



Averting maternal death and disability

Program note  
Using UN process indicators to assess needs in  
emergency obstetric services

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Over the past decade, the UN process indicators [1] have been increasingly recognized as a tool to identify the availability, use, and to some extent, the quality of emergency obstetric care (EmOC). They also offer a practical way of monitoring change that is likely to influence maternal mortality. Impact indicators (such as the maternal mortality ratio) are less desirable for monitoring programmatic changes because they do not identify areas of deficiency, the estimates tend to be imprecise, the time period they reflect, depending on the methodology, is often 10–12 years prior to the data collection, and they require large sample sizes and are, therefore, costly to produce.

Issued by UNICEF, WHO and UNFPA, the indicators described below present a logical sequence of how program managers of a country's Safe Motherhood program may want to prioritize

their activities, beginning with coverage and moving on to performance. The first indicator — 'number of facilities providing emergency obstetric functions' — determines if the services exist. When the number of facilities is examined by geographical region, it informs us about the distribution of those services. The 'proportion of women who deliver at emergency obstetric care facilities' informs us about the level of service utilization and 'met need' informs us further if the women who truly need emergency services actually receive them. 'Cesarean deliveries as a proportion of all births' indicates the level of use of a particular life-saving procedure. Finally, the 'case fatality rate' reflects the quality of care and facility performance. Interpretation of individual indicators is not always straightforward, but taken together, the indicators help identify where key problems lie and where additional information may be needed for a deeper understanding of a problem.

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Process indicators Indicator	Definition	Numerator	Denominator	Recommended level
Availability of EmOC	No. of facilities providing EmOC	No. of facilities providing basic or comprehensive EmOC	500 000 population	1 comprehensive per 500 000 population; 4 basic per 500 000
Proportion of all births in EmOC facilities	Proportion of all births in EmOC facilities	No. of births delivered in EmOC facilities in time period	Estimated no. of births in area in same time period	> 15%
Met need	Proportion of women with obstetric complications delivered at EmOC facilities	No. of women with obstetric complications treated in EmOC facilities in time period	Estimated no. of women with obstetric complications	100%
Cesarean deliveries as a proportion of all births	Cesarean deliveries as a proportion of all births	No. of Cesareans in time period	Estimated no. of births in same time period	5–15%
Case fatality rate	Proportion of women with obstetric complications admitted to a facility who die	No. of deaths in facility due to specific complications during time period	No. of women treated for specific complications in facility in time period	< 1%

Underlying the UN indicators is an understanding of the medical services that are absolutely necessary to save the lives of women who experience obstetric complications. The eight crucial procedures listed below, known as ‘signal functions’, distinguish facilities that provide emergency obstetric care (EmOC) from those that do not, and between those that provide Basic EmOC or Comprehensive EmOC. If a facility has provided the first six functions *in the past 3 months*, it provides Basic EmOC. If it has provided all eight of the functions, it qualifies as Comprehensive:

- parenteral antibiotics;
- parenteral oxytocic drugs;
- parenteral anti-convulsants for pregnancy-induced hypertension;

- manual removal of placenta;
- removal of retained products of conception (e.g. vacuum aspiration);
- assisted vaginal delivery (e.g. vacuum extraction, forceps);
- surgery (e.g. cesarean delivery); and
- blood transfusion.

The Averting Maternal Death and Disability (AMDD) Program began in 1999 to support governments and international organizations to improve access to emergency obstetric care. This support has been made possible by a grant from the Bill and Melinda Gates Foundation to the Mailman School of Public Health at Columbia University. The first step in carrying out each country project is a Needs Assessment, one com-

ponent of which is collecting the data required for the process indicators. In addition to service statistics from the facilities, outside sources (censuses or national surveys) are needed to provide the number of expected births and the total population for the catchment area under consideration. The following brief reports present the data from the Needs Assessments in Mozambique, Nepal and Senegal, undertaken in 2000 and 2001.

## 1. Results from Mozambique 2000 [2]

The Needs Assessment for the province of Sofala, Mozambique, was conducted by the Direção Provincial de Saúde de Sofala, between June and August 2000. Sofala is one of 11 provinces in Mozambique, located in the central region of the country with a population of 1 453 928 (1997 Census). The crude birth rate used to calculate the expected number of births was 47/1000 population.

The Needs Assessment team visited all the hospitals ( $n = 5$ ) and 22 of 39 maternity health centers. Centers with large numbers of deliveries per year were given top priority.

### 1.1. Availability of EmOC

Population size	Current availability		Recommended number	
	Basic	Comprehensive	Basic	Comprehensive
1 453 928	1 (8%)	4 (133%)	12	3

For the population size, 12 Basic and three Comprehensive EmOC facilities should be available. Only one facility provides the full set of Basic EmOC services, or 8% of the recommended number. Four of the five hospitals provide Comprehensive EmOC. The signal function least likely to be performed at maternity health centers is the manual removal of retained placenta (four centers had manually removed a retained placenta in the previous 3 months). Approximately one-third of the health centers had

provided anti-convulsants, had removed retained products or had performed an assisted vaginal delivery.

### 1.2. Proportion of births in EmOC facilities

Facility type	Number of births	Expected number of births	Proportion	Recommended
5 EmOC	8484	70 500	12%	> 15%
All facilities surveyed	24 134	70 500	34.2%	

Fewer than 15% of all births take place in facilities that provide EmOC, an indication that women in need of services are not receiving them. If all facilities surveyed are considered, 34% of births are institutional.

### 1.3. Met need

Facilities	Number of women with complications treated	Expected number of complications in population	Met need	Recommended
5 EmOC	827	10 575	7.8%	100%
All facilities surveyed	1622	10 575	15.3%	

Fewer than 8% of the women who are estimated to have severe obstetric complications are receiving treatment at facilities that provide either Basic or Comprehensive EmOC.

### 1.4. Cesarean deliveries as a proportion of all births

Number of cesareans	Expected number of births	Proportion	Recommended range
703	70 500	1%	5–15%

Only 1% of all births in the population is by cesarean; many women who would benefit from surgical deliveries are not receiving this potentially life-saving intervention. Cesareans are performed at only five hospitals and very few are performed at several of the hospitals.

### 1.5. Case fatality rate for hospitals reporting maternal deaths

Hospital	Number of maternal deaths/ complications	Case fatality rate	Recommended maximum
Central Hospital Beira	24/514	4.7%	1%
Nhamatanda	3/125	2.4%	
Marromeu	2/18	11.1%	

Every hospital that registered any maternal death exceeded the maximum recommended level of 1%.

## 2. Results from Nepal 2000 [3]

The Needs Assessment in Nepal was carried out in the 45 districts of the Eastern, Western and Mid-western regions. Nepal has 75 districts and five regions. The three regions have a population of 12 734 979 or approximately half of the country's total population. The crude birth rate used to calculate the expected number of births was approximately 40/1000 population. The Needs Assessment was conducted by the company New Era under the direction of the Family Health Division of the Ministry of Health and UNICEF in March and April of 2000.

The Needs Assessment team visited 157 facilities, of which 42 were government hospitals, 90 were government health centers, and 25 were non-governmental hospitals and clinics.

### 2.1. Availability of EmOC

Region	Population size	Current availability		Recommended number	
		Basic	Comprehensive	Basic	Comprehensive
All three regions	12 734 979	5 (5%)	18 (69%)	102	26
Eastern	5 316 150	2 (5%)	10 (91%)	43	11
Western	4 509 076	1 (3%)	6 (67%)	36	9
Mid-western	2 909 753	2 (9%)	2 (33%)	23	6

The need for Comprehensive EmOC facilities

is not being met, especially in the Western and Mid-western regions. A very large gap exists between the recommended number of Basic EmOC facilities and those that are available. Of the 18 Comprehensive facilities, eight are government facilities; of the five Basic facilities, four are governmental.

### 2.2. Proportion of births in EmOC facilities

Region	Number of births	Expected number of births	Proportion	Recommended
All facilities surveyed	26 797	514 509	5.2%	> 15%
Eastern	12 178	209 660	5.8%	
Western	11 933	192 047	6.2%	
Mid-western	2686	112 802 <sup>a</sup>	2.4%	

<sup>a</sup>Excludes Kalikot and Jajarkot districts.

Far fewer women give birth in facilities than is recommended, especially in the Mid-western region.

### 2.3. Met need

Region	Number of women with complications treated	Expected number of complications in population	Met need	Recommended
All facilities interviewed	4233	78 753 <sup>a</sup>	5.4%	100%
Eastern	1819	31 449	5.8%	
Western	1734	28 807	6.0%	
Mid-western	680	18 497	3.7%	

<sup>a</sup>Based on a total of 525 022 estimated pregnancies.

Very few women who experience obstetric complications are receiving the medical care they need.

### 2.4. Cesarean deliveries as a proportion of all births

Region	Number of cesareans	Expected number of births	Proportion	Recommended range
All three regions	4238	514 509	0.8%	5–15%
Eastern	2270	209 660	1.1%	
Western	1565	192 047	0.8%	
Mid-western	403	112 802	0.4%	

Some women with life-threatening complications are not receiving the care necessary to assure a safe delivery. Only a quarter of institutional births take place in non-governmental facilities, but 36% of cesareans are performed at these same facilities.

### 2.5. Case fatality rate for hospitals reporting maternal deaths

Region	Number of maternal deaths/ complications	Case fatality rate	Recommended maximum
All three regions	82/4233	1.9%	1%
Eastern	20/1819	1.1%	
Western	37/1734	2.1%	
Mid-western	25/680	3.7%	

Each region exceeds the maximum recommended level of 1%. All the indicators suggest that efforts to increase access to, utilization of and quality of services are most urgent in the Mid-western region, the most physically inaccessible of the three regions.

## 3. Results from Senegal 2001 [4]

The Needs Assessment in Senegal was national in scope. It was conducted by UNFPA and the National Office of Reproductive Health of the Senegalese government between February and March of 2001.

The Needs Assessment team visited 172 facilities: 13 government hospitals and 127 government health centers, posts or maternities, and 32 private facilities. The facilities serve a population of 9.8 million with a crude birth rate of 46 per 1000 population.

### 3.1. Availability of EmOC

Population size	Current availability		Recommended number	
	Basic	Comprehensive	Basic	Comprehensive
9 833 757	5 (6%)	33 (165%)	79	20

Senegal appears to have many Comprehensive EmOC facilities, but very few facilities provide the full range of Basic EmOC functions. Of the 38 facilities that provide Basic or Comprehensive EmOC, 17 are public and 21 are private. The function that prevents many facilities from providing the full range of basic services is assisted vaginal delivery; few providers are trained to perform this procedure.

### 3.2. Proportion of births in EmOC facilities

Facility type	Number of births	Expected number of births	Proportion	Recommended
38 EmOC	43 770	452 352	9.7%	> 15%
All facilities surveyed	129 475	452 352	28.6%	

Only 38 of the 172 facilities visited provide Basic or Comprehensive EmOC. If we consider strictly the births at those facilities, only 10% of all births take place where the full range of emergency obstetric care is available. If all the facilities visited are considered, 29% of all births are institutional.

### 3.3. Met need

Facilities	Number of women with complications treated	Expected number of complications in population	Met need	Recommended
38 EmOC	7789	67 853	11.5%	100%
All facilities interviewed	13 144	67 853	19.4%	

The proportion of women with serious obstetric complications who are treated at EmOC facilities is approximately 12%. Even if all facilities are included, only 19% of women estimated to have serious complications are treated.

### 3.4. Cesarean deliveries as a proportion of all births

Number of cesareans	Expected number of births	Proportion	Recommended range
4999	452 352	1.1%	5–15%

The number of cesarean deliveries falls short of the recommended 5% minimum.

### 3.5. Case fatality rate for facilities reporting maternal deaths

Number of maternal deaths/complications	Case fatality rate	Recommended maximum
519/13 144	4.0%	1%

The aggregated case fatality rate exceeds the recommended maximum of 1%, indicating that hospitals and health centers need to improve their readiness and ability to respond to serious obstetric complications.

## 4. Conclusion

This Program Note describes the baseline indicators collected in three country projects. Rarely is just one indicator sufficiently informative for anyone designing, monitoring or evaluating a health program, especially when the health problem at hand involves the delivery of services and health seeking behaviors. The Process Indicators described in this feature are a good example of how multiple indicators can provide a more comprehensive view of a health system's dynamics than any single indicator. Individual indicators by themselves have limitations, but in unison they piece together a more complete assessment of a situation.

In the case of Sofala, Mozambique and Senegal, we actually see more than the recommended number of comprehensive emergency obstetric care facilities for the size of the population to be served. Even in the regions of Nepal that were surveyed, we see fairly good coverage of comprehensive facilities. What the indicator does not tell us is how equitably distributed the facilities are or if they are concentrated in urban centers. Are they accessible by road for a large portion of the population? And most importantly, are women using the services?

The indicator of the proportion of births in EmOC facilities tells us immediately that women

are not using the services to the extent needed (assuming that 15% of pregnant women develop complications requiring medical attention). The low levels of met need and the proportion of births by cesarean indicate more specifically that women who truly need emergency obstetric services are not seeking services or are not receiving them as they should.

Although case fatality rates exceed the recommended maximum of 1%, the measurement of performance and quality of care is complex and is best done using more than just one indicator. The case fatality rate can be quite high without necessarily reflecting an unreadiness to respond or poor professional performance of the providers. Women can arrive at hospital in such serious conditions that most interventions fail to be effective. Additional indicators such as the time interval between arrival at the facility and treatment (or death) would clarify whether a problem exists with the facility's readiness to respond to women with complications with staff availability, skill level, drugs, equipment or supplies, or if the problem is more related to difficulties accessing the services (transportation, distance, etc.). These additional indicators can be developed with small studies or by carrying out an audit.

The process indicators will be estimated periodically during the course of the AMDD Program to monitor the progress of program efforts towards improving access to, utilization of and quality of emergency obstetric services.

It is important to note that the three countries described in this feature were not selected because of the quality of coverage or performance of their maternity services, but because their program managers were eager to share their findings with others in similar situations.

## References

- [1] UNICEF, WHO, UNFPA. Guidelines to monitoring the availability and use of obstetric services, New York, 1997.
- [2] Jamisse L, Matediane E, Derveeuw M. Needs assessment on availability and use of emergency obstetric care

- services in Sofala Province, Mozambique. Final report. Ministry of Health and UNFPA, 2000.
- [3] Needs assessment on the availability of emergency obstetric care services in Eastern, Western and Mid-Western regions of Nepal. Final report. New Era. Family Health Division of Ministry of Health and UNICEF, 2000.
- [4] Moreira I, Faye EHO, Diop FS, Djiba SD, Gako NMN, Fall N et al. Evaluation de la Disponibilité, de l'Utilisation et de la Qualité des Soins; Obstétricaux d'Urgence au Senegal. Rapport Final (Draft). Ministère de la Santé, Service National de la Santé de la Reproduction, FNUAP, Université de Columbia, 2001.

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Papers can be submitted via e-mail to [jafortney1@aol.com](mailto:jafortney1@aol.com) or in hard copy to Dr. J A Fortney, AMDD Program, Mailman School of Public Health, Columbia University, 60 Haven Avenue, New York NY 10032, Papers should be of Microsoft Word, follow the style of this journal, and must address the issues of access to, or quality of, emergency obstetric care.

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