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Research Article

Maternal and Neonatal Health Care Knowledge Among Yemeni Community Midwives: A Community Based Cross Sectional Study

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Abstract

Background and Objective: Maternal and neonatal health indicators in Yemen are among the worst in the world. Community Based Maternal and Neonatal Care (CBMNC) program aims to accelerate Yemen efforts to reduce maternal and child mortality through strengthening the role of Community Midwives (CMWs). This study aimed at assessing CMWs knowledge as a part of the evaluation of the CBMNC program before its national scale-up. **Materials and Methods:** This is a community-based cross-sectional study in a purposively selected districts where CBMNC program is being implemented. Accessibility sampling of 389 CMWs who: 1) received the standard CBMNC training; 2) were permanently residing in the targeted districts for at least 2 years; and 3) provided their consent were included in the study. Data collection on antenatal care; delivery care; immediate neonatal care; postnatal care and treatment of complications were conducted (April-June 2014). CMWs knowledge, score was calculated for the correct answers for each knowledge area and for all areas combined (overall knowledge score). Data entry and analysis were done using SPSS -version 22. **Results:** Medium level of knowledge was prevailing (72%). Minority was scored high (5.9%). Disproportionate knowledge levels were encountered among the different maternal and neonatal areas; being lowest for antenatal care and highest for newborn care. Correct answers were identified by very low percentages for what is included in the postpartum examination (0.8%); Partograph use (6.2%); Successful intervention to reduce maternal mortality (8.7%) and what skilled providers should tell the mother about newborn care (17.2%). **Conclusion:** It was concluded that the majority of CMWs (72%) had medium level of overall knowledge score. Antenatal care knowledge was the least whereas newborn care has the highest scored area. The need to address such gap in the training and refresher courses is necessary for CMWs to have an impact on the maternal and child health care in Yemen.

Key words: Community based-community midwives-neonate, antenatal care, postnatal care, reproductive health

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Yemen is classified as a 'low-middle income country'¹. It ranks low among countries rated according to the United Nations Development Program Human development Index for 2016 (168 out of 188)². Yemen's development is guided by the National Strategic Vision 2025³ and the based 4th Development Plan for Poverty Reduction (2011-2015)⁴. However, the country is in crisis since 2011 which is worsening since September 2014⁵. Yemen faces a formidable web of economic, environmental and political challenges which contribute to the country's low level of human development. It has one of the world's highest birth rates approximately 3% per annum and the average Yemeni woman bears 5 children⁶.

The health system in Yemen suffers from short comings in structure and organization, low staff morale, low quality of healthcare, shortages of essential medicines and insufficient government budget. These are compounded by irrational use of healthcare, lack of equity in facility distribution and human resources, as well as, a lack of a formal referral system or of integration of services at the level of delivery of care⁷. The Yemeni National Reproductive Health Strategy (NRHS) focuses on 2 main areas of reproductive health: maternal and newborn health and family planning. This strategy is a joint effort among population sector in the Ministry of Public Health and Population (MoPHP) and its partners. It addresses both areas and describes concrete and evidence-based interventions to be implemented within 5 years period, 2011-2015. NRHS identified community midwives (CMWs) as the front-line health providers to bring Maternal and Neonatal Health (MNH) services to isolated and remote areas. Training of midwives, especially CMWs in rural areas where 74% of the Yemeni population live and about 50% has limited or no access to health services, especially MNH was identified as a key strategy to reducing maternal and neonatal mortality⁸.

The Community Based Maternal and Neonatal Care (CBMNC) program started in 2007 with the support of United Nations Children's Fund (UNICEF) as an intervention that is expected to accelerate Yemen to achieve MDGs (Millennium Development Goals) 4 and 5. The CBMNC program is a component of the larger safe motherhood strategy, which is a component of the NRHS. The program base on appropriate selection, training and supervision of CMWs and provide them with appropriate supplies, medicines and equipment to improve key health-related behaviors, extend the accessibility of MNH services and strengthens linkages between communities and health services⁹. The home based or community care packages include maternal care, essential newborn care, improving the behavior change

communication of the community, resuscitation of newborn babies at the time of home delivery and management of sick newborns with antibiotics at home¹⁰. Since the program began, maternal and newborn home-based care programs have been established in 25 districts through the training of 500 CMWs and the provision of supplies and equipment¹¹. The CBMNC package is delivered predominantly at home as front line service provision level in the health system and within the context of national Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCAH) strategies⁹.

Although there are noticeable positive sides of the program implementation; before the expansion to other areas, an evaluation was conducted to assess successes, shortcomings and the replicability of the program to nationwide scale in terms of effectiveness, efficiency, sustainability, role of partners and stakeholder satisfaction of the CBMNC towards improving maternal and newborn care in the intervention districts. This paper aimed at assessing CMWs knowledge in selected implementation area as a part of the evaluation of the CBMNC program before its national scale-up.

MATERIALS AND METHODS

Design and target population: This is a community based cross sectional study carried out in 22 purposively selected districts of 4 Yemeni governorates where CBMNC program is being implemented. The governorates and districts were selected purposively based on available information provided from the health offices in the governorates and the UNICEF sub offices which indicates the following:

- Density of trained CMWs
- Continuity of CMWs activities
- Existence of other CBMNC program activities like schoolgirls support groups
- General satisfactory security status in the selected governorates
- Resources available for field work such as availability of trained data collectors, existence of working CMWs, local administrative support etc....

Eligible CMWs were those who (1) received the standard CBMNC training; (2) are permanently residing in the targeted districts for at least 2 years prior to the survey and (3) provided their consent to participate in the study.

Sampling: Sampling was done using purposive sampling taking into consideration the previously mentioned criteria of governorates and districts selection. After communication

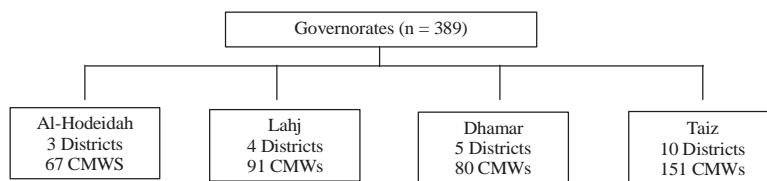


Fig. 1: Flow chart of CMWs sample distribution

with UNICEF representatives and local health authorities in the respective governorates, it was decided that the selected 22 districts have the highest number of trained and working CMWs.

The sample size was calculated as based on the following assumption using the following formula¹²:

$$n = \frac{k^2(pq)}{d^2} \quad (1)$$

Where: n = required sample size; k = standard of 1.96 at 95% certainty; p = the prevalence of (50%); q = 1-p and d = precision or error allowable, which be in the present study is 0.05. It is assumed a prevalence of 50% for unknown knowledge prevalence and to maximize the required sample size. The calculated sample size was 384. However, a total of 389 CMWs was encountered and enrolled proportionally as shown in Fig. 1:

Study instrument: A questionnaire was developed to assess CMWs knowledge and consists mostly of closed questions: antenatal care ANC (11 questions); labour and delivery care (8 questions); immediate neonatal care (8 questions); postnatal care (11 questions) and management of selected complications (10 questions). The questionnaire content was based on the CBMNC training manual⁸.

Data collection: Between 12-14 midwives from each of the 4 governorates were enrolled as data collectors based on qualification, previous experience in questionnaire administration and conducting fieldwork in communities. A 2-day training on use of the tools was conducted by the research team and took place just before the survey day to maximize retention of knowledge and skills learned. Pre-testing of study tools was done in selected villages that bear similarities to the targeted ones which were not included in the sample. Each trainee performed 3-5 interviews. Immediately following training, between 5-0 days of fieldwork were conducted in each governorate under the

direct supervision of the researchers. The CMWs were identified by CBMNC program supervisor and reproductive health manager in each governorate. Targeted CMWs were approached in their respective health centers/units or at their homes in those very remote areas. Before each interview, informed consent was taken. The field team consisted of 12-14 interviewers in each governorate. It was further subdivided into 3 smaller teams consists of a supervisor and 2 interviewers each was responsible for approaching almost equal numbers of respondents. The supervisors were responsible for:

- Mapping the selected areas
- Identifying the eligible CMWs.
- Planning the daily schedule including travel
- Supervising data collectors teams
- Reviewing the returned questionnaires for completion
- Ensuring the best possible quality of research tools

Fieldwork was conducted in the period April-June 2014 by the trained midwives supervised by research team members.

Statistical analysis: All completed questionnaires were reviewed and coded after completion. Data entry and analysis were done using SPSS -Statistical Package for Social Sciences-22 (SPSS Incorporation, Chicago, IL, USA). Univariate analysis was done with percentages. Numerical variables were tested by the mean and Standard Deviation (SD). For CMWs knowledge, scoring was made for the correct answers for each knowledge area and for all areas combined (overall knowledge score). The percentages were calculated by dividing the number of correct answers by the number of all questions for each area. A summary variable "Level of knowledge" was then determined as following¹³:

- If percentage of correct answers was less than 50% the level was assigned as "Low"

- If percentage of correct answers was in the range 50%-75% the level was assigned as "Medium"
- If percentage of correct answers was more than 75% the level was assigned as "High"

Ethical consideration: All participants were briefed on the aim of the study. Later on, all respondents were asked to give their oral permission using an informed consent form. Participants in the study were reassured that their responses would be strictly confidential and their identity would not be revealed. Approval for the study was granted by the Ministry Of Public Health and Population (MOPHP).

RESULTS

There were 389 CMWs fulfilling the inclusion criteria included in the study. Of them, 38.8% were from Taiz, 23.4% from Lahj, 17.2% from Al-Hodeidah and 20.6% from Dhamar. Their knowledge about antenatal care is shown in Table 1 which illustrates that the most correctly identified answer was that related to the definition of focused ANC followed by the way to safely dispose syringes and needles, whereas the least correctly answered question was about the interventions that have proven most successful in reducing maternal mortality.

In Table 2 about knowledge of normal labor and birth, only 6.2% correctly answered to plot the cervical dilation on the partograph if a woman is admitted during the active phase of labor. In addition, only 18.5% correctly mentioned what to do in case bleeding after birth continues. However, other relevant knowledge area was responded with varying percentages of correct answers; on the top was indicating that active management of the 3rd stage of labor should be practiced for all women after birth and the timing of oxytocin administration during the active management of the 3rd stage of labor.

With regards to knowledge of immediate newborn care, the highest percentage of identified correct answers were that about the timing of breast feeding initiation and how to maintain the normal temperature of the newborn, whereas the least correctly identified answer was that for the question about the steps of counseling the mother about newborn care (Table 3).

Enquiry about postnatal care knowledge, (Table 4) shows that the vast majority of CMWs correctly indicated the number and timing of postnatal home visits by a trained care provider and correctly answered the questions about the proper positioning of the newborn when breast feeding. However, only 0.8% correctly answered the questions about what postpartum abdominal examination should include.

Table 5 retrieves correct knowledge about management of complications. The most effective way to immediately control eclamptic convulsions was the most common identified correct answer followed by the causes of postpartum hemorrhage. On the other hand, around one-third of CMWs correctly answered the question about newborn resuscitation and identified what suspect unsatisfactory progress of labor.

In Table 6, around 3 quarters of the CMWs have had medium level of overall knowledge score which means that they respond correctly to 50 up to 75% of the items but only 5.9% of them showed high level of knowledge. Only 35.5, 27.0 and 16.5% of CMWs have had high level of knowledge in immediate newborn care, management of complications and postpartum care respectively while none of them reported high level of knowledge in antenatal care.

Table 7 reveals that only 13.9 and 2.2% of CMWs in Taiz and Lahj respectively had high level of knowledge compared to none in Al- Hodeidah and Dhamar. It is also clear from the table that the majority of CMWs in Lahj and Taiz had medium level of knowledge while only nearly one-half of them reported the same level of knowledge in Al-Hodeidah and Dhamar respectively.

DISCUSSION

In the present study, knowledge of CMWs taking part in the CBMNC program was tested addressing important issues related to antenatal care, normal labor and birth, immediate care of the newborn, postnatal care and management of significant maternal and neonatal ailments. CMWs are playing a major supportive role for the health system in many low-resource settings in the betterment of maternal and child health¹⁴⁻²⁰. Therefore, sound training of this group and evaluation of retained knowledge is of paramount importance^{21,22}.

Medium level of knowledge is prevailing (72%) whereas minority showed high level of knowledge (5.9%). This is lower figure compared with what was reported in an evaluation study in Pakistan where 18% scored high²⁰. Furthermore, disproportionate knowledge levels were encountered amongst the different MNH continuum of care components, which being lowest for antenatal care and normal delivery and highest for newborn care (Table 6). This means that our CMWs knowledge is patchy rather than comprehensive which is what Pakistani evaluation reached²⁰. On the other hand, the obvious difference in the knowledge levels among governorates could be related to timing of the training in the different governorates.

Table 1: Correct answers of CMWIs about ANC knowledge (n = 389)

Questions	No.	%
Definition of Focused antenatal care	372	95.6
After giving a pregnant woman her first dose of tetanus toxoid by intramuscular injection, the used syringe and needle should be: Placed in a safety box	360	92.8
When counseling a pregnant woman about nutrition, be sure to: Ask her what she eats in a typical day to determine if her diet is adequate	311	79.9
Focused antenatal care includes which of the following actions: Checking the woman's blood pressure at every visit	301	77.4
Pregnant women should receive educational messages about: Personal hygiene, rest and exercise during pregnancy, diet and nutrition during pregnancy, danger signs during pregnancy/Anthypertensive drugs should be given in preeclampsia-eclampsia cases if the diastolic blood pressure is: 110 mmHg or more	268	68.9
If the woman trusts the provider and feels that s/he cares about the outcome of the pregnancy, she will be more likely to: Return for scheduled antenatal care visits, return immediately if a danger sign appears, comply with recommended treatment	199	51.2
The information obtained from the antenatal history can help the provider to: Plan for childbirth, identify existing problems, identify health education and counseling needs	181	46.5
The tests that should be performed for every woman during antenatal care include is Hemoglobin	177	45.5
When counseling a pregnant woman about formulating a birth plan, the provider should tell her: She should put money aside to pay for the expenses of the birth	152	39.1
Interventions that have proven most successful in reducing maternal mortality (Using the risk approach, providing comprehensive antenatal care, increasing the number of caesarean sections and using a skilled birth attendant who has access to emergency care)	37	9.5
	34	8.7

Table 2: Correct answers of CMW about normal labor knowledge (n = 389)

Questions	No.	%
Active management of the third stage of labor should be practiced: For all women in labor	373	95.9
Before applying controlled cord traction during active management of the third stage of labor: Oxytocin is administered intramuscularly immediately after the birth of the baby	347	90.4
Which of the following will help to decrease the risk of infection during childbirth? Reducing prolonged labor	323	83.0
During the first stage/active phase of labor the woman should: Be encouraged to take light meals/food as tolerated	319	82.0
Cervical dilation plotted to the right of the alert line indicates: Unsatisfactory progress in labor	239	61.4
Contaminated instruments in the labor ward should immediately be: Soaked in 0.5% chlorine solution for 10 min	229	58.9
If bleeding continues after delivery of the placenta using active management, the first thing the provider should call for help and: Massage the uterus	72	18.5
If a woman is admitted during the active phase of labor, cervical dilation is initially plotted on the partograph: On the alert line	24	6.2

Table 3: Correct answers of CMW about knowledge of immediate newborn care (n = 389)

Questions	No.	%
Breastfeeding should begin: Within the first hour following birth	375	96.4
To maintain the newborn's axillary temperature between 36.5 and 37.5°C it is important to: Cover the baby's head, place the baby in skin-to-skin contact on the mother's chest and cover with a blanket	369	94.9
When counseling the mother about breastfeeding, the skilled provider should tell her to: Breastfeed on demand for as long as the baby wants to feed	331	85.1
The first step in thermal protection for the newborn includes: Drying the baby thoroughly immediately after birth, covering the baby with a clean dry cloth immediately after birth	283	72.8
Immediate care for a normal newborn includes: Drying the baby thoroughly immediately after birth	251	64.5
The best way to determine if a newborn needs resuscitation is to: Observe respirations immediately and begin resuscitation if they are less than 30 min	246	63.2
When counseling the mother about her newborn, the skilled provider should help the mother formulate a complication readiness plan for her baby, make sure the mother understands danger signs for her baby and where to go if they arise and tell the mother to bring her baby for a newborn care visit on the 6th day after birth	67	17.2

Table 4: Correct answers of CMW about postnatal care knowledge (n = 389)

Questions	No.	%
After child birth, the mother should have a home visit by a trained care provider: On the 2nd day, 7th day from delivery and at least a 3rd visit during postpartum period and follow up visits whenever needed	385	99.0
When counseling a new mother about breast feeding in the first h following birth: Help her position her baby so that she attaches properly to the nipple	369	94.9
During the first 2 h following birth, the provider should: Measure the woman's blood pressure and pulse and check the uterine tone every 15 min	307	78.9
After completing the postpartum examination: The exam table should be wiped off with 0.5% chlorine solution after each use	300	77.1
During the postpartum visit to the clinic, obtain a history for the: Mother and baby	290	74.6
Each time you counsel the breast feeding mother about nutrition, tell her that: She should eat at least 1 extra meal day ⁻¹	268	68.9
For lactational amenorrhea to be an effective method of family planning: Mother never recovered her menses, Child is on exclusive breast feeding, Within the first 6 months after childbirth	249	64.0
Each postpartum examination should include: Measurement of blood pressure and temperature and assessment of conjunctiva, breasts, abdomen, perineum and legs	216	55.5
Counseling is important component of family planning service, it helps the women to: Take a free decision based on provided information, select a method with which is satisfied and use the method effectively and safely	205	52.7
During each postpartum visit, specific information should be obtained from the woman about: Problems during pregnancy, during and after child birth and any present problems	114	29.3
Postpartum abdominal examination should include: Palpating the uterus for hardness and roundness	3	0.8

Table 5: Correct Answers of CMW about Knowledge on Management of Complications (n=389)

Questions	No.	%
The most effective way to immediately control eclampsia convulsions is to: Give magnesium sulfate Immediate postpartum hemorrhage can be due to: Uterine atony, genital trauma, retained placenta	336	86.4
When performing newborn resuscitation with an Ambu bag and mask, it is important to verify that: The seal between the newborn's mouth, nose and Ambu bag is adequate	329	84.6
Carry out rapid initial assessment: For all women of childbearing age who present with a danger sign	308	79.2
When performing newborn resuscitation with an Ambu bag and mask, ventilate at a rate of: 20-30 breaths per min if there is no chest indrawing	299	76.9
When there is an obstetric emergency, tell the woman and her family or support person: As much as possible about the management of the emergency	224	57.6
A woman with a ruptured uterus has which of the following signs and symptoms: Rapid maternal pulse, persistent abdominal pain and suprapubic tenderness, Fetal distress	216	55.5
Treatment of postpartum metritis includes: Bed rest and adequate hydration, Intravenous ampicillin, gentamicin and metronidazole until fever-free for 48 h	191	49.1
Unsatisfactory progress of labor should be suspected if: The latent phase is longer than 8 h, Cervical dilation is plotted to the right of the alert line on the partograph, the woman has been experiencing labor pains for 12 h or more without giving birth	148	38.0
Newborn resuscitation procedures: Can usually be carried out without oxygen	130	33.4
	126	32.4

Table 6: Correct answers of CMW about CMWs knowledge level by knowledge area (n = 389)

Knowledge level (Percentage of correct items)	Antenatal care (11 items)		Normal delivery (18 items)		Newborn care (8 items)		Postpartum care (11 item)		Management of complications (10 items)		Overall score	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
High	0	0.00	13	3.3	138	35.5	64	16.5	105	27.0	23	5.9
Medium	246	63.2	325	83.5	199	51.2	255	65.5	175	45.0	280	72.0
Low	143	36.8	51	13.2	52	13.3	70	18.0	109	28.0	86	22.1

Table 7: CMWs knowledge level by governorate (n = 389)

Knowledge level	Lahj (n=91)		Hodeidah (n=67)		Dhamar (n=80)		Taiz (n=151)		Overall score	
	No.	%	No.	%	No.	%	No.	%	No.	%
High	2	2.2	0	0.0	0	0.0	21	13.9	23	5.9
Medium	83	91.2	37	55.2	39	48.8	121	80.1	280	72.0
Low	6	6.6	30	44.8	41	51.2	9	6.0	86	22.1

Antenatal care knowledge scored lowest in the total knowledge score (zero high score). This is worrying in the view that good quality antenatal care to all pregnant women is necessary to optimize the best health outcomes for the women and their fetuses¹⁹. In the present study, a high percentage (95.6%) correctly identified the definition of focused antenatal care which is the same percentage encountered in the Pakistani evaluation²³. However, addressing particular components of antenatal care appeared in low percentages. In particular, very low percentages of CMWs identified the intervention that have proven most successful in reducing maternal mortality (8.7%) and what to counsel the pregnant mother when she is going to formulate her birth plan (9.5%).

Knowledge on normal delivery (Table 6) is the 2nd least dimension scored high (3.3%) with the least percentage of correct answer (6.2%) reported for partograph use (Table 2). The WHO model of the partograph, was developed as an international standard in 1988 following the launch of the worldwide Safe Motherhood Initiative and is recommended to be routinely used in monitoring labors to help identify abnormal progress and women who might need further interventions²⁴. The partograph is a vital tool for providers who need to be able to identify complications in childbirth in a timely manner and refer women to an appropriate facility for treatment²⁵. Another important issue scored low (18.5%) was the notion that uterine massage and calling for help. Uterine massage is a crucial maneuver included in the WHO Safe Childbirth Checklist²⁴ These 2 areas need emphasis in the CMWs training.

Studies showed that many newborn lives can be saved by the use of interventions that require simple technology. The majority of these interventions can be effectively provided by a single skilled birth attendant caring for the mother and the newborn²²⁻²⁶. In the present study, knowledge on new born care was scored the highest in the total knowledge score (35.5%). Timing of the initiation of breast feeding and procedures to maintain newborn temperature were correctly answered with highest percentages (96.4 and 94.9% respectively). Unfortunately, only 17.2% could correctly identified that the skilled provider should help the mother formulate a complication readiness plan for her baby, make sure that she understands newborn danger signs, where to go if they arise and to tell her to bring the baby for a newborn care visit on the 6th day after birth. Knowledge of mothers about the danger signs in newborn is imperative to reduce any delays and preventable deaths²⁷. Studies confirmed that many deaths are related to late recognition of neonatal illness, delays in decision to seek care at household level and subsequent late intervention at healthcare facilities^{28,29}.

Appropriate postnatal care starting immediately after the birth of the baby and up to 6 weeks after birth is crucial for the wellbeing of the mother and newborn. Furthermore, postnatal care provides health professionals with the opportunity to promote exclusive breastfeeding, personal hygiene, appropriate feeding practices and family planning counseling and services. Moreover, postnatal care allows for the provision of postnatal vitamin A and iron supplementation to the mother and immunization of newborns to provide them with optimal start to life³⁰. In the present study, only 16.5% of CMWs were scored high in the postpartum care (Table 6). However, this dimension showed an important promising finding as 99% correctly identified the number and timing of home visits by trained care provider (Table 4). International organizations now recommend home visits in the baby's first week of life to improve newborn survival^{31,32}. Studies from Bangladesh³³, India³⁴ and Pakistan³⁵ have shown that home-based newborn care interventions can prevent 30-60% of newborn deaths in high mortality settings under controlled conditions. On the other hand, only 0.8% (3 CMWs) correctly indicated that postpartum abdominal examination should include palpating the uterus for hardness or roundness (Table 4) which is emphasized in the standard training midwifery training^{36,37} for satisfactory delivery outcome. This is another area to be stressed upon in the training.

Twenty seven percent of CMWs had good score in the knowledge about management of complications (Table 6). Knowledge on management of postnatal complications was assessed by 10 questions, which appeared with percentages ranged from 86.4-32.4% (Table 5). Our findings are lower than comparable findings in the Pakistani evaluation²⁰, where knowledge questions answered scored 52-93%. This is alarming since one of the core responsibilities of CMWs as frontline care providers in many areas in Yemen is early identification of complications and timely referral which is vital to reduce maternal and neonatal mortality in the country³⁸.

CONCLUSION

The majority of CMWs (72%) had medium level of overall knowledge score. Antenatal care knowledge was the least whereas newborn care had the highest scored area. There is clear gap in certain knowledge items in all aspects of the maternal and neonatal care. Such gap needs great attention to be strongly addressed in the training and refresher courses of CMWs to have an impact on the maternal and child health care in Yemen.

SIGNIFICANCE STATEMENTS

This study is part of the first evaluation had ever done for the CBMNC program in Yemen since its inception in 2007. The study aimed to discover knowledge gaps before optimizing the program national scale-up. Discovering knowledge gaps is of paramount importance to strengthen the role of CMWs. This is particularly crucial with the documented deteriorated formal health service delivery since 2014 and displacement of populations and of the CMWs, destruction of referral facilities, loss of supervision and weakening of an already weak health system.

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