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AVERTING MATERNAL DEATH AND DISABILITY

Reducing maternal mortality in Yemen: Challenges and lessons learned from baseline assessment

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ABSTRACT

Objective: The Yemen is a signatory of the Millennium Development Goals (MDGs) and one of 10 countries chosen for the UN Millennium Project. However, recent MDG progress reviews show that it is unlikely that the maternal health goal will be reached by 2015 and Yemen still has an unacceptably high maternal mortality of 365 per 100 000 live births. Because 82% of deaths happen intrapartum, the purpose of this needs assessment was to identify and prioritize constraints in delivery of emergency obstetric care (EmOC). **Methods:** Four district hospitals and 16 health centers in 8 districts were assessed for functional capacity in terms of infrastructure; availability of essential equipment and drugs; EmOC technical competency and training needs; and Health Management Information System. **Results:** We found poor obstetric services in terms of structure (staffing pattern, equipment, and supplies) and process (knowledge and management skills). **Conclusion:** The data argue for strengthening the 4 interlinked health system elements—human resources, and access to, use, and quality of services. The Government must address each of these elements to meet the Safe Motherhood MDG.

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1. Introduction

Yemen is one of the least developed countries in the world, ranking 151 out of 175 countries on the United Nations Development Programme Human Development Index 2005 [1]. Yemen's population in 2004 numbered 19.77 million, 75% of which lives in rural areas. Approximately 46% of the population is younger than 15 years of age and 23% consists of women of reproductive age. The crude birth rate is 39.2 per 1000 population. The illiteracy rate is high at 47% (27% for men and 69% for women) and is higher in rural areas, especially among women. Forty-one percent of the population lives below the poverty line and 19% is in absolute poverty [2,3].

The health of Yemeni women, particularly around the time of birth, is a significant concern. Each year, 130 000 women give birth and are thus at risk of death or disability from obstetric complications. The 2003 Yemen PAFAM survey [3] estimated that 365 women per 100 000 live births die from obstetric complications, making maternal death the leading cause (42%) of death among women of reproductive age. However, other sources suggest a much higher maternal mortality

ratio (MMR) of greater than 800 per 100 000. Eighteen percent of maternal deaths occur during pregnancy and 82% during delivery. With a total fertility rate (TFR) of 6.2 and only 16% of births occurring in health facilities, repeated exposure to pregnancy means that Yemeni women face a 1 in 44 lifetime risk of maternal death [2–7]. This heavy health burden faced by Yemeni women is also an infringement of their basic human rights.

Yemen is a signatory of both the International Conference on Population and Development (ICPD) and the Millennium Development Goals (MDGs) and is one of 10 countries chosen for the UN Millennium Project. However, recent MDG process reviews suggest that it is unlikely that the maternal health MDG will be reached by the target date of 2015 [8,9].

The Government of Yemen (GoY) supported by the United Nations Children's Fund (UNICEF), United Nations Population Fund (UNFPA), World Bank, and the German Agency for Technical Cooperation (GTZ) implement a safe motherhood program in public facilities throughout the country aimed at reducing maternal morbidity and mortality. This article summarizes the findings of an initial needs assessment conducted to identify and prioritize constraints in the delivery of emergency obstetric care (EmOC) in 8 districts targeted by the World Bank Health Reform Support Project (HRSP). The assessment provided baseline information on what is required to strengthen delivery of obstetric care and hence to reduce maternal mortality.

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2. Materials and methods

A baseline survey was conducted from April to June 2006, in areas targeted by the World Bank, to assess the availability and utilization of EmOC using the UN indicators [10]. The survey targeted 22 health facilities made up of 5 District Hospitals (DH) and 17 Health Centers (HC) in 8 districts from 3 governorates: Sana'a, Ibb, and Hodeidah. These facilities, which are in rural and poor areas, were selected because they are targeted by the pilot EmOC Project sponsored by the World Bank Health Reform Support Project. One DH and one HC were excluded from the sample because the DH was still under construction and the HC was already targeted by another donor agency (UNICEF). The final sample included 4 DHs and 16 HCs.

Assessment tools used were adapted from the UNICEF, WHO, UNFPA Guidelines for Monitoring the Availability and Use of Obstetric Services [10,11]. Previous needs assessment studies in Yemen used these tools and found them useful in evaluating availability, utilization, and quality of obstetric services [12,13].

The main components of the assessment included: functional capacity of the facility in terms of infrastructure; availability of essential equipment and drugs; technical competency and training needs of the providers in EmOC; and Health Management Information System (HMIS) affecting the overall effectiveness of health care delivery.

Interviews were conducted with health providers and health managers of the targeted facilities along with observation of equipment, supplies, and HMIS by trained Reproductive Health teams from the governorates. Teams included an obstetrician, a midwife, and a pharmacist and were led by the Governorate Reproductive Health Director and supervised by a member of the central reproductive health Directorate at the Ministry of Public Health and Population.

All team members, leaders, and supervisors received 4 days of training in which the objectives and design of the study were described and data collection tools were thoroughly explained and reviewed. A pilot study was conducted in facilities that were not included in the assessment but were similar, and data instruments were revised accordingly.

The fieldwork took place during May and April 2006. Throughout the study, each team met daily to review the quality of data collected, making corrections if needed. Each team was visited by the first author in the field where the quality of data collection methods and recording was checked and ensured.

At the end of the survey, data were again checked for consistency and cleaned. All data were coded and entered in an IBM compatible computer using SPSS (SPSS, Chicago, IL, USA). Processed data were checked against the original forms. Data were analyzed using SPSS; frequencies and cross tabulations were produced.

3. Results

3.1. Availability of EmOC signal functions

Fig. 1 shows that no facility (not even district hospitals) provided even all basic EmOC (BEmOC) functions. These facilities are unable to perform the signal functions because they lacked materials and/or human resources. No facility (not even the DHS) was capable of performing assisted vaginal delivery (forceps or vacuum extractor) because of lack of trained staff. None of the 20 targeted facilities was fully functioning. Regarding comprehensive EmOC (CEmOC) services, there were none. None of the 4 DHs provided cesarean delivery services. Two hospitals had cesarean delivery services in the past but had stopped more than a year earlier when two expatriate female gynecologists left the country. Although Fig. 1 shows that one hospital in Ibb and one of the two hospitals in Hodeidah provided blood transfusion (signal function 7), this is misleading because this is a donor-based transfusion service; none of the targeted hospitals has a blood bank. Moreover, the only assessed hospital in Sana'a governorate had no blood transfusion service.

We found marked variations in obstetric services within and among the governorates. Two HCs provided no delivery services because there were no female staff, while one DH had no deliveries inside the facility (despite having 6 midwives) because the EmOC Center was still under construction.

Round-the-clock availability of services was inconsistent at both at DH and HC levels; less than 30% of the assessed facilities have on-site services 24 hours a day, 7 days a week (24/7) (Fig. 2). Facility level was not a predictor as some DHs do not provide services 24/7 while some HCs do.

3.2. Utilization of EmOC services

3.2.1. Proportion of all births in EmOC facilities

The third UN Indicator recommends that at least 15% of all births in the population should take place in EmOC facilities. The needs

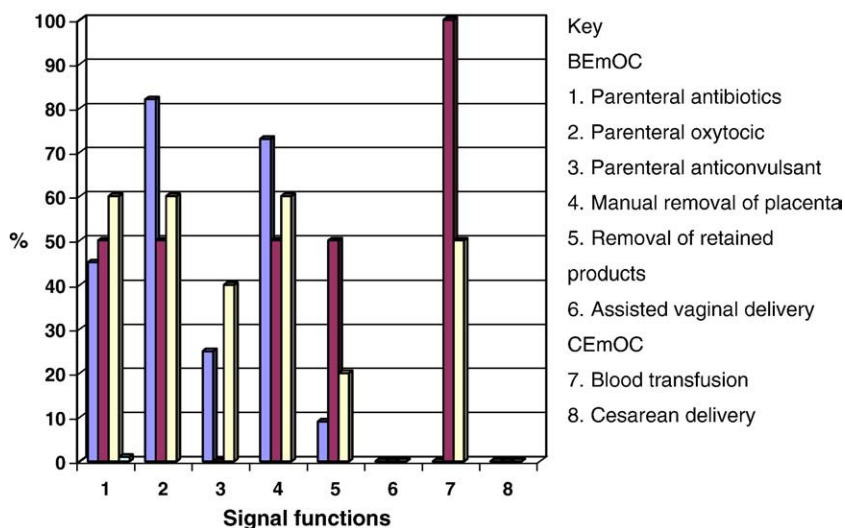


Fig. 1. EmOC signal functions by governorate. Blue for Sana'a; Red for Ibb; Yellow for Hodeidah

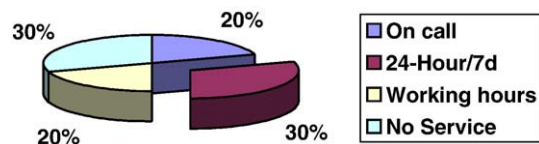


Fig. 2. Consistent availability (24/7) of services.

assessment found only 3% in Ibb and 1% in Sana'a. Because of a weak HMIS these data were unavailable for Hodeidah. Of the 20 facilities assessed, only one facility achieved the minimum acceptable level for this indicator (15%). We found wide variations among and within the governorates and between and within facility levels. For example, one HC had 3 times the proportion of deliveries as the district hospital because of the presence of a trusted expatriate obstetrician.

3.2.2. Met need for EmOC

The fourth UN Indicator recommends that 100% of women estimated to have obstetric complications should be treated in EmOC facilities. We could not calculate this important indicator for 14 facilities (70%) because of weak HMIS (Table 1). Where figures are available, met need was estimated to be 10% or less, except for the facility with the expatriate obstetrician.

3.2.3. Cesarean deliveries as a percentage of all births in the population

As a proportion of all births in the population, cesarean deliveries should account for 5%–15%. As no DH of the 4 hospitals assessed provided this service, we considered this to be zero.

3.2.4. Quality of EmOC services

As a measure of quality of EmOC services, the case fatality rate (sixth UN Indicator) among women with obstetric complications in EmOC facilities should be not greater than 1%. Despite thoroughly reviewing all available records at assessed facilities, no data on either maternal deaths or complications could be found in any facility.

3.3. Common problems identified

3.3.1. Drug availability

Drugs needed to provide BEmOC are sporadically or completely unavailable (Fig. 3). Of the 20 facilities, 5 have had no drugs and not one facility had the life saving drug magnesium sulfate.

3.3.2. Equipment availability

Equipment needed to provide BEmOC was sporadically or completely unavailable (Fig. 4). Of the 20 facilities, 5 had no labor room and no facility had an Ambo bag for newborn resuscitation. Some facilities had no sphygmomanometer, stethoscope, or baby weighing scale.

3.3.3. Staff availability

The targeted facilities had another critical shortage—qualified staff (Table 2). Although all HCs should have a general practitioner, many facilities were staffed only by paraprofessionals such primary health care workers (PHCWs) or community midwives (CMW).

With rare exceptions, health professionals complained of poor motivation and morale because of isolation, low salaries, lack of continuing education, lack of supervision, and poor work environments due to shortages of medicines, equipment, and supplies.

3.3.4. Providers' knowledge

Seven questions were included in the health provider interviews covering clinical competencies in managing EmOC complications, specifically postpartum hemorrhage (PPH), newborn asphyxia, and incomplete abortion. Fig. 5 shows that staff knowledge was extremely poor in despite 40% having mentioned that they had received some sort of training in EmOC.

4. Discussion

The discrepancy between Yemen and high-income countries is much greater for maternal death than for any other public health indicator, with an MMR of 365 deaths per 100 000 live births (compared with 20) and lifetime risk of 1 in 44 (compared with 1 in 2800) [3,14].

Table 1
Met need by facility, 2005

Facility	Total complications (including abortions)	Complications without abortions	Catchment population	Expected births	Expected complications	Met need including abortions (%)	Met need without abortions (%)
Sana'a							
Manakha DH	No registers	No registers	40 000	1600	240		
Al Manar HC	No registers	No registers	12 000	480	72		
Bani Al Waled HC	No delivery service		8000	320	48		
Al Garss HC	No delivery service		5000	200	30		
Bani Ismail HC	No registers	No registers	13 000	520	78		
Beit Al Beshri HC	No registers	No registers	10 000	400	60		
Bani Mansoor HC	No registers	No registers	6923	277	42		
Sook Al Sabt HC	No registers	No registers	8500	340	51		
Al Orosh HC	4	4	8000	320	48	8	8
Al Marbak HC	44	34	N/A	229	34		
Bani Seham HC	No registers	No registers	11 000	440	66		
Ibb							
Al Qaeda DH	56	45	120 000	4800	720	7.8	
Al Gashen HC	No registers	No registers	30 000	1200	180	6.3	
Bani Omar HC	No registers	No registers	17 573	703	105		
Kawdan HC	No registers	No registers	18 000	720	108		
Hodeidah							
Bajel DH	No delivery service (under construction)		172 600	6904			
Beit Al Fakee DH	51	1	242 086	9683			
Omal Bajel HC	181	65	32 000	1280	192	94	33.9
Al Abasi HC	No registers	No registers	24 000	960			
Al Kote'e HC	No registers	No registers	15 000	600			

Abbreviations: DH, district hospital; HC, health center.

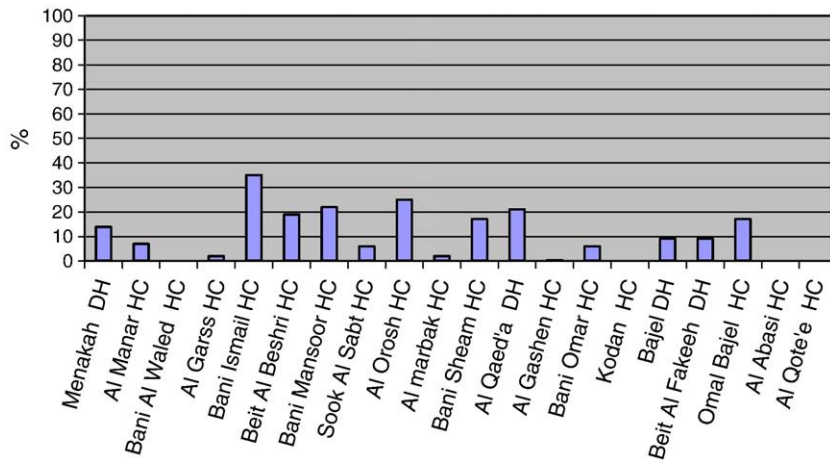


Fig. 3. Availability of EmOC essential drugs by facility.

To reduce unacceptably high maternal mortality in Yemen, efforts to provide quality EmOC services have gathered momentum recently [4,6,15]. This has led to numerous initiatives among government and donor communities (e.g. UNICEF, GTZ, World Bank) to address safe motherhood and reduce maternal mortality [12,13].

This assessment was conducted to identify and prioritize constraints in the delivery of EmOC services in the project area. The assessment provided crucial baseline information on what is needed to improve obstetric care. These baseline data are also important for monitoring and evaluation of planned interventions and will inform decision taking.

The results of this needs assessment shed light on why maternal mortality is persistently high in Yemen despite a maternal health policy priority and infrastructure investments. The reasons for this are evident from the state of obstetric services in the targeted facilities in terms of structure (staffing pattern, equipment, and supplies) and process indicators (knowledge and management skills), and are typical for many Yemeni health facilities.

Overall, the results of the assessments showed that most of the facilities performed few of the signal functions for EmOC because they lack materials and/or human resources. For example, no facility performs assisted vaginal delivery owing to lack of trained staff and district hospitals perform no cesarean deliveries owing to lack of a

functional operating theater, blood bank facilities, and/or skilled staff. Moreover, the health facilities were rundown, poorly maintained, and inadequate in responding to common maternal complications. There were problems with electricity and water supplies. Providers were insufficiently trained and even lacked the capacity to manage some of the more common obstetric complications. Equipment, drugs, and consumable supplies were always in short supply and facilities had few management systems to support quality health care.

We found poor management to be behind many of these shortcomings, for example, maldistribution of scarce staff and lack of job descriptions.

We also found the very weak HMIS to be a universal limitation making it impossible to calculate some UN indicators and consequently there was little use of maternal health data. Recording all necessary data to facilitate calculation of the UN Process Indicators in all facilities providing EmOC services is critical if we are to assess progress. The MoPHP, together with partner organizations supporting EmOC, should work jointly to establish a functioning HMIS to make possible calculation of these important indicators. This is also extremely important for any monitoring and evaluation and will facilitate an informed decision taking process.

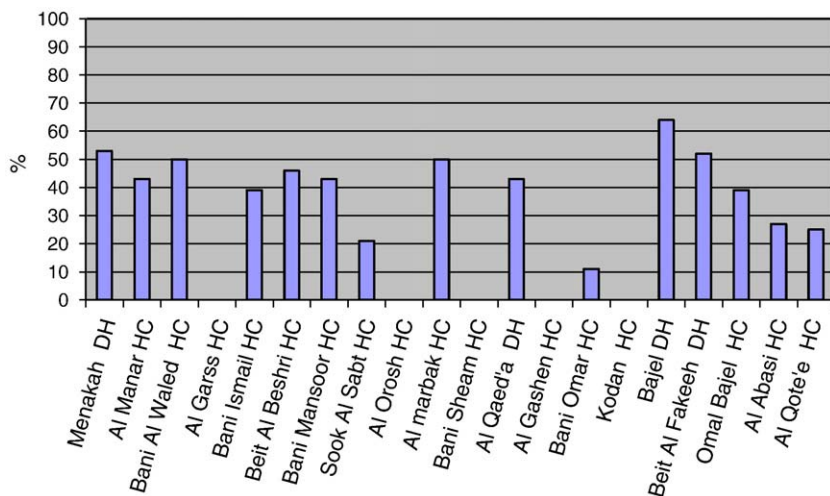


Fig. 4. Availability of EmOC essential equipments by facility.

Table 2
Staffing pattern related to obstetric service provision^a

Facility Name	Ob/Gyn		Surgeon		AD		PD		GP	MA	TA		MW		CMW	Nurse		PHCW	
	Y	F	Y	F	Y	F	Y	F			Y	F	Y	F		Y	F		
Sana'a																			
Manakha DH	0	0	0	0	0	0	0	0	4 M	2 (1M)	0	0	1	0	9	0	0	4	
Al Manar HC									0	0	0	0	0	0	1	0	0	3	
Bani Al Waled HC									0	0	0	0	0	0	0	0	0	0	
Al Garss HC									0	1M	0	0	0	0	0	1 M	0	0	
Bani Ismail HC									0	0	0	0	0	0	1	0	0	0	
Beit Al Beshri HC									0	0	0	0	0	0	1	0	0	0	
Bani Mansoor HC									0	0	0	0	0	0	1	1 M	0	0	
Sook Al Sabt HC									0	1M	0	0	0	0	1	0	0	1	
Al Orosh HC									0	1M	0	0	0	0	0	0	0	0	
Al Marbak HC									2 M	1M	0	0	0	0	1	0	0	0	
Bani Seham HC									0	0	0	0	0	0	0	1 M	0	0	
Ibb																			
Al Qaeda DH	0	0	0	0	0	0	1	0	3 (2M)	0	1	0	1	1	4	0	0	1	
Al Gashen HC									1	0	0	0	0	0	2	0	0	0	
Bani Omar HC									0	1	0	0	0	0	1	0	0	3	
Kawdan HC									0	0	0	0	0	0	1	0	0	0	
Hodeidah																			
Bajel DH	1	0	0	0	0	1	0	0	0	1	2	0	1	0	6	0	0	1	
Beit Al Fakee DH	0	0	0	1	0	1	0	0	0	0	0	0	1	0	8	1	0	0	
Omal Bajel HC		1							0	0	0	0	0	0	2	0	0	0	
Al Abasi HC									0	0	0	0	0	0	1	0	0	1	
Al Kote'e HC									0	0	0	0	0	0	3	1	0	0	

Abbreviations: DH, district hospital; Pd, Pediatrician; HC, health center; AD, anesthetist doctor; GP, general practitioner; MA, medical assistant; TA, technician anesthetist; MW, midwife; PHCW, primary health care worker; M, male, Y, yemeni; F, foreigner.

^a Values are given as number.

These findings as well as the results of the UN Process Indicators for the targeted facilities are consistent with findings from previous need assessments performed in Yemen by UNICEF [12] and YG-RHP [13] and in similar low-income countries [16–19] that have invested in physical infrastructure without significant investments in human resources, equipment, and supplies.

This needs assessment had the important limitation that it covered a limited number of health facilities. Excluded were any facilities not targeted by the specific World Bank program including any private facilities (which are rare in rural areas). As public facilities are typically less satisfactory than private ones, and as the World Bank HRSP targets facilities in poorer areas, it is possible that the quality of obstetric facilities in these 3 governorates is understated. Future needs assessments will need to be more inclusive.

5. Recommendations

Based on this needs assessment, the following major interventions were recommended to address maternal and newborn mortality and morbidity:

- Advocate for improving safe motherhood policies at the regional and national levels.
- Provide essential EmOC equipment, supplies, and drugs.
- Develop nationally acceptable EmOC standards, protocols, and guidelines for managing normal deliveries and obstetric complications.
- Train in case management for obstetric complications including emergency life saving skills.
- Strengthen the HMIS to monitor change and identify gaps in quality.

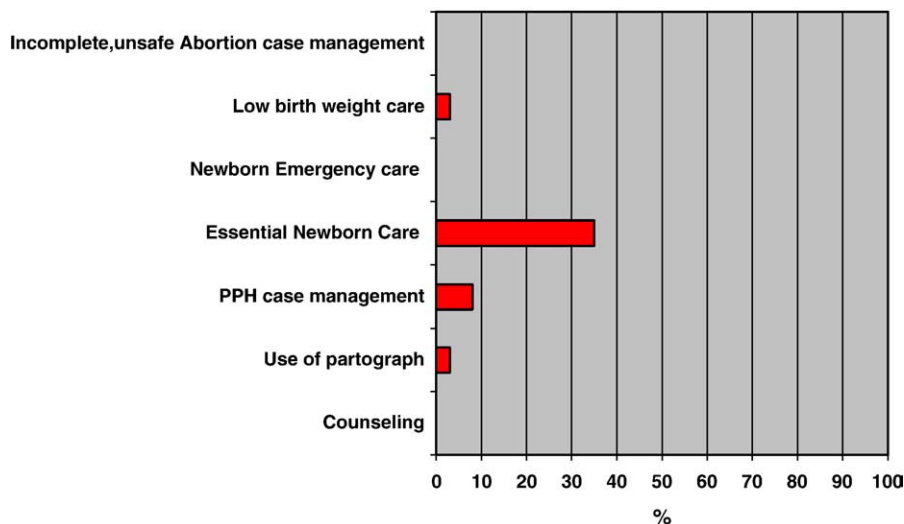


Fig. 5. Obstetric care providers' knowledge.

Table 3
Implementation stages framework

Preparation stage	1. Renovation and facility upgrades 2. Provision of essential supplies and equipment 3. Review and development of EmOC protocols and guidelines 4. Training and placement of key staff 5. Record keeping, data collection, and analysis
Service delivery stage	6. Team building and creation of emergency response teams 7. Quality improvement approaches 8. Ongoing readiness and preparedness 9. External and supportive supervision

As a guide to the implementation, we recommended using the "Implementation Stages Framework" developed by AMDD (Table 3) [17]. This framework provides a model for strengthening EmOC service delivery consisting of 2 stages—preparation and service delivery—each with several elements that serve as building blocks for improving the quality and efficiency of EmOC services.

6. Postscript

The World Bank HRSP responded to this needs assessment by providing funds to introduce EmOC services in 3 district hospitals and 12 health centers in the target districts which were chosen for their remoteness, neglect, and generally poor quality services. Under this program, rehabilitation and renovation work started in early 2007; provision of the necessary EmOC equipment and drugs is underway. The following activities are also underway:

- Establishing a system for maternal mortality surveillance.
- EmOC training courses for doctors and midwives.
- Distribution of clinical guidelines and protocols.
- Regular supervision to ensure application of guidelines/protocols.

As most equipment is already acquired and the distribution of EmOC drugs was started recently, EmOC services could be available in all rehabilitated and renovated facilities by early 2009.

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