

Knowledge and Understanding of Obstetric Danger Signs Among Pregnant Women Attending the Antenatal Clinic at the National Referral Hospital in Thimphu, Bhutan: A Cross-Sectional Study

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Abstract

Background: The third Sustainable Development Goal aims to reduce maternal and newborn deaths. Pregnant women's understanding of danger signs is an important factor in seeking timely care during emergencies. We assessed knowledge of obstetric danger signs using both recall and understanding of appropriate action required during obstetric emergencies.

Methods: This was a cross-sectional study among pregnant women attending antenatal clinic at Bhutan's largest hospital in Thimphu. Recall was assessed against seven obstetric danger signs outlined in the Mother and Child Health Handbook (7 points). Understanding of danger signs was tested using 13 multiple choice questions (13 points). Knowledge was scored out of 20 points and reported as "good" ($\geq 80\%$), "satisfactory" (60 – 79%) and "poor" ($< 60\%$). Association between knowledge score and participant characteristics were tested using Chi-square, Fisher's Exact and t-tests. Corresponding non-parametric tests were performed where appropriate. Correlation between participant characteristics and knowledge score as well as number of danger signs recalled was tested using Pearson's correlation coefficient. Results with $p < 0.05$ were considered significant.

Results: Four hundred and twenty-two women responded to the survey (response rate = 96.0%). Mean (\pm SD) knowledge score was 12 (± 2.5). Twenty women (4.7%) had "good knowledge", 245 (58.1%) had "satisfactory knowledge" and 157 (37.2%) had "poor knowledge". The median number of danger signs recalled was 2 (IQR 1, 3) while 68 (20.3%) women could not recall any danger signs. Women were most knowledgeable about pre-labour rupture of membranes (96.0%) and least knowledgeable about spotting during pregnancy (19.9%). Knowledge level was significantly associated with reading Mother and Child Health Handbook, mother's education level, husband's education level, number of antenatal care visits, gestational age and past surgery on reproductive tract. Both knowledge score and number of danger signs recalled significantly correlated with the period of gestation.

Conclusions: Most pregnant women had satisfactory knowledge score but recognized the appropriate actions warranted during obstetric emergencies. The MCH Handbook has played a significant role in improving knowledge and understanding of danger signs.

Background

The Sustainable Development Goals (SDG) highlights the interconnectedness of population health with other aspects of development such as eradicating poverty, conserving environment and economic growth [1]. To ensure healthy lives and promote well-being for all ages, the third SDG outlines reducing preventable maternal and newborn deaths as its first two targets [1].

Although most maternal deaths are preventable [2], it poses major challenges to health systems around the world, especially in underdeveloped and developing nations [1]. While many countries struggled to achieve the Millennium Development Goal of reducing maternal mortality ratio (MMR) [1, 3], Bhutan was

among nine countries that achieved the greatest relative reduction in MMR globally [3]. MMR in Bhutan decreased from 560 in 1990 to 86 per 100,000 live births in 2012 [4].

The Royal Government of Bhutan initiated many policy and infrastructural reforms over the years to achieve the Millennium Development Goal targets [5, 6]. Key milestones include the Safe Motherhood and Child Survival Programme initiated in 1994, Emergency Obstetric Care centres established in 1999, maternal mortality reviews started in 2000, Mother and Child Health (MCH) Handbook introduced in 2007, National Child Health Strategy developed in 2014, and the Bhutan Every Newborn Action Plan adopted in 2016 [5, 6]. Additionally, health professionals were continually trained in delivering quality obstetric care and in prevention and management of emergencies such as post-partum haemorrhages [5, 6]. For Bhutan to achieve its target reduction of MMR (70 per 100,000 live births) and neonatal mortality rate (12 per 1,000 live births), additional efforts are required to further reduce preventable maternal and neonatal deaths.

Most maternal deaths in Bhutan are attributed to direct obstetric causes [6]. A pregnant woman's understanding of danger signs during pregnancy is vital to seeking timely care during obstetric emergencies and reducing the first delay [2]. Other studies have assessed knowledge levels by women's ability to recall danger signs [7–10]. Although recall indicates that a woman has heard of danger signs, what action she would take if faced with emergency situations depends on her understanding of the danger signs. We assessed pregnant women's knowledge of obstetric danger signs through recall and their understanding of appropriate action necessary during a potential obstetric emergency. We also assessed the impact of the MCH Handbook on knowledge and understanding of obstetric danger signs.

Methods

Study design

This was a cross-sectional study among pregnant women attending antenatal clinic at Bhutan's largest hospital between May 2019 and July 2020.

Study setting

General setting

Bhutan is situated in the eastern Himalayas with a population of 0.7 million; Thimphu is its capital and largest city [11]. In 2015, Bhutan had 196,297 women in the reproductive age group (15 – 49 years) with 24,846 residing in Thimphu [11]. The national general fertility and total fertility rates were 57.3 and 1.7 per 1,000 women, respectively [11].

The state provides free-health care services across all levels (primary, secondary, and tertiary) [12]. MCH services including antenatal care (ANC) and post-natal care are provided free of cost through hospitals and out-reach clinics initiated to increase coverage [12]. As part of its Reproductive, Maternal, Neonatal and Child Health Program, the Ministry of Health introduced the MCH Handbook in 2007, and revised it in

2014 and 2019 [12, 13]. Each Handbook has a unique identification number that tracks the pregnancy through the *Druk* Health Management & Information System [13].

The MCH Handbook is a recording tool as well as an information booklet. The handbook records parents' demographic details, mother's antenatal records, birth preparedness plan, birth details of the child, maternal and neonatal records, child's growth charts, and vaccination records. It provides information on breastfeeding and nutrition, vaccination schedules, obstetric danger signs, monitoring developmental milestones, dental care, and general advice on antenatal and postnatal care [14]. The MCH Handbook of Bhutan outlines seven key obstetric danger signs: 1) vaginal bleeding, 2) high fever, 3) preterm labour, 4) severe abdominal pain or vomiting, 5) severe headache, blurred vision or convulsions, 6) fast or difficult breathing, and 7) reduced or absent foetal movements [14].

Specific setting

This study was conducted at the MCH wing of the Gyaltsuen Jetsun Pema Mother and Child Hospital, which is a part of the Jigme Dorji Wangchuck National Referral Hospital complex in Thimphu.

A pregnant woman is issued the MCH Handbook during her "booking visit" [12]. Health workers explain the contents of the MCH Handbook during each antenatal visit. Staffs deliver key health messages in their daily talk (15 – 20 minutes) to the group of clients gathered in their respective units. Obstetric danger signs are discussed in these talks by health workers (health assistants, nurses or midwives) from the ANC Unit. These health messages are reinforced during subsequent ANC and postnatal visits.

Study participants

All pregnant women aged 18 years and above, and attending ANC at Gyaltsuen Jetsun Pema Mother and Child Hospital were eligible for the study. Participants were selected using systematic random sampling: every third pregnant woman registering for their routine ANC visit for the day was invited to participate in the study; those who consented were interviewed. Repetition of study participants was avoided by careful assessment of their MCH tracking number.

Variables and data sources

Data were collected by the authors through an interviewer-administered questionnaire that was designed for the purpose of this study (supplementary material). The questionnaire was pilot-tested among 20 pregnant women at Gyaltsuen Jetsun Pema Mother and Child Hospital in March 2019.

Mother's knowledge of obstetric danger signs was assessed with a knowledge score. Recall was assessed against seven obstetric danger signs outlined in the MCH Handbook (7 points). Understanding of danger signs was tested using 13 multiple choice questions (13 points). Every danger sign recalled and each correct response was awarded a score of one. Knowledge was scored out of 20 points by adding the number of danger signs recalled and the number of correct responses to the 13 questions.

Demographic characteristics (age, educational level of both partners, place of residence, family type), obstetric characteristics (gravida, parity, previous stillbirth, past surgery on reproductive tract and “bad obstetric history”), and whether pregnant woman had read the MCH Handbook were collected.

Sample size

In the absence of a baseline knowledge level of obstetric danger signs among Bhutanese women, we calculated a sample size of 441 for a finite population of 24,846 based on the following assumptions: 50% probability for good knowledge, 5% margin of error, and 15% drop out rate.

Data entry and analysis

Data were entered into EpiData Entry version 3.1 and analyzed in EpiData Analysis version 2.2.3 (EpiData Association, Odense, Denmark) and STATA version 13.1 (StataCorp LP USA).

Knowledge was categorized as “good” ($\geq 80\%$, score 16 – 20), “satisfactory” (60–79%, score 16 – 20) and “poor” ($< 60\%$, score ≤ 15). Continuous variables are reported as mean, standard deviations, median and interquartile range. Categorical variables are reported as frequencies and percentages. Normality for continuous variables was tested using Shapiro-Wilk test. Association between knowledge score and participant characteristics were tested using Chi-square, Fisher’s Exact and t-tests. Corresponding non-parametric test (Kruskal-Wallis test) was performed where appropriate. Pearson’s correlation coefficient was calculated between knowledge score as well as number of danger signs recalled and mother’s age, period of gestation, gravidity and parity. Results with $p < 0.05$ were considered significant.

Ethics considerations

Ethics clearance was obtained from the Research Ethics Board of Health, Ministry of Health, Bhutan. Informed written consent was taken from each participant prior to the interview.

Results

A total of 422 pregnant women were interviewed (response rate = 96.0%). The mean (\pm SD) age of participants was 27.9 (\pm 4.8) years. Almost half of the women (196, 46.4%) were in their first pregnancy and the median gestational age was 34 weeks (IQR 26, 38). Three-quarters of the women (309, 73.2%) were in the third trimester of their pregnancy and a quarter of them (112, 26.5%) had come for their 7th – 10th ANC visits.

One woman was admitted for gestational hypertension or pre-eclampsia in her past pregnancy. Three women had experienced stillbirths and 13 women reported at least one child who had died under five years of age. Among multigravid women, none had a “bad obstetric history” (Rh incompatibility of parents’ blood groups; three or more consecutive spontaneous abortions; birth weight of past child less than 2500 grams or more than 4500 grams). Table 1 summarizes the basic demographic and obstetric characteristics of the participants.

Table 1

Demographic and obstetric characteristics of pregnant women attending antenatal clinic at Gyaltsuen Jetsuen Pema Mother and Child Hospital, Thimphu, Bhutan, May 2019 – July 2020

Basic characteristics	n	(%)
Total	422	(100)
Mother's age (years)		
18–24	107	(25.4)
25–34	276	(65.4)
35–40	39	(9.2)
Mother's level of education		
None	47	(11.1)
Non-formal education	10	(2.4)
Primary	26	(6.2)
Secondary	243	(57.6)
Tertiary	96	(22.7)
Father's level of education		
None	41	(9.7)
Primary	33	(7.8)
Secondary	201	(47.7)
Tertiary	147	(34.8)
Residence		
Urban	376	(89.1)
Rural	46	(10.9)
Family type		
Extended	223	(52.8)
Nuclear	199	(47.2)
Current gravida		
Primigravid	196	(46.4)
Two to four	218	(51.7)
Five or more	8	(1.9)

Basic characteristics	n	(%)
Trimester during visit		
1st trimester	6	(1.4)
2nd trimester	107	(25.4)
3rd trimester	309	(73.2)
Number of ANC visits at the time of interview		
1–3 visits	119	(28.2)
4–6 visits	191	(45.3)
7–10 visits	112	(26.5)
Number of past abortions*		
0	368	(87.2)
1	42	(10.0)
2	12	(2.8)
Surgery on reproductive tract in past**		
No	394	(93.4)
Yes	28	(6.6)
*Primigravida women were excluded		
**Surgeries included caesarean section, salpingotomy, salpingectomy, myomectomy etc.		

Sources of information on danger signs

Over three-quarters of women (335, 79.4%) had heard of obstetric danger signs. Nurse/midwife was the most common source of information (258, 77.0%) on danger signs. Among 375 literate women, 308 (82.1%) reported having read the MCH Handbook and 165 (44.0%) of them reported the MCH Handbook as a source of information on obstetric danger signs. Figure 1 lists the frequency of each source cited by the pregnant women as their source(s) of information regarding obstetric danger signs.

Knowledge of Obstetric Danger Signs

The mean (\pm SD) knowledge score was 12.0 (\pm 2.5). Twenty women (4.7%) had “good knowledge” on obstetric danger signs. Most women (245, 58.1%) had “satisfactory knowledge” while a third of them (157, 37.2%) had “poor knowledge”. The median number of danger signs recalled was 2 (IQR 1, 3). Among the 335 women who reported having heard of danger signs previously, 68 (20.3%) could not recall

any danger sign. Vaginal bleeding was the most common danger sign recalled (227, 67.8%) while the least recalled danger sign was “symptoms of pulmonary embolism” (6, 1.8%).

Over 90% of women chose the correct response to 5 of the 13 questions related to: pre-labour rupture of membranes (96.0%), vaginal bleeding with fleshy parts (95.5%), preterm labour pain (92.7%), puerperal sepsis (91.0%) and reduced foetal movements (90.5%). The three most common questions with incorrect answers were related to: spotting during pregnancy (19.9%), postpartum haemorrhage (75.8%) and symptoms of pulmonary embolism (78.6%). The details of knowledge assessment using the twenty items are shown in Figure 2.

Factors associated with knowledge of obstetric danger signs

Knowledge level (categorized) was significantly associated with reading MCH Handbook ($p < 0.001$), mother’s education level ($p = 0.003$), husband’s education level ($p < 0.001$), and past surgery on reproductive tract ($p = 0.047$) using Fisher’s Exact Test. Knowledge level was also significantly associated with number of ANC visits ($p = 0.002$) and gestational age ($p = 0.033$) using t-test. The number of danger signs recalled was significantly associated with mother’s education level ($p < 0.001$), husband’s education level ($p = 0.011$) and reading MCH handbook ($p < 0.001$) using Kruskal-Wallis test. Both knowledge score ($r = 0.17$, $p < 0.001$) and number of danger signs recalled ($r = 0.12$, $p = 0.033$) significantly correlated with the period of gestation. Age of pregnant woman, place of residence, family type (nuclear, extended or single mother), gravida and past abortions were not significantly associated with knowledge score.

Discussion

Knowledge of obstetric danger signs

Most women in our study had low scores on recall of obstetric danger signs. However, when presented with an obstetric emergency, most recognized the urgency of the situation and identified the need to seek medical attention. Women were most knowledgeable about pre-labour rupture of membranes, vaginal bleeding with fleshy parts and preterm labour. They were least knowledgeable about spotting during pregnancy, postpartum haemorrhage and symptoms of pulmonary embolism.

Studies in the past have equated women’s knowledge on obstetric dangers signs with their ability to spontaneously recall varying number of danger signs [8–10, 15–18]. These studies surveyed women in the community [8, 9, 16, 18, 19] at different times after their last pregnancy [8–10] and assessed danger signs by classifying them as related to antepartum-, intrapartum- and postpartum-period [9, 15, 16, 19]. Though we cannot make direct comparisons of knowledge levels, the median number of danger signs recalled in our study is comparable to that reported elsewhere [8]. The most common danger sign recalled in our study was vaginal bleeding, a pattern that is similar to what is reported elsewhere [8, 10, 16–18, 20, 21]. However, the most common danger sign recalled was fever in Madagascar and Papua New Guinea while abdominal pain was the most common danger sign recalled in Bangladesh [22].

The role of MCH Handbook

In our study, both the number of danger signs recalled and knowledge score were significantly associated with reading MCH Handbook. It is possible that this association resulted due to our focus on the danger signs outlined in the MCH Handbook issued to the participants. A 2018 recommendation by the World Health Organization (WHO) for home-based records for maternal, newborn and child health reported that home-based records empower women to make decisions by improving their knowledge [23]. WHO also reported increased healthcare-seeking patterns for antepartum and postpartum complications in places where some form of home-based records were used [23]. The MCH Handbook of Bhutan replaced three previously used home-based records: 1) antenatal record card; 2) postnatal clinic card; and 3) child immunization and growth chart card [13]. It also incorporates health education and information related to all aspects of pregnancy, breastfeeding as well as child growth and development [12–14]. Therefore, Bhutan's MCH Handbook fulfils all three levels of functions expected of a home-based record: data recording and storing function, behaviour change communication function, and monitoring and referral function. However, the digital tracking of pregnancy through the MCH Handbook only captures how frequently pregnant women come for their ANC and postnatal visits but not the quality of each visit.

Factors associated with levels of knowledge

Our findings suggest that the knowledge of danger signs was associated with gestational age of pregnancy and number of ANC visits. Repeated exposure to educational talk at the antenatal clinic may have reinforced and increased knowledge of danger signs. Studies elsewhere reported increased knowledge with more ANC visits [15] and utilizing ANC services [18]. Health education increases awareness of danger signs [17, 24] and is reported to have doubled the odds of knowing about danger signs [9].

We found significant association of educational level of both mother and her husband with the number of danger signs recalled and knowledge score. Similarly, other studies have reported increased odds of knowing and recalling danger signs with higher levels of mother's education [15, 17, 24]. Likewise, the number of danger signs recalled by a pregnant woman was also associated with her husband's educational level [7]. Educating husbands together with women might be a method to reinforce understanding of danger signs during pregnancy. A multi-center study among pregnant women admitted in late pregnancy to hospitals in 2019 noted that women-invited husband participation was an enabler for early ANC booking and subsequent visits in Bhutanese women [12].

In our study, undergoing surgery in the past (caesarean section, salpingectomy, salpingotomy, myomectomy) was significantly associated with knowledge levels, a finding similar to that reported in Uganda [19]. We did not find significant association of knowledge with the following factors that were found significant in other studies: age of women, place of residence and parity [18, 24].

Knowledge of danger signs during pregnancy is one of the components of birth preparedness and complication readiness [25]. Those with knowledge of at least one danger sign were twice as likely to have better birth preparedness plans [16, 21, 22] and four-times more likely to be aware of birth

preparedness and complication readiness [19]. In Nepal, women and their families failed to seek care in time during obstetric emergencies as they were unaware of danger signs [26].

Reducing maternal mortality

Disseminating information through the media could improve knowledge of danger signs as only half of women in our study reported media as a source of information on danger signs. However, good knowledge on danger signs alone without easy access to health facilities would hinder receiving timely services. Geographical inaccessibility has been reported as a barrier to using ANC services in Bhutan [12] where women in rural areas were twice as likely to deliver at home than their urban counterparts [27].

Achieving the SDGs requires an integrated approach as health shares an intricate and reciprocal relationship with other socioeconomic and environmental factors [1]. Income inequality and poverty alleviation still remain barriers to timely and quality care: women intentionally delayed their ANC booking visit due to lack of funds [12]. As Bhutan graduates from a least developed country to a lower-middle income country, more investment in health could include pre-conception care and effective implementation of the child's first 1000 golden days programme.

Limitations

The high rate of correct responses to most questions could have been due to respondent's social desirability bias where the respondents may have felt compelled to choose "seek care from a hospital" or simply "guessed" it to be the expected response.

Conclusion

Most pregnant women had satisfactory knowledge of obstetric danger signs. Although explicit recall of danger signs was poor, women recognized obstetric emergencies and identified the appropriate action warranted. Reading the MCH Handbook was significantly associated with women's recall and knowledge of danger signs.

List Of Abbreviations

ANC Antenatal Care

MCH Mother and Child Health

MMR Maternal Mortality Ratio

SDG Sustainable Development Goals

Declarations

Ethics approval and consent to participate

Ethics clearance was obtained from the Research Ethics Board of Health, Ministry of Health, Royal Government of Bhutan (approval letter number REBH/Approval/2018/063 dated 25th October 2018). Informed written consent was taken from each participant prior to the interview.

Consent for publication

Not applicable.

Availability of data and materials

The dataset used for this study (minus key identifiers) are available from the corresponding author upon request.

Competing interests

The authors declare that they have no competing interest.

Funding

There was no funding for this study.

Authors' contributions

STT, TD, SY, TP and PD conceived and designed the study. STT, SY, TD and TP collected and entered data. STT, TD and PD conducted the data analysis / interpretation. STT and TD drafted the manuscript. All authors read, critically reviewed, and approved the final manuscript.

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Figures

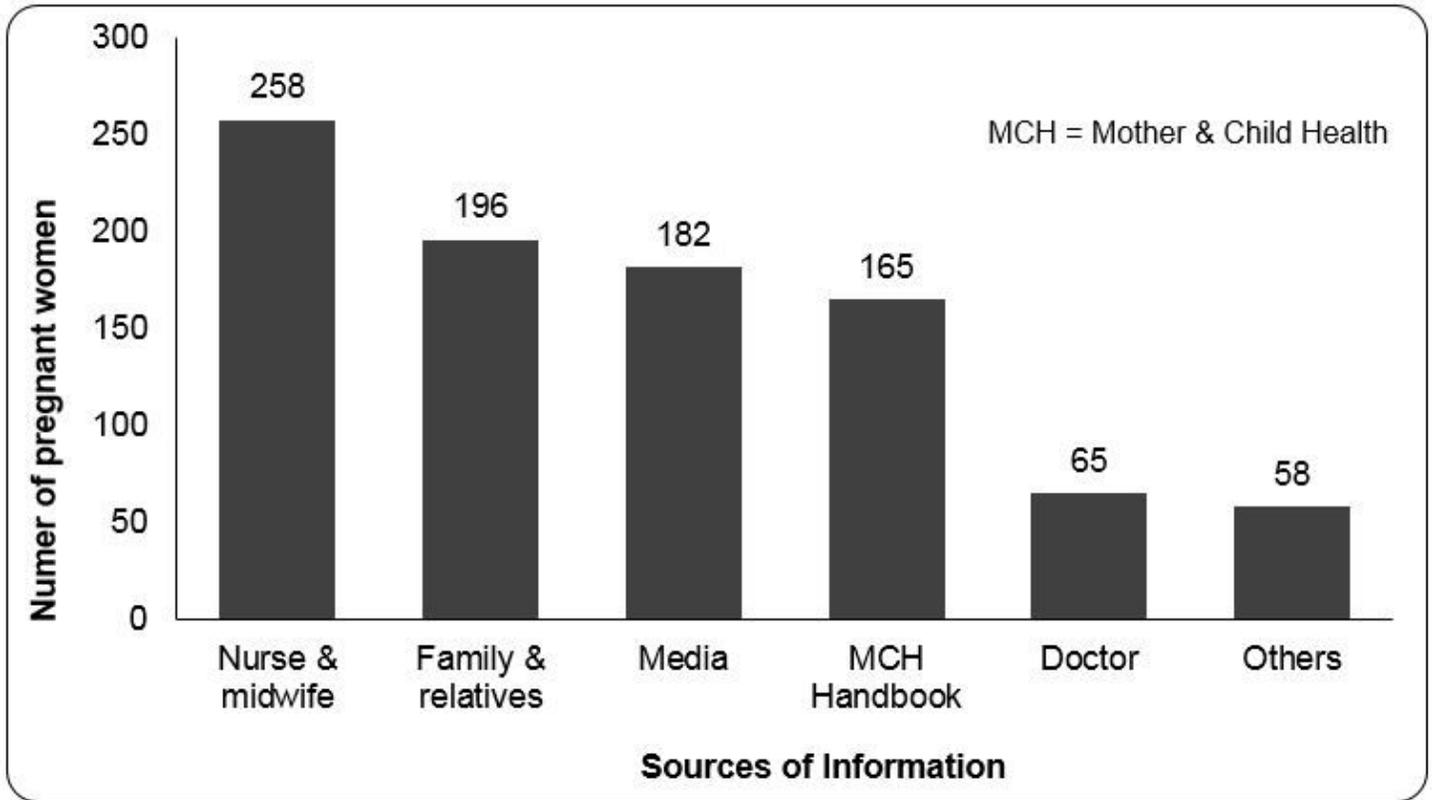


Figure 1

Sources of information cited by pregnant women who reported having previously heard about obstetric danger signs attending antenatal clinic at Gyaltsuen Jetsuen Pema Mother and Child Hospital, Thimphu, Bhutan, May 2019 – July 2020 (n = 335)

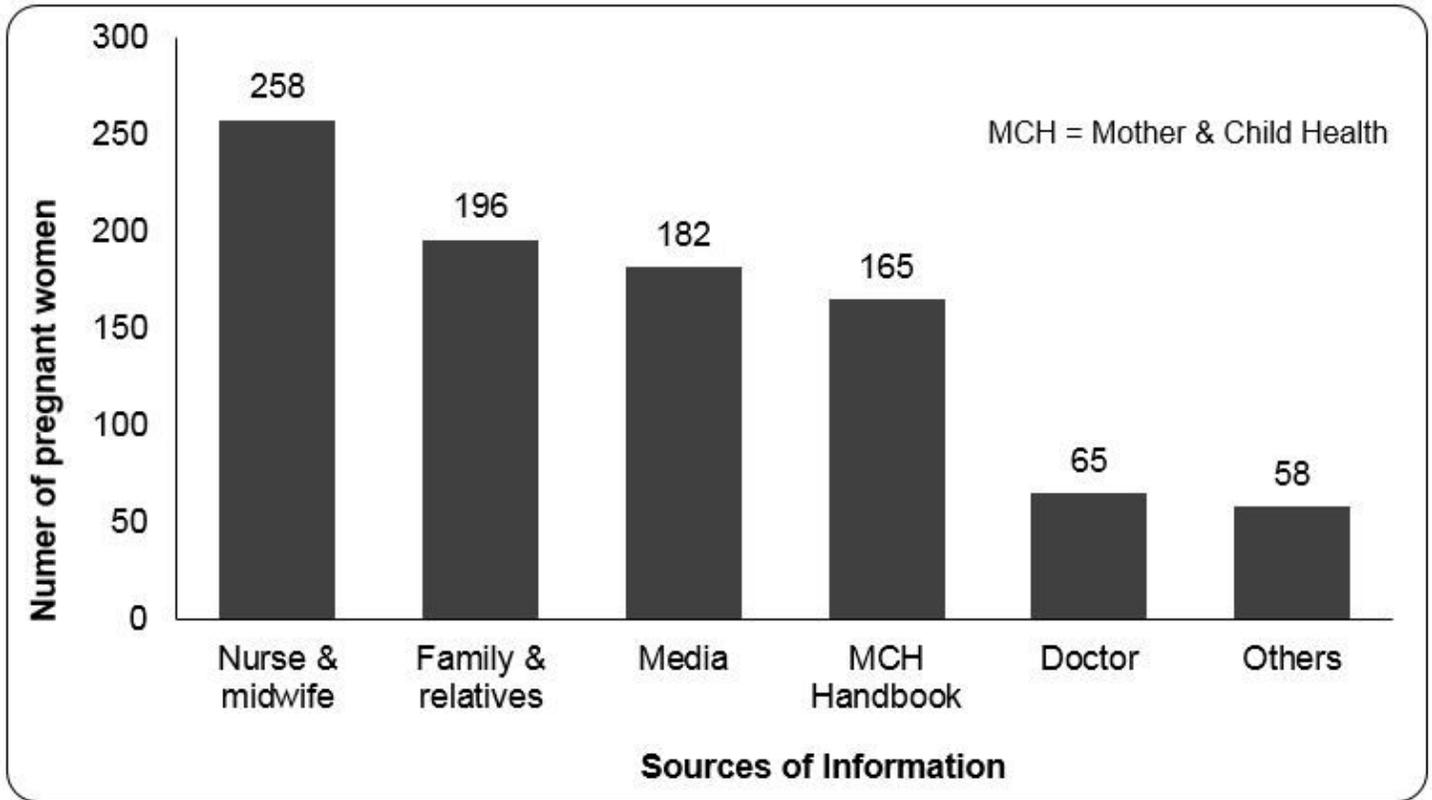


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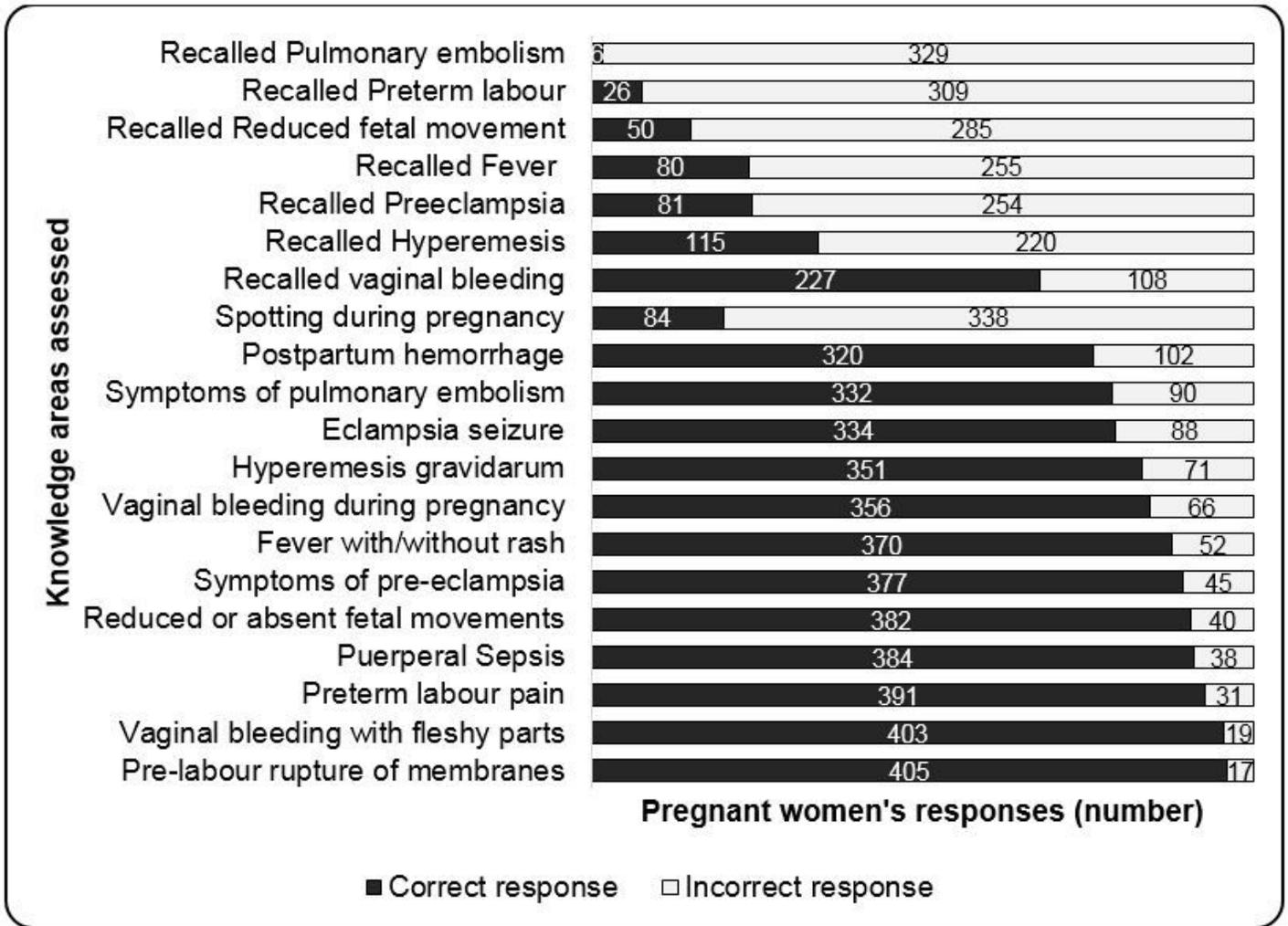


Figure 2

Responses to questions related to knowledge of obstetric dangers signs by pregnant women attending antenatal clinic at Gyaltsuen Jetsuen Pema Mother and Child Hospital, Thimphu, Bhutan, May 2019 – July 2020 (n = 422)

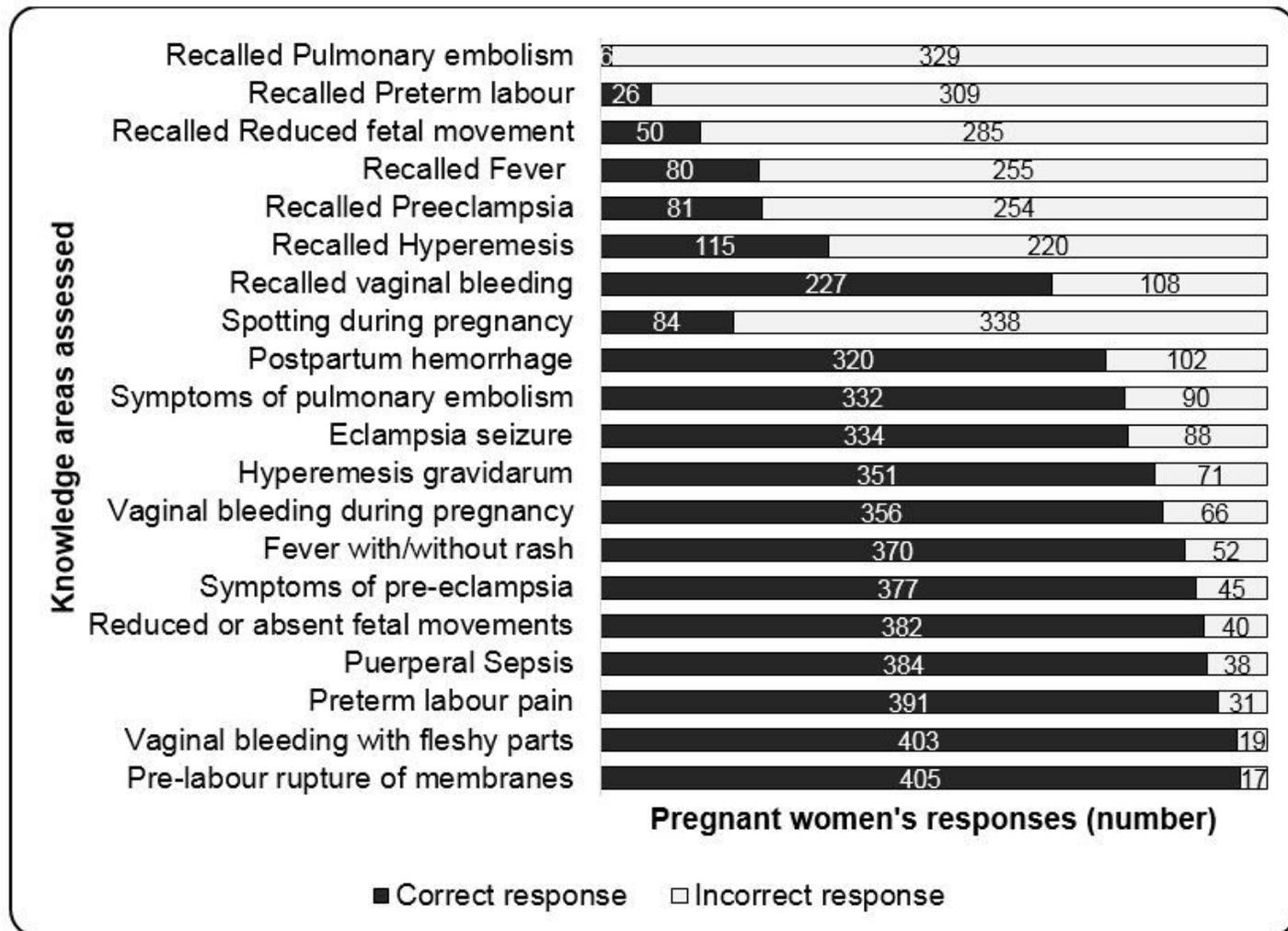


Figure 2

Responses to questions related to knowledge of obstetric dangers signs by pregnant women attending antenatal clinic at Gyaltsuen Jetsuen Pema Mother and Child Hospital, Thimphu, Bhutan, May 2019 – July 2020 (n = 422)

Supplementary Files

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