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Knowledge, attitude and practice of healthcare providers on maternal deaths causes in Dhamar Governorate, Yemen

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Abstract

Background: Sufficient awareness about the causes of maternal deaths among healthcare providers greatly contributes in reducing the incidence and prevalence of maternal deaths.
Aim: This study investigated the knowledge, attitudes and practices (KAP) of the healthcare providers towards maternal deaths causes in Dhamar Governorate, Yemen.
Methods: It was a descriptive cross-sectional survey conducted at the public and private health facilities in Dhamar Governorate, between 2019 and 2020. Using designed-semi-structured questionnaire, demographic and professional characteristics of the participants and their KAP toward maternal deaths were collected.
Results: A total of 167 respondents, aged 22-50 years (mean± SD: 29.33± 6.00 years) were enrolled in the study. Majority of the participants were females 97.6% (153), aged 22-29 years 65.3% (109). Most of the participants were working as midwifes 43.1% (72) followed by nurses**,** gynecologist & obstetricians, general practitioners, and consultants (29.3%, 7.2%, 18.6% and 1.8%, respectively). Almost half (50.9%) of the participants had work experience of one to five Years. About two thirds (64.7%) of the participants had moderate level of knowledge on maternal mortality causes, whereas 28.1%, and 7.2% had good to poor knowledge, respectively. The overall rate of the participants' attitude on agreement toward the factors that contribute in increasing maternal deaths was 81.4%.
Conclusion: This study shows inadequate knowledge of the medical staff on maternal mortality and causes. On the other hand, these healthcare providers show good attitude and practice on such health problem. Further investigation is required to understand the reasons for this gap. Reduction of MMR requires improvement of knowledge and skills through creating in-service training opportunities for both practitioners and mid-level healthcare providers.

Keywords: Healthcare providers, Causes of maternal deaths, Dhamar, Yemen.

1. Introduction

Maternal mortality has been defined as "the death of a women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any causes related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes" [1,2]. The most common tool used to evaluate the state of maternal health in a country is the maternal mortality ratio (MMR). MMR is expressed as maternal deaths per 100,000 live births during a time period [3, 4]. Globally, more than half a million women die of maternal causes every year; one death every minute. Of these deaths, 99% occur in developing countries [3]. Sub-Saharan Africa accounts for 50% of the maternal death burden, followed by Asia with 45% [5]. Although, MMR worldwide has declined by 38%, from 342 deaths in 2000 to 211 deaths in 2017 per 100,000

live births, the rates still remain relatively high in most of the developing countries. The highest maternal mortality ratios were recorded in Eastern and Southern Africa; sub-Saharan Africa; and west & central Africa (384-674/100,000) followed by South Asia (163/100,000) [6]. In Yemen, the maternal mortality ratio was 164 deaths per 100,000 live births in 2017 [7,8], as one of the highest rates in the Arab states region [8].

There are direct and indirect causes of maternal mortality. The first which are related to the obstetric complication of the pregnancy status such as pregnancy, delivery, postpartum hemorrhage, infection, hypertension disorder. While, the indirect causes of maternal mortality result from a previous existing disease or a developed new medical condition, which is aggravated by the pregnancy. For instance, cardiac diseases, anemia, malaria and HIV [9]. Most (70–80%) of maternal deaths are due to direct obstetric causes [5,10]. Consequently, further reduction in maternal and neonatal mortality requires improvement in providers' knowledge of complications during birth because this is when maternal deaths are most likely to occur [11, 12]. Unfortunately, about 830 women are still dying every day from the causes that became understandable and can be largely prevented [13].

Awareness of healthcare providers about leading causes of maternal deaths effectively contributes in reducing MMR. There are no previous studies about this public health problem in Dhamar governorate, Yemen. Thus, this study aimed to investigate the knowledge, attitude and practices of the causes of maternal deaths among healthcare providers at the public and private hospitals in this area.

2. Methods

Study Design and Area

This descriptive cross-sectional survey was conducted among the healthcare providers at public and private health facilities in Dhamar Governorate, Yemen, between 2019 and 2020. The public health facilities were Thamar University Al-Wahda Teaching Hospital, Dhamar General Hospital Authority, Fever Hospital and, medical center of Red Crescent Society whereas the private health facilities were Taiba, Queen Arwa, Dar Al Shifa, Al-Helal Moden, and Dr. Mohammed Al-Musaly Hospitals.

Study Group

A total of 167 participants, aged 22-50 years (mean± SD: 29.33± 6.00 years), agreed to participate in the study and gave the required information for the evaluation. Participants were selected on the basis of their availability in the health facility.

Data Collection

Data were collected by using a pre-tested semi-structured questionnaire consisted of two parts. The first part included the demographic and professional characteristics of participants (Age, gender, employment and work experience). The second part designed for assessing the knowledge (8 closed questions = 8 points; 2 mention questions = 4 points), attitudes (9 items), and practice (3 closed questions = 3 points; 3 mention questions = 6 points).

Statistical analysis

Data entry, checking and analysis were done using Statistical Package for Social Science (SPSS) software (version, 14). The descriptive statistics were curried out to represent the categorical variables by the frequency distribution and percentages. The continuous variables by the mean and standard deviation (SD). Regarding, the closed questions' knowledge and practice, one point has been granted to choose the appropriate answer on the question that has one correct choice. One point has been also granted to choose all the right answers on the question that has four correct or three correct choices. While, a score zero was given to each inappropriate answer as "No", "don't know", "false choice", or "sometime". The partial answer on the question's knowledge that has multiple correct answers was also recorded as zero.

Regarding the opened questions "mention", the two score points granted to each question answer may vary from zero, one point or, two points. For example, three to five correct direct causes of maternal deaths (two points); one to two correct direct causes (one point); and zero for don't know" or wrong answer.

The level of knowledge scores (12 points) regarding maternal mortality were categorized into three levels, poor (0 - 4 points), moderate (5 - 8 points) and good (9 - 12 points). While, the practices scores (9 points) were categorized into two levels, poor (0-5 points) and adequate (5 – 9). The five-points likert scale (strongly agree = 5, agree = 4, Neutral = 3, disagree =2, and strongly disagree = 1) was used to measure attitudes' participants. The mean of participants' attitudes was calculated to rearrange a rank of each item from 1 to 9; and to determine level of response to each item from strongly agree to strongly disagree, as well as the overall mean and level of response to all the items.

3. Results

Demographic and professional characteristics

A total of 167 healthcare providers were enrolled in this study. The majority (97.6%) were female and aged 22-29 years (65.3%). Most of the participants were midwifes (43.1%) followed by nurses (29.3%), general practitioners (18.6%), gynecologist and obstetricians (7.2%) as well as consultants (1.8%). Work experience mostly extend from one to five years (50.9%) (Table 1).

Participants' knowledge regarding maternal mortality causes:

Table 2 reveals that majority (89.2%) of the participants confirmed that they had knowledge about existence of partograph for monitoring labor progression and about also existence of WHO guideline for pregnancy and delivery complication (74.3%).

Ninety one percent of participants answered that the maternal mortality is preventable. More than half of participants completely knew, the meaning of pregnancy induced hypertension (eclampsia) and the suspected amount of bleeding (500-1500 ml) in postpartum hemorrhage cases (52.1% and 50.30%, respectively). On the other hand, about one third (32.9%) of participants knew the meaning of maternal mortality and lower than quarter (21.6%) of them completely knew the aim of active management of third stage of labor (AMTSL). Also, as shown in Table 2, ''A condition in which the fetus does not get out of pelvis, with uterine contraction" this obstructed labour definition was chosen by 26.3% of the participants.

Table 1: Demographic and professional characteristics of the study's participants (n= 167)

Variable	Frequency	Percentage
Age category (years)		
<25	22	13.2
25–29	87	52.1
30-34	23	13.8
35-39	20	12.0
≥ 40	15	9.0
Gender		
Female	163	97.6
Male	4	2.4
Employment		
Consultant	3	1.8
Gynecologist and obstetrician	12	7.2
General practitioner	31	18.6
Midwife	72	43.1
Nurse	49	29.3
Work experience (years)		
< 1	29	17.4
1- 5	85	50.9
6-10	27	16.2
≥ 11	26	15.6

Table 2: Participants' knowledge regarding maternal mortality and causes (n= 167)

Item	n (%)	Item	n (%)
Do you know that there is partograph for monitoring labor progression?		**Meaning of maternal mortality**	
*Yes**	149 (89.2)	*Death during pregnancy*	15 (9.0)
No	18 (10.8)	*Death during delivery*	61 (36.5)
Do you know that there is WHO guideline for pregnancy and delivery complication?		*Death within 6 weeks after delivery*	7 (4.2)
*Yes**	124 (74.3)	All choices *	55 (32.9)
No	43 (25.7)	Two choices	24 (14.4)
Amount of bleeding in PPH		I don't know	5 (3.0)
1500 ml	20 (12.0)	**Are maternal deaths preventable?**	
1000 ml	7 (4.2)	*Yes**	152 (91.0)
500 ml	4(2.4)	*No*	14 (8.4)
All choices*	84 (50.3)	*I don't know*	1 (0.6)
Two choices	40 (23.4)	**Mention the direct causes of maternal mortality?**	
400 ml (False choice*)*	3 (1.8)	PPH, APH and PIH	70 (41.9)
I don't know	9 (5.4)	PPH and APH	24 (14.4)
Aim of AMTSL		PPH, APH, PIH and obstructed labour	14 (8.4)
Increase of uterus contraction	23 (13.8)	No knowledge **	12 (7.2)
Make separation of placenta easy	27 (16.2)	APH	9(5.4)
Protect from PPH	25 (15.0)	PIH	9(5.4)
Preserve Hb ratio	3 (1.8)	PPH, APH, PIH and Postpartum infection	7 (4.2)
All choices *	36 (21.6)	PPH, APH, PIH, Obstructed labour and Pulmonary embolism	7 (4.2)
Three choices	33 (19.8)	PPH, APH, PIH Obstructed labour and Postpartum inf.	7 (4.2)
Two choices	14 (8.4)	PPH	4(2.4)
I don't know	6 (3.6)	PPH, APH, PIH and Pulmonary embolism	4(2.4)
Symptoms and signs of Eclampsia		**Mention the indirect causes of maternal mortality?**	
Hypertension	13 (7.8)	No knowledge**	46(27.5)
Proteinuria	7 (4.2)	CD	18 (10.8)
Convulsion	30 (18.0)	CD and DM	15 (9.0)
Edema	0 (0.0)	CD, DM, HTN, Anemia, and renal diseases	15 (9.0)
All choices*	87 (52.1)	CD, DM, and HTN	14 (8.4)
Three choices	20 (12.0)	CD and HTN	8 (4.8)
Two choices	10 (6.0)	CD, DM, HTN, Epilepsy and Blood diseases	8 (4.8)
I don't know	0 (0.0)	HTN	6 (3.6)
Obstructed labour definition		CD and Trauma	6 (3.6)
Normal delivery	2 (1.2)	HTN and DM	5 (3.0)
Abnormal delivery	9(5.4)	CD, DM, HTN, Malaria, AIDS and Cholera	5 (3.0)
*A condition in which the fetus does not get out of pelvis, with uterine contraction**	50 (29.9)	CD, DM, HTN; Renal, Lung and Liver diseases	5 (3.0)
		CD and Epilepsy	5 (3.0)
A condition in which the fetus does not get out of pelvis, without uterine contraction	7 (4.2)	CD and Anemia	4(2.4)
		Anemia	3 (1.8)
The active stage of labor more than 12 hours	22 (13.2)	DM	2 (1.2)
Multi inappropriate choices	74 (44.3)	CD, DM, HTN and Anemia	1 (0.6)
I don't know	3 (1.8)	CD, HTN, Anemia, and Malaria	1 (0.6)

* The correct answer, ** No knowledge include: I don't know+ wrong answers

APH: Antepartum hemorrhage, AMTSL: active management of third stage of labor, CD: Cardiac disease, DM: Diabetes mellitus, HTN: hypertension " Chronic", PIH: Pregnancy induced hypertension, PPH: Postpartum hemorrhage. Note: The italic statements indicate the available answer choices of the closed questions.

When participants were asked to mention the direct causes of maternal deaths, most of them (41.9 %, n=70) reported postpartum hemorrhage (PPH), antepartum hemorrhage (APH), and pregnancy induced hypertension (PIH) as the main direct causes of maternal deaths. Whereas, 25 (15 %) participants reported four causes including PPH, APH and PIH as well as any other cause such as obstructed labor, postpartum infection or pulmonary embolism (8.40%, 4.20% and 2.40%, respectively). Accordingly, 24 (14.4%) participants reported two causes that included both PPH and APH. However, only 14 (8.4%) participants reported five causes (PPH, APH, PIH, and obstructed labour as well as any other cause such as pulmonary embolism or postpartum infection). Twenty-two (13.2%) participants reported APH, PPH and PIH as a single cause (5.4%, 5.4% and 2.4%, respectively). Generally, three to five direct causes were correctly reported by 65.30% (n= 109) of the participants whereas, one to two direct causes were correctly reported by 27.60% (n = 46). Consequently, 7.2% (n=12) of the participants had no knowledge towards direct causes of maternal mortality.

Regarding the participants' knowledge towards indirect maternal mortality causes, 10.8% (n=18) of them reported cardiac disease (CD) as the main indirect cause of maternal deaths followed by both CD and diabetes mellitus (DM) 9.0% (n= 15). Also, CD, DM, hypertension (HTN), anemia, and renal diseases were reported by 9.0% (n=15) of the participants. In addition, 14 (8.4%) participants reported three causes such as CD, DM and HTN. Six percent (n = 10) reported CD, DM and HTN as well as any other three diseases together such as malaria, AIDS and cholera or renal, lung and liver diseases. Generally, three to five indirect causes of maternal mortality were correctly reported by 29.34%, (n = 49) of the participants whereas, one to two direct causes were correctly reported by 43.11% (n= 72). Consequently, 27.54% (n = 46) of the participants had no knowledge towards indirect causes of maternal mortality (Table 2).

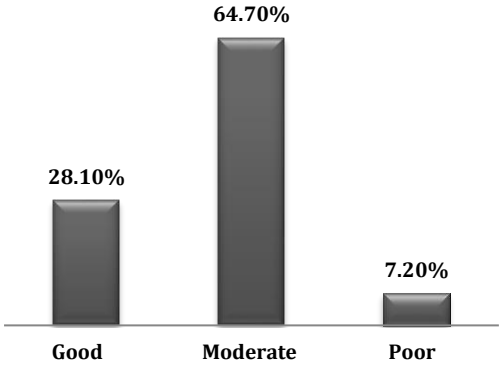

Figure 1: The overall knowledge level of participants towards maternal mortality and causes

Overall level of the participants' knowledge

Figure 1 showed that, about lower than two thirds of the participants (64.7%, n=108) had average knowledge on maternal mortality causes and, more than the quarter (28.1%, n=47) had good knowledge. While, only 12 (7.2%) participants had poor knowledge**.**

Attitude of participants toward practices, situation and circumstances responsible for increasing maternal mortality

As shown in Table 3, the majority (76.0%) of the participants strongly attributed the increase of maternal mortality to the distant between patients' homes and health facilities followed by maternal awareness about importance of health care (62.0%) as well as the poverty (58.7 %). Lack of appropriate medical capabilities and experiences of health care worker and bad level of health care and ignorance of health staff on exact health policies as well as absence of application of evidence-based recommendation were also reported by the participant. The results showed that mean weight ± SD of all items of attitudes was 4.07 ± 0.554 where the overall response level was agreed with rate 81.4%. For more details about the mean, rate and level of participants' responses to each item can be seen in table 3.

Table 3: Attitude of the participants toward practices, situation and circumstances responsible for increasing maternal mortality (n =167)

		5 SA	4 A	3 N	2 DA	1 SDA			Rank	Level
	Item	n (%)	n (%)	n (%)	n (%)	n (%)	Mean ± SD	%		
1	Bad level of health care	65(38.9)	67(40.1)	16 (9.6)	18 (10,8)	1(0.6)	4.06 ± 0.99	81.2	5	A
2	Lack of experience in health care worker	51(30.5)	71(42.5)	22(13.2)	21 (12.6)	2(1.2)	3.89 ± 1.02	77.7	6	A
3	Lack of appropriate medical capabilities	63(37.7)	83(49.7)	9 (5.4)	11 (6.6)	1(0.6)	4.17 ± 0.85	83.5	4	SA
4	Ignorance of health staff around exact health policies	45(26.9)	61(36.5)	34(20.4)	22 (13.2)	5(3.0)	3.71 ± 1.09	74.3	7	A
5	There is no application of evidence-based recommendation	37(22.2)	59(35.3)	46(27.5)	19(11,4)	6(3.6)	3.61 ± 1.06	72.2	8	A
6	Lack of maternal awareness regarding of importance of health care	104(62.0)	57(34.1)	3 (1.8)	2 (1.20)	1(0.6)	4.56 ± 0.65	91.3	2	SA
7	The hospitals are distant from patients' homes	127(76.0)	36(21.1)	2 (1.2)	0 (0.0)	2(1.2)	4.72 ± 0.55	94.3	1	SA
8	Poverty	98 (58.7)	54(32.3)	8 (4.8)	6 (3.6)	1(0.6)	4.45 ± 0.80	89.0	3	SA
9	Poor laboratory services	27 (16.2)	54(32.3)	58(34.7)	27(16.2)	1(0.6)	3.47 ± 0.97	69.5	9	A
	Mean weight (± SD) of total items						**4.07 ± 0.554**	**81.4**		**A**

SA: Strong agree, A: agree, N: Neutral, DA: Disagree, and SDA: Strongly disagree

Participants' practices

Table 4 exhibits that methods used by the respondents for postpartum hemorrhage prevention were AMTSL (43.7%); oxytocin, misoprostol, tranexamic acid, and vitamin K (12.6%); oxytocin (12.6%); and massage of uterus (11.4%). Regarding control of obstructive labour, Caesarean section was reported by 31.7%. Referral to more specific center was reported by 38.9% of the participants. In addition, 66.5% of the respondents reported that the most (66.5%) common drug used for eclampsia's convulsion was magnesium sulfate followed by Diazepam (11.4%). As shown in Figure 3, almost two third of the participants reported that their health facilities had an antenatal, a postnatal care visit registration system and a maternal death record (68.9%, 66.5% and 61.1% respectively)

Table 4: Practices related to postpartum hemorrhage, obstructive labour, eclampsia and availability of health information system (n =167)

Item	n	%	Item	n	%
Mention the methods used for prevention postpartum hemorrhage?			**Mention the most common drug used for eclampsia's convulsion?**		
AMTSL	73	43.7%	Magnesium sulfate	111	66.5%
Oxytocin, Misoprostol, Tranexamic acid, and Vitamin K	21	12.6%	Diazepam	19	11.4%
Oxytocin	20	12.0%	Magnesium sulfate and Hydralazine	8	4.8%
Massage of uterus	9	5.4%	Magnesium sulfate and Diazepam	7	4.2%
Oxytocin and Misoprostol	7	4.2%	Magnesium sulfate, Diazepam, Hydralazine	1	0.6%
AMTSL and treatment of predisposing factor	5	3.0%	Diazepam and Hydralazine	1	0.6%
Traction of umbilical cord with massage	5	3.0%	Referral	20	12.0%
Tranexamic acid, misoprostol and vitamin K	5	3.0%	**Availability of health information system ***		
Uterus massage and ice	5	3.0%	Antenatal care visit registration		
Oxytocin, uterus massage and ice	5	3.0%	Yes	115	68.9%
Misoprostol	2	1.2%	No	52	31.1%
Referral	10	6.0%	Postnatal care visit registration		
Control of obstructive labour			Yes	111	66.5%
Caesarean section	53	31.7%	No	56	33.5%
Estimation and follow up on partograph	19	11.4%	Are all deaths cases death recorded?		
According to the case (treat the causes)	15	9.0%	Yes	102	61.1%
Calling the specialist	6	3.6%	Sometime	17	10.2%
I don't know	9	5.4%	No	48	28.7%
Referral	65	38.9%			

*Closed question

4. Discussion

Majority of maternal mortality occur during childbirth and within 24 hours after delivery which can be prevented when mothers deliver in the health facility where a skilled birth attendant can offer emergency obstetric care (EmOC) [14]. This study showed that about lower two thirds of the participants had moderate level of knowledge on maternal mortality causes, and more than the quarter had good level of knowledge. Only 7.2% of the participants had poor level of knowledge. Where the vast majority of the participants also aware that the maternal mortality is preventable. The majority of the participants knew about the partograph and three quarters of them know about WHO guideline for pregnancy and delivery complication. When the participants were asked to state the direct and indirect causes of maternal deaths in two separated questions, three to five direct causes and indirect cusses were correctly stated by 65.30% and 29.34%, respectively. Also, one to two direct (27.60%) and indirect (43.11%) cusses were correctly stated too. Accordingly, percentage who had no knowledge towards the direct and indirect mortality causes were 7.20%, and 27.5%, respectively. More than half of the participants correctly indicated to the signs and symptoms associated with eclampsia cases and the suspected amount of bleeding in PPH cases. On the other hand, the lowest knowledge level of the participants found to be 21.60% about aim of AMTSL followed by 26.3% of obstructed labour definition and 32.9% of maternal mortality meaning although, every healthcare provider should have a better knowledge about these critical aspects.

Socio-economic status such as the poverty, ignorance, poor use of available maternal services and poor transport factor have been documented as significant non-medical factors to maternal mortality [15]. In a developing country as Yemen, many women are unaware the obstetric care benefits in hospitals, where only three out of ten children are born in a health facility [16,17]. In the present study, the vast majority of participants strongly agreed that the long distance to hospital, poor maternal awareness about importance of health care, and the poverty contribute in rising the maternal mortality with response rates 94.3%, 91.3%, 89.0%, respectively.

Regarding the medical contributor factors in rising the maternal mortality, the majority of participants indicated to the lack of appropriate medical capabilities, bad level of health care; lack of experiences of health care worker; ignorance of health staff on exact health policies; and absence of application of evidence-based recommendation with response rates ranged from 72.2% to 83.5%. Based on the mean weight of all items of attitudes, the overall response level was agreed with rate 81.4%. This emphasizes the need to the periodical assessment of emergency obstetric care (EmOC) levels and determine the palaces aspects and possible support elements for improvement of service quality and reduction of maternal deaths which may result from a medical factor.

AMTSL is recommended for PPH prevention [18,19] which involves using oxytocin, controlled cord traction and uterine massage after delivery of the placenta [19] and when AMTSL is not available, the WHO "strongly" recommends using misoprostol for the same purpose [20]. Lower than half of the participants reported using AMTSL utterly or, use it as well as treatment of

predisposing factor (46.7%, 78). As well, using oxytocin; uterine massage; using oxytocin and misoprostol; traction of umbilical cord with massage; and using misoprostol were reported within the practices used to prevent the PPH (25.7%,). While, other methods have been reported in some of practices such as using tranexamic acid, and vitamin K as well as massage of uterine and ice.

Magnesium sulphate is the drug of choice to control eclampsia's convulsion and, antihypertensive can be used to control increases in blood pressure [21]. Overall, three quarters (76.1%) of the participants reported routinely using magnesium sulphate, where its use was individually reported (66.5%) or use it as well as other drugs such hydralazine and/or diazepam (9.60%). A study was conducted in Nepal showed also that 75% of public hospitals and 83% of private hospitals routinely used magnesium sulphate for managing eclampsia [22]. The partograph tool is used in order to help to determine whether a woman is presenting with obstructed or prolonged labor. Cesarean section is also recommended during obstructed labor [5]. In this study, the most common (31.7%) practice used to control the obstructed labour was cesarean section followed by 11.4% of the estimation and follow up on partograph. On the other hand, the highest percentage of the referral was 38.9% of obstructed labour cases. The need to referral such complicated cases, may be attributed to the fact, that some health centers targeted have no capacity of surgical intervention, and provision and management of blood products and that most participants were midwifes and nurses (72.4 %), as well as the lack of skilled healthcare providers.

Almost one third of the study subjects reported that their health facilities had no an antenatal, a postnatal care visit registration system and an maternal death record. Planners in public and private sector program need cause-specific mortality data to identify adequately prioritize safe motherhood efforts. Reliable morbidity and mortality levels and differentials are essential to developing evidence-based policies in healthcare [5]. This indicates to that health information systems improving in the various health sectors and levels in Yemen are critical.

5. Conclusion

This study shows 64.70% of the healthcare providers have average level of knowledge towards maternal mortality and causes, whereas, 28.10% have good level. The overall agreement rare of the participants' attitude toward the factors that contribute in increasing maternal deaths was 81.4%. In conclusion, this study shows inadequate knowledge of the medical staff on maternal mortality and causes. On the other hand, these healthcare providers show good attitude and practice on such health problem. There is need to the periodical assessment of emergency obstetric care (EmOC) levels and determine the palaces aspects and possible support elements for improvement of service quality and reduction of maternal deaths.

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Competing interests
The authors declare that they have no competing interests.

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