International Journal of Gynecology and Obstetrics (2006) **93**, 300—307

International Journal of
GYNECOLOGY
& OBSTETRICS

www.elsevier.com/locate/ijgo

AVERTING MATERNAL DEATH AND DISABILITY

Global patterns in availability of emergency obstetric care

A. Paxton [a,*], P. Bailey [b], S. Lobis [a], D. Fry [a]

[a] *Mailman School of Public Health, Columbia University, New York, NY, USA*
[b] *Family Health International, Research Triangle Park, NC, USA*

Received 19 January 2006; accepted 28 January 2006

KEYWORDS
Maternal mortality;
Emergency obstetric care;
Obstetric complications;
Needs assessments

Abstract

Objective: This paper examines the availability of basic and comprehensive emergency obstetric care (EmOC), interventions used to treat direct obstetric complications. Determining what interventions are provided in health facilities is the first priority in analyzing a country's capabilities to treat obstetric emergencies. There are eight key interventions, six constitute basic EmOC and all eight comprehensive EmOC. *Methods and results:* Based on data from 24 needs assessments, the following global patterns emerge: comprehensive EmOC facilities are usually available to meet the recommended minimum number for the size of the population, basic EmOC facilities are consistently not available in sufficient numbers, both in countries with high and moderate levels of maternal mortality, and the majority of facilities offering maternity services provide only some interventions indicating an unrealized potential. *Conclusion:* Upgrading maternities, health centers and hospitals to at least basic EmOC status would be a major contributing step towards maternal mortality reduction in resource-poor countries.

* Corresponding author. Fax: +1 212 544 1933.
E-mail address: ap428@columbia.edu (A. Paxton).

0020-7292/$ - see front matter
doi:10.1016/j.ijgo.2006.01.030

1. Introduction

Improving a country's standards of maternity care requires identifying what is needed. For needs assessments and project monitoring, the functioning of an EmOC facility is defined by the performance of each signal function at least once in the previous 3 months. [1] Many other aspects are implicit in this definition: providers are competent to administer the drugs and perform the procedures, the drugs and equipment are present, the infrastructure to care for a patient exists, and, finally, women seek services in sufficient numbers that even some of the most infrequent complications are attended. The notion that these services are available 24 h a day, 7 days a week (24/7) is also implicit in the definition.

Ideally, the needs assessment should include private as well as public facilities, as the private sector is increasingly meeting obstetric needs in some countries. However, some national level needs assessments were undertaken where it was not possible for public health authorities to gain access to records in private facilities. In the case of Morocco where the private sector provides a significant portion of care, especially for women in urban areas, this seriously underestimates the availability of EmOC.

When undertaking a needs assessment, many countries begin with an exhaustive list of health facilities nationwide that provide maternity services. These facilities are then divided into "potential comprehensive EmOC facilities" and "potential basic EmOC facilities" based upon the type of facility. Usually, district hospitals, regional hospitals and referral hospitals are designated "potential comprehensive", while lower level facilities such as health centers and maternities are on the "potential basic" list. Some study coordinators decided to visit all "potential comprehensive EmOC facilities" and only a sample of "potential basic EmOC facilities".

Process indicator #1 is determined through physical inspection of the facility by a team that usually is comprised of a clinician (physician or midwife), and a public health specialist working in collaboration with the facility staff and local public health authorities. The team reviews facility registers (maternity registers, operating theatre registers or female ward registers), case notes and reports, and other relevant data. Patient names were not noted during the review of registers. The team also collects information on facility infrastructure, the availability of drugs, equipment, furniture, linens, laboratory facilities, registries and staffing, all of which can help to identify exactly where a bottleneck to service provision lies and what actions could be taken to improve service provision. Staff are also interviewed.

The data presented are simple proportions and absolute numbers.

2. Results

As shown in Table 1, needs assessments of EmOC services have been undertaken in many countries worldwide. Most of these needs assessments were undertaken by the Averting Death and Disability (AMDD) Program of Columbia University (funded by the Bill and Melinda Gates Foundation) and its nongovernmental organizations (NGOs) and government partners. To our knowledge, 26 needs assessments have been national or near national (covering over 60% of the health districts or 50% of the population) in scope, while 15 needs assessments examined EmOC service provision on a smaller scale. The list of countries that have conducted needs assessments continues to expand.

Three important findings emerge from 24 needs assessments (two national needs assessments are excluded due to concerns with data quality), as presented in Table 2, below:

- comprehensive EmOC facilities are usually available to meet the recommended minimum number for the size of the population, even in least developed countries,

Table 1 EmOC needs assessments undertaken since 1994 (as of August 2004)

Region	National or near national[a] assessments, $n=26$	Smaller assessments, $n=15$
Africa	Benin, Cameroon, Chad, Gabon, Gambia, Guinea, Guinea Bissau, Ivory Coast, Malawi, Mali, Mauritania, Morocco, Mozambique, Niger, Senegal, Sierra Leone, Zimbabwe	Eritrea, Ethiopia, Kenya, Madagascar, Rwanda, Southern Sudan, Tanzania, Uganda
Asia	Bangladesh, Bhutan, Nepal, Sri Lanka	Afghanistan, India (Rajasthan and Maharastra), Pakistan, Tajikistan, Vietnam
Latin America/Caribbean	Bolivia, El Salvador, Honduras, Nicaragua	Peru
Other	United States (secondary data analysis)	

[a] Encompasses at least 60% of the health districts or 50% of the total population.

Table 2 EmOC service availability in countries with needs assessment data

Maternal mortality ratio[a]	Country and period of time	Area	Number facilities surveyed	Availability of EmOC			# Facilities with < 6 signal functions (% of facilities surveyed)
				Comp. (1/500K pop.)	Basic (4/500K pop.)	Comp. + basic (5/500K pop.)	
17	United States 2000[b]	National	3084	534%	0%	107%	81 (3%)
92	Sri Lanka 1999	16 out of 25 districts	115	113%	20%	38%	59 (51%)
110	Honduras 2003	National	27	164%	0%	33%	5 (19%)
150	El Salvador 2003	National	33	215%	0%	43%	5 (15%)
220	Morocco 2000	National	510	106%	59%	69%	312 (61%)
230	Nicaragua 1999–2000[bc]	9 out of 17 SILAIS	123	225%	53%	86%	105 (85%)
380	Bangladesh 1999[b]	National	710	105%	18%	35%	364 (51%)
410	Peru 1999–2000[bc]	Six northern provinces in the Department of Ayacucho	31	100%	48%	58%	28 (90%)
420	Bhutan 2002[b]	National	31	304%	76%	122%	23 (74%)
420	Bolivia 2003	National	85	199%	11%	48%	45 (53%)
500	Pakistan 1999	Three districts of the Province of Sindh	70	101%	31%	45%	41 (59%)
540	India 2000	7 out of 31 districts in Rajasthan State	82	31%	37%	36%	35 (43%)
690	Senegal 2000[b]	National	172	168%	6%	39%	134 (78%)
730	Cameroon 2000	5 out of 10 provinces	487	134%	3%	29%	465 (95%)
740	Nepal 1999–2000[b]	45 districts of the eastern, western and mid-western regions	157	71%	5%	18%	134 (85%)
850	Benin 2002[b]	National	282	193%	35%	67%	237 (84%)
880	Uganda 2002[b]	19 out of 56 districts	197	122%	24%	44%	156 (79%)
1000	Mauritania 2000[b]	National	67	135%	5%	31%	59 (88%)
1000	Mozambique 1999	Sofala Province	27	138%	9%	34%	22 (81%)
1100	Chad 2002[b]	38 out of 55 health districts	40	153%	11%	40%	9 (23%)
1200	Mali 2002[b]	8 regions and district administrative de Bamako	153	121%	17%	38%	112 (73%)
1400	Rwanda 2003	Four districts	27	432%	0%	86%	21 (78%)
1600	Niger 2000[b]	National	85	99%	61%	68%	9 (11%)
1800	Malawi 2000	Southern region; 12 out of 27 districts	193	170%	2%	36%	173 (90%)

[a] UNICEF/WHO/UNFPA. Maternal Mortality in 2000: estimates developed by WHO, UNICEF and UNFPA. Geneva, 2004.
[b] Public and private facilities included.
[c] Assisted vaginal delivery is so infrequently performed in Nicaragua or Peru that this signal function was not taken into account in the EmOC classification in the needs assessments.

- basic EmOC facilities are consistently not available in sufficient numbers, both in countries with high maternal mortality levels and in countries with moderate levels, and
- the majority of facilities offering maternity services in countries surveyed are not able to provide the full array of signal functions to qualify as EmOC facilities.

These findings confirm those from smaller, published studies [2—5] as well as published and unpublished needs assessments from AMDD and its partners (see Appendix A).

Table 2 provides data on the availability of EmOC, shown as a percent of the UN minimum number of facilities for the size of the population.

One of the surprisingly consistent findings from multiple national-level needs assessments is the availability of comprehensive EmOC facilities that meets the recommended minimum number for the size of the population. Concerns remain however, both with regard to the quality of care in these facilities, and of the question of equity and geographical and financial accessibility.

Having a sufficient number of comprehensive EmOC facilities in the aggregate does not necessarily mean they are well distributed throughout the country. As Table 3 shows, only two countries for which we have data (Benin and the United States) have the minimum recommended number of comprehensive EmOC facilities per population in all of its sub-national areas. (The geographic distribution of EmOC facilities is the second of the six UN process indicators for EmOC).

By their nature, comprehensive EmOC facilities are typically located in urban areas [2] and, not surprisingly, the availability of EmOC tends to be better in capital cities than in the country overall. This means that comprehensive EmOC facilities are not readily available for women in rural communities who often must travel long distances just to access the main road that connects to the urban center. Also, globally, for the 60% of women who deliver outside hospitals or health centers (most of whom are located in countries with high MMRs), there may be long delays in making the decision to seek care, due to financial or logistical barriers, lack of knowledge of the early signs of a developing complication, or lack of confidence (often justifiable) in the health services. This, combined with the delay in reaching a facility in a distant town or city, means many women arrive at the comprehensive facility too ill to be effectively treated. This indicates the need for more, smaller, facilities at the periphery that provide basic EmOC. The relative lack of services for rural women has been documented elsewhere [6].

The second surprisingly consistent finding from multiple national-level needs assessments is the small number of basic EmOC facilities in relation to the size of the population. This low proportion of basic EmOC facilities to population doubtless results from a number of factors: prioritization by governments of resources for hospitals over lower level facilities, difficulty of maintaining equipment and supplies in relatively more rural locations, and difficulty in retaining qualified staff in smaller facilities. In addition, government regulations and policies often make it difficult for a facility without a physician present to perform certain signal functions.

The lack of availability of basic EmOC facilities is most extreme when disaggregated by sub-national area. Like the comprehensive facilities, basic EmOC facilities are more available in the province containing the capital city than in more distant provinces (data not shown). This has enormous implications for access to care for women living in rural areas.

Table 3 Geographic distribution of comprehensive EmOC facilities in select countries[a]

Country	Type of facilities surveyed	National availability of comprehensive EmOC facilities	Percent of sub-national areas with minimum # comprehensive EmOC facilities
Bangladesh	Public and private	(265/252) 105%	(4/6) 67%
Benin	Public and private	(26/14) 186%	(6/6) 100%
Chad	Public and private	(24/16) 150%	(10/14) 71%
Mali	Public and private	(26/22) 118%	(4/9) 44%
Mauritania	Public and private	(7/5) 140%	(4/13) 31%
Morocco	Public only	(69/65) 106%	(14/16) 87%
Nicaragua	Public and private	(9/4) 225%	(5/9) 56%
Senegal	Public and private	(33/20) 165%	(8/10) 80%
Sri Lanka	Public only	(33/29) 114%	(11/16) 69%
United States	Public and private	(3003/563) 533%	(51/51) 100%

[a] Countries were selected based on the availability of national and sub-national data.

In many countries, the majority of facilities providing maternity services do not perform all six signal functions so as to qualify as a basic EmOC facility. Of the 24 countries whose needs assessments findings are presented in Table 2, three-fourths had fewer than half their maternity facilities qualify as providing EmOC.

Potential EmOC facilities, or those that provide fewer than the designated six functions, are likely to contribute to the reduction of maternal mortality by properly handling normal deliveries, treating the obstetric complications that they can, and stabilizing and referring patients with complications that they are not equipped to treat. Our experience, however, suggests that "maternities" and other front line facilities are underutilized in countries with high MMR because women begin their deliveries at home, and when a complication arises the maternity is bypassed completely; the woman's family takes her directly to a hospital even if it is much farther away; this is due to an understandable lack of confidence that the necessary care will be available in the maternity.

The good news about the wealth of potential EmOC facilities is that, with the upgrading of services, more obstetric complications can be treated closer to the communities where women live (without constructing new buildings). Upgrading activities typically include:

- identification and provision of, or repair of, essential equipment,
- minor renovations in physical plant,
- provision of required supplies and planning for continuous supply,
- in-service training of facility staff, preferably with competency-based training,
- supportive supervision, both internal and external to facility, and
- improved management systems in the facility.

Upgrading potential EmOC facilities to at least basic EmOC status is a major contributing step towards maternal mortality reduction. Potential EmOC facilities should be examined carefully to determine if the investment should be made to upgrade them (are they strategically located? do they have or could they have a reasonable volume of patients?) or if they should be encouraged to refer all serious complications. Mapping the geographical area when deciding which facilities to upgrade is an excellent tool. A map shows the locations of the facilities, the roads and the most densely populated communities. The aim might be to upgrade enough facilities to have the ratio of four basic EmOC to 500,000 population.

3. Discussion

The distinction between actual EmOC functioning and theoretical functioning was stressed at the time each needs assessment was conducted. Early in the practical experience of this process indicator, investigators learned that many facilities that were assumed to be fully functioning in fact were not, either because of staff training deficiencies, shortages of key staff, equipment/drug shortages or poor management. Mostafa and Ali Haque found that 6 of 20 district hospitals in Bangladesh were functioning only at the basic level and 10 of 25 Thana Health Complexes were not providing basic EmOC despite having a full-time medical officer on staff [7].

Often the results of the needs assessment come as a surprise to health officials because many fewer facilities than expected are actually functioning at the level they are supposed to function. Recently, a needs assessment in Uganda revealed a critical shortage in functioning facilities, which led those involved in strategic planning at the national level to prioritize the upgrading of facilities to provide EmOC [8].

The finding that basic EmOC services are insufficient in the vast majority of countries surveyed may surprise readers. Prior reports have not indicated a deficiency of this magnitude. Some confusion may be due to the use of the terms emergency obstetric care and essential obstetric care (EOC), terms that sound similar and that even have been used interchangeably (note the use of the term EOC in the *Guidelines*), but which have significantly different meanings.

Emergency obstetric care is a subset of functions or services that are included in the broader definition of "essential" obstetric care, which also includes the management of 'women at high risk', 'problem pregnancies', the monitoring of labor, newborn special care and contraceptive methods [9]. Although the definition of a basic facility was articulated as early as 1993 in the early version of the *Guidelines*, like the definition of a 'skilled attendant', the actual working definition is often looser and more flexible. In practice, the term 'basic' obstetric facility may be associated more with the functions of normal deliveries and newborn care of 'essential' obstetric care than with the life-saving functions needed to attend emergencies.

Koblinsky and Campbell describe the availability of basic and comprehensive EOC in Yunnan, China, Egypt and Zimbabwe as having levels that go beyond the recommended availability [10]. They also suggest that private clinics and dedicated

birthing centers can also be examples of basic EOC facilities. However, their case studies do not provide detailed information about how these assessments were determined and whether the signal functions of a basic EmOC facility are part of the package of services available in the basic EOC facilities of these three countries.

In fact, most birthing centers are unlikely to provide basic EmOC. Where birthing centers are part of a wider maternal health strategy, they have been constructed primarily to attend normal births. For example, numerous countries have experience with such centers, which the community often builds and maintains [10,11]. In theory, the birthing center should facilitate the referral of a woman or her newborn with complications and staff may or may not be able to stabilize a woman prior to referral. Birthing centers are not likely to be equipped with vacuum extractors or manual vacuum aspiration. Nor are they likely to treat severe pre-eclampsia or eclampsia with magnesium sulfate.

Nurses, midwives, auxiliary midwives and other providers working in birthing centers may not have the skills and competencies necessary to perform all of the six signal functions that define a basic EmOC facility, even if this were part of their original training. It is possible that, as with facilities, we would see a gap between the theoretical skill level and the actual skill level of these providers if an assessment of their skills were undertaken [12]. Such an assessment should scrutinize not only her/his skills to attend a normal delivery but also the extent to which s/he can appropriately diagnose pregnancy-related complications and perform the signal functions. Also, this type of analysis will safeguard against the temptation to meet the skilled birth attendant targets with increasingly lower-skilled providers.

An interesting historical finding is that as countries improve their health systems and are increasingly able to provide EmOC services to pregnant women, facilities tend to be upgraded to comprehensive EmOC level, bypassing the level of basic EmOC altogether. (In our experience, when facilities were upgraded to basic EmOC level and quality was improved, services were utilized at a steadily increasing rate). Several Central American countries (e.g. Honduras and El Salvador) have prioritized an investment in hospitals over basic EmOC facilities and nearly all institutional births take place in hospitals; Sri Lanka and Malaysia have lowered their MMR by increasing access to a professional cadre of birth attendants and to hospitals [13]. Today, hospital births are the norm in these countries. To date, we are not aware of any country that has the recommended ratio of basic EmOC to population, although several countries have a ratio of comprehensive plus basic facilities to population that is close to or equal to 5 EmOC facilities per 500,000 population (see Table 2). In the United States, a country with a relatively low MMR, all facilities that provide EmOC do so at the level of a comprehensive facility and the ratio of EmOC facility to population is greater than 5:500,000 [14]. We must note, however, that most needs assessments have been undertaken in countries with high MMR so less information is available on countries with moderate or low MMR.

Data from national needs assessments to date clearly indicate an insufficiency of EmOC facilities—particularly basic EmOC facilities—to meet the needs of the population. Reasons for the lack of basic EmOC facilities are many, but include a prioritization of hospitals by governments, shortages of skilled personnel (especially those with the skills to perform manual removal of placenta, removal of retained products and assisted vaginal delivery), poor retention of skilled personnel, especially in rural areas, lack of emergency equipment or equipment repair and maintenance, drug shortages due to economic and managerial problems, and policy barriers, especially those related to which procedures health personnel are trained to perform at what level of the system. These findings strongly suggest that health planners can not assume that EmOC services are available as back up for midwives or other providers who care for women at home or in birthing center or maternities. Referral centers should be inspected even when the focus of the program is broader than EmOC to ensure that women with emergencies will be cared for appropriately when they arrive. Resource-poor countries with high levels of maternal mortality should consider upgrading maternities and health centers to basic EmOC status a high priority. This step will ensure that services are available in facilities located closest to communities, especially rural communities that are particularly vulnerable.

Acknowledgments

The dedication and energy of the staff of partner agencies in Africa, Asia and Latin America who carried out field work for these needs assessments is greatly appreciated. A longer version of this paper was commissioned by the Millennium Project Task Force on Child Health and Maternal Health. This work was made possible by a grant from the Bill and Melinda Gates Foundation; however, the funding source was not involved in the preparation of this paper.

Appendix A

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