The vast majority of the studied women were housewives. Around one-quarter of the ever-pregnant women were significantly exposed to health educational messages compared with 12.7% of the never-pregnant women ($P < 0.01$).

Women's awareness of key knowledge indicators to prevent maternal deaths regarding ANC, natal and postnatal care, and the obstetric complications that may occur were very deficient among the ever-pregnant and the newly married never-pregnant women; yet, the ever-pregnant women were significantly more aware as shown in Tables 2–4. About one-third (32.4%) of the never-pregnant women and 47.4% of the ever-pregnant women knew at least two symptoms of anemia, the most common of which were shortness of breath, tiredness, and fainting ($P < 0.05$). The most commonly identified cause of maternal mortality was severe bleeding, followed by puerperal sepsis, in both groups. Abortion was the least reported cause of maternal deaths by both groups (Table 2).

The least identified indicator among both study groups was ways for safe delivery. Although bleeding is the highest reported cause for obstetric complications and is one of the reported causes of maternal deaths in the studied villages, only 26.6 and 20.2% of the never-pregnant and 43.9 and 34.3% of the ever-pregnant groups, respectively, knew that bleeding is a danger symptom during delivery and in the postnatal period ($P < 0.001$). Less than one-quarter of both groups knew at least two signs of labor. Rupture of membranes and increased contractions were the most commonly identified signs of labor (Table 3).

**Table 2 Women's awareness of key knowledge indicators to prevent maternal deaths (ANC and pregnancy complications)**

| Indicator (eight indicators) | Never pregnant (*n* = 173) | Ever pregnant (*n* = 827) [*n* (%)] | Total (*n* = 1000) | *P* value |
|---|---|---|---|---|
| % of surveyed women who know at least two causes of direct maternal mortality | 22 (12.7) | 142 (17.2) | 164 (16.4) | 0.15 |
| % of surveyed women who know at least two danger signs of pregnancy complications | 23 (13.3) | 221 (26.7) | 244 (24.4) | 0.00** |
| % of surveyed women who know that weight gain of >10–12 kg is a risk during pregnancy | 17 (9.8) | 128 (15.5) | 145 (14.5) | 0.05* |
| % of surveyed women who know at least two health problems as a risk for pregnancy (of which anemia is one) | 37 (21.4) | 279 (33.7) | 316 (31.6) | 0.00** |
| % of surveyed women who know at least two symptoms of anemia | 56 (32.4) | 392 (47.4) | 448 (44.8) | 0.00** |
| % of surveyed women who know at least two types of food to treat or prevent anemia | 68 (39.3) | 430 (52.0) | 498 (49.8) | 0.00** |
| % of surveyed women who know at least two ways to treat anemia | 17 (9.8) | 134 (16.2) | 151 (15.1) | 0.03* |
| % of surveyed women that know whom to contact upon having pregnancy complications | 71 (41.0) | 495 (59.9) | 566 (56.6) | 0.00** |

*Significant at $P \leq 0.05$; **Highly significant at $P < 0.01$.

**Table 3 Women's awareness of key knowledge indicators to prevent maternal deaths (delivery care and complications)**

| Indicator (six indicators) | Never pregnant (*n* = 173) [*n* (%)] | Ever pregnant (*n* = 827) [*n* (%)] | Total (*n* = 1000) | *P* value |
|---|---|---|---|---|
| % of surveyed women who know at least two signs of labor | 23 (13.3) | 187 (22.6) | 210 (21.0) | 0.01* |
| % of surveyed women who know at least two emergency symptoms for referral to hospital | 41 (23.7) | 241 (29.1) | 282 (28.2) | 0.14 |
| % of surveyed women who know at least two danger signs of delivery complications | 37 (21.4) | 343 (41.5) | 380 (38.0) | 0.00** |
| % of surveyed women who know at least three ways for safe delivery | 7 (4.0) | 122 (14.8) | 129 (12.9) | 0.00** |
| % of surveyed women who know at least two reasons that require delivery at the hospital | 29 (16.8) | 253 (30.6) | 282 (28.2) | 0.00** |
| % of surveyed women that know whom to contact upon having delivery complications | 103 (59.5) | 576 (69.6) | 679 (67.9) | 0.01* |

*Significant at $P \leq 0.05$; **Highly significant at $P < 0.01$.

**Table 4 Women's awareness of key knowledge indicators to prevent maternal deaths (postpartum care and complications)**

| Indicator (four indicators) | Never pregnant (*n* = 173) [*n* (%)] | Ever pregnant (*n* = 827) [*n* (%)] | Total (*n* = 1000) | *P* value |
|---|---|---|---|---|
| % of surveyed women who know at least two danger signs during the postnatal period | 37 (21.4) | 332 (40.1) | 369 (36.9) | 0.00* |
| % of surveyed women who know at least two symptoms of puerperal sepsis | 26 (15.0) | 222 (89.5) | 248 (24.8) | 0.00* |
| % of surveyed women who know whom to contact upon having complications during the postnatal period | 58 (33.5) | 499 (60.3) | 557 (55.7) | 0.00* |

*Highly significant at $P < 0.01$.

About 21.7% of the never-pregnant women and 40.1% of the ever-pregnant women mentioned at least two danger signs during the postnatal period ($P < 0.05$). The danger signs in the postpartum period commonly mentioned included fever (35.8% of the never-pregnant women as against 51.5% of the ever-pregnant women) and severe bleeding (20.2% of the never-pregnant women as against 34.3% of the ever-pregnant women) (Table 4).

Table 5 shows that the percent of the women who got a score of knowledge of at least 50**%** is significantly higher in the ever-pregnant group than in the never-pregnant group (43.9 and 19.1%, respectively).

Table 6 shows the relation between the level of awareness of the study participants and their general characteristics. It was observed that never-pregnant women and women aged less than 20 years were associated with significantly more than two times the risk of unawareness of obstetric danger signs (OR = 3.3 and 2.0, respectively) as compared with ever-pregnant women and those aged more than 20 years. Moreover, housewives and those with no exposure to obstetric health educational messages were significantly associated with more than two times the odds of unawareness (OR = 2.14 and 2.59, respectively) compared with working women and those exposed to obstetric health educational messages (controls, $P < 0.05$).

Logistic regression analysis revealed that the most important significant predictors for unawareness of obstetric danger symptoms were in the order, being never pregnant, nonexposure to health educational messages, housewives, and women with lower- to

middle-income husbands (with OR = 3.0, 2.2, 1.8, and 1.5, respectively) (Table 7).

## Discussion

Women need not die in childbirth. Women die from a wide range of complications in pregnancy, during childbirth, or in the postpartum period. These life-threatening complications are treatable, and thus, most of these deaths are avoidable if women with the complications are able to identify and seek appropriate emergency obstetric care [18]. Lack of awareness of the significance of symptoms of obstetric complications is one of the reasons of failure of women to identify and seek appropriate emergency care [19]. The importance of knowledge to shape health-seeking behaviors that contribute to save women's lives from preventable causes of maternal deaths has been stressed by many authors [4,20–22].

The major causes of maternal mortality are hemorrhage, sepsis, and hypertensive disorder of pregnancy, and so, pregnant mothers need to have adequate knowledge about the symptoms indicating these problems [16]. Regarding the current study, only 12.7% of the never-pregnant and 17.2% of the ever-pregnant women knew two causes of maternal mortality, and the most commonly reported causes were heavy bleeding and puerperal fever. Only 24.4% of the women in the current study mentioned at least two danger signs of pregnancy with no significant difference between ever-pregnant and never-pregnant women. Feeling very weak or tired (anemia) and having severe abdominal pain (pain in the belly) were the most commonly reported danger signs. It is estimated that more than 40% of the pregnant women worldwide are anemic. At least half of this anemia burden is assumed to be due to iron deficiency. Pregnant women require additional iron and folic acid to meet their own nutritional needs as well as those of the developing fetus. Deficiencies

**Table 5 Distribution of the study participants according to their total awareness score about indicators of all obstetric danger signs (pregnancy, delivery, and postpartum)**

| Degree of awareness | Never pregnant (*n* = 173) [*n* (%)] | Ever pregnant (*n* = 827) [*n* (%)] | Total (*n* = 1000) | *P* value |
|---|---|---|---|---|
| ANC and pregnancy complications (%) | | | | |
| <50 | 100 (57.8) | 332 (40.1) | 432 (43.2) | 0.00* |
| ≥50 | 73 (42.2) | 495 (59.9) | 568 (56.8) | |
| Delivery care and complications (%) | | | | |
| <50 | 144 (83.2) | 530 (64.1) | 674 (67.4) | 0.00* |
| ≥50 | 29 (16.8) | 297 (35.9) | 326 (32.6) | |
| Postpartum care and complications (%) | | | | |
| <50 | 116 (67.1) | 333 (40.3) | 449 (44.9) | 0.00* |
| ≥50 | 57 (32.9) | 494 (59.7) | 551 (55.1) | |
| Total score (%) | | | | |
| <50 | 140 (80.9) | 464 (56.1) | 604 (60.4) | 0.00* |
| ≥50 | 33 (19.1) | 363 (43.9) | 396 (39.6) | |

*Highly significant at $P < 0.01$.

**Table 6 The odds ratio for the determinants of the level of knowledge about obstetric danger symptoms among the studied group**

| Characteristics | Total (*N* = 1000) [*n* (%)] | <50% (*N* = 604) [*n* (%)] | ≥50% (*N* = 396) [*n* (%)] | *P* value of $\chi^2$ | OR (95% CI) |
|---|---|---|---|---|---|
| Parity | | | | | |
| Never pregnant | 173 | 140 (80.9) | 33 (19.1) | 0.00 | 3.31 (2.21–4.96)* |
| Ever pregnant | 827 | 464 (56.1) | 363 (53.9) | | |
| Current age (years) | | | | | |
| <20 | 339 | 233 (68.7) | 106 (31.3) | 0.000 | 2.05 (1.39–3.04)* |
| 20–29 | 485 | 280 (57.7) | 205 (42.3) | | 1.28 (0.89–1.83) |
| ≥30 | 176 | 91 (51.7) | 85 (48.3) | | Reference group |
| Type of residence after marriage | | | | | |
| In a house with her husband | 315 | 192 (61.0) | 123 (39.0) | 0.80 | 1.03 (0.78–1.35) |
| In a house with relatives | 685 | 412 (60.1) | 273 (39.9) | | |
| Wife's education | | | | | |
| Illiterate or can read and write | 512 | 320 (62.5) | 192 (37.5) | 0.10 | 1.96 (0.96–4.03) |
| Preparatory or more | 451 | 267 (59.2) | 184 (40.8) | | 1.71 (0.83–3.52) |
| Higher education | 37 | 17 (45.9) | 20 (54.1) | | Reference group |
| Wife's employment | | | | | |
| Housewife | 937 | 577 (61.6) | 360 (38.4) | 0.00 | 2.14 (1.24–3.69)* |
| Working | 63 | 27 (42.9) | 36 (57.1) | | |
| Husband's employment* | | | | | |
| Lower middle income | 753 | 477 (63.3) | 276 (36.7) | 0.00 | 1.63 (1.21–2.21)* |
| Upper middle income | 247 | 127 (51.4) | 120 (48.6) | | |
| Exposure to obstetric health educational message | | | | | |
| No | 776 | 509 (65.6) | 267 (34.4) | 0.00 | 2.59 (1.89–3.55)* |
| Yes | 224 | 95 (42.4) | 129 (57.6) | | |

*Highly significant at $P < 0.01$.

**Table 7 Predicting factors associated with poor knowledge about obstetric danger symptoms using logistic analysis**

| Predictors | AOR (95% CI) |
|---|---|
| Never pregnant | 3.09 (2.05–4.66)** |
| Ever pregnant | Reference group |
| No health educational messages | 2.28 (1.67–3.12)** |
| Exposed to health educational messages | Reference group |
| Housewife | 1.80 (1.03–3.14)* |
| Working woman | Reference group |
| Lower middle income husband | 1.46 (1.08–1.98)* |
| Upper middle income husband | Reference group |

AOD, adjusted odds ratio; CI, confidence interval; *$P$ value < 0.05.; **$P$ value < 0.01.

in iron and folic acid during pregnancy can potentially impact the health of the mother, her pregnancy, and fetal development negatively [23]. Anemic women are less able to tolerate hemorrhage with delivery and more prone to postpartum hemorrhage [24]. A large proportion of the pregnant women did not know the danger signs of serious health problems that could affect their pregnancy adversely [25].

Although bleeding is an important dangerous obstetric symptom [16] and is the highest reported cause for obstetric complications and maternal deaths in the studied villages [26], less than half of the studied participants mentioned vaginal bleeding as a danger sign during pregnancy, labor, and in the postpartum period (34.9, 40.9, and 31.9%, respectively). The proportion of the study participants who mentioned bleeding as a danger sign during pregnancy (34.9%) was nearly the same as the findings in the studies of Burkina Faso (39.4%) [14] and Guatemala (31.0%) [15]. However, those who mentioned bleeding as a danger sign during labor (40.9%) were nearly the same as in the Kenyan study (37.0%) [16], and during the postpartum period (31.9%), it was mildly higher as compared with the finding in Guatemala (28.0%) [14] and Indonesia (29.0%) [27]. Postpartum hemorrhage is a leading cause of approximately 30% maternal deaths worldwide [28]. Despite the fact that the majority of the deliveries in rural areas occur at home, the least identified indicator among both study groups was ways for safe delivery, wherein only 4% of the never-pregnant women and 14.8% of the ever-pregnant women knew at least three ways of safe delivery ($P$ < 0.05). The proportion of the study participants who mentioned labor lasting more than 12 h as a danger sign (10.0%) was significantly lower than in Burkina Faso's study (82.2%) [14] and nearly the same as in Guatemala's study (11.0%) [16].

In the current study, only 39.6% of the study participants exhibited good awareness (≥50**%**) about obstetric danger signs, wherein the percent of women who got a score of knowledge of at least 50**%** was significantly higher among the ever-pregnant women compared with the never-pregnant women (43.9 and 19.1%, respectively) ($P$ < 0.001). This could be explained by the finding of the current study, which showed that never-pregnant women, women aged less than 20 years, and those who did not have exposure to obstetric health educational messages were associated with significantly more than two times the odds of unawareness of obstetric danger signs (OR = 3.3, 2.0 and 2.59, respectively) than ever-pregnant women, those aged more than 20 years, and those exposed to obstetric educational messages. Increased awareness among multiparous (ever pregnant) women may be related to their own experiences of pregnancy and delivery, which is an important source of their information, especially among those who had complications associated with their pregnancy. This is in line with Pembe *et al.* [29], who stated that young women in their first pregnancy may need more consideration when providing counseling and health education. This is also in parallel to the study conducted by Manju and Sudhanshu [30], who found that the knowledge of safe motherhood differed significantly across parity.

Although awareness was higher in ever-pregnant women than in never-pregnant women, it is still very low (only 43.9% got a score more than 50%). Hence, there is a need to assess the content and/or the process of ANC. A study conducted by Metwally *et al.* [31] revealed that the vast majority of the studied women (94.2%) did not receive the minimum required number of visits (four visits) of ANC and most of the studied women (48.7%) who had at least one visit (80.5%) came only to be vaccinated against tetanus. Half of the studied women did not seek PNC within 40 days after delivery. More women must be brought within reach of ANC, perhaps through community-based ANC. The quality of ANC care may need to be reviewed to ensure that it is performed in such a way that women learn about the danger signs and about what to do if any of them occur. Antenatal care provides an opportunity to counsel women about possible serious danger signs of pregnancy and delivery and to promote delivery by skilled attendants [32–34]. Logistic regression analysis in a study conducted by Metwally *et al.* [26] revealed that a lack of antenatal care carried significantly three times and 10 times the risk of death in El Fayoum and Benisuef, respectively.

In the current study, education seems not to play a positive role in increasing the awareness of women about obstetric complications as the awareness of the ever-pregnant women (significantly more illiterate) was significantly higher than that of the never-pregnant women. This is in contrast to Anya *et al.* [34], who stated that educated women have a better pregnancy

outcome compared with uneducated women. Moreover, occupation seems to influence the level of women's awareness about the signs of obstetric complications. This could be explained by the fact that working women have a better opportunity to share experiences with others unlike housewives. Furthermore, in rural areas, sources of information are limited unlike in urban areas, in addition to the prevalence of illiteracy, which may contribute to this result.

The question raised in this study was regarding Do we need to Promote Preconceptional Educational Programs?, especially when it has been found that efforts to improve pregnancy outcomes through behavior modification interventions have been inconsistent and ineffectively utilized. In the current study, only 19.1% of the newly married never-pregnant women got a score of knowledge about danger signs of pregnancy of at least 50%. One study examining women's perceptions, knowledge, and awareness of PC healthcare reported that although a majority of the women understand the importance of optimizing their health before conception, they also have deficiencies in their knowledge of risk factors that impact maternal and fetal health [35]. PC care is the provision of biomedical, behavioral, and social health interventions to women and couples before conception occurs, aimed at improving their health status and reducing factors that contribute to poor maternal and child health outcomes. The three integral components of PC counseling are identification of risk factors related to pregnancy, patient education regarding pregnancy risks, management options, and reproductive alternatives, and initiation of interventions, when possible, to provide optimum pregnancy outcome [36]. Certain researchers, providers, and healthcare advocates have suggested developing a reproductive health life plan for young women and couples as they enter their reproductive years [37–39].

There is growing experience in implementing PC care initiatives both in high-income countries, such as Italy, the Netherlands, and the USA, and in low-income and middle-income countries, such as Bangladesh, the Philippines, and Sri Lanka. It was agreed that it is important to identify and document these initiatives to inform others and to inspire them to take up work in this area [9]. Early behavioral and educational intervention regarding PC care can be effective in reducing risk factors [40], and also has a substantial influence on societal costs [41,42]. Correspondingly, in April 2006, the Centers for Disease Control and Prevention (CDC) released revised PC care guidelines. The recommendations aim to improve the knowledge and attitudes and behaviors of men and women related to PC health, assure that all women of childbearing age receive PC care services, reduce risks indicated by a previous adverse pregnancy outcome through interventions during the interconception period, and reduce adverse pregnancy outcomes [43].

## Conclusions and recommendations

This study indicated that the knowledge level about obstetric danger signs was low among women, but significantly lower among newly married never-pregnant women than in ever-pregnant women and was affected by receiving health educational messages. Logistic regression analysis revealed that significant predictors for unawareness of obstetric danger symptoms were in the order, never-pregnant women, women unexposed to health educational messages, housewives, and women with lower-income or middle-income husbands (OR = 3.0, 2.2, 1.8, and 1.5, respectively).

Accordingly, this study reflects the importance of the PC health education program and the need for a strategic plan to increase the awareness of women in the childbearing age about obstetric complications. It is also recommended that general health education in school be improved to promote reproductive awareness. The importance of PC health promotion activities should be included in the residency and continuing medical education of all primary-care physicians. Because antenatal care is not obligatory and the pregnant women may be reluctant about taking antenatal care, so a PC health education program is needed to increase women's awareness about obstetric danger symptoms, which will help in reducing maternal mortality.

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**Conflicts of interest**

None declared.

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