



## Averting maternal death and disability

# Program note: using UN process indicators to assess needs in emergency obstetric services: Morocco, Nicaragua and Sri Lanka

AMDD Working Group on Indicators<sup>1,\*</sup>

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### 1. Introduction

This is the fourth Program Note in a series that features the UN process indicators for monitoring obstetric services [1–3]. Issued by UNICEF, WHO and UNFPA, the indicators are used to identify the availability, use, and, to some extent, quality of emergency obstetric care (EmOC) [4]. The indicators answer the following questions:

- Are there sufficient facilities providing EmOC?
- Are they well distributed?
- Are enough women using them?
- Are the right women using them?
- Are enough critical services being provided?
- Is the quality of the services adequate?

The indicators are also useful at monitoring changes in availability, utilization and quality. The definitions are summarized in Table 1 and recommended levels can be found in the results tables.

The UN indicators developed from an understanding that certain medical services or procedures are necessary to save the lives of women with obstetric complications. These procedures or ‘signal functions’ distinguish facilities that provide

basic or comprehensive emergency obstetric care from those that do not.

If a facility has provided the first six functions *in the past 3 months*, it provides basic EmOC and if it has provided all eight of the functions, it qualifies as comprehensive:

- parenteral antibiotics;
- parenteral oxytocic drugs;
- parenteral anticonvulsants for pregnancy-induced-hypertension;
- manual removal of placenta;
- removal of retained products (e.g. vacuum aspiration);
- assisted vaginal delivery (e.g. vacuum extraction, forceps);
- surgery (e.g. cesarean delivery); and
- blood transfusion.

The major obstetric complications that are taken into consideration for the calculation of the process indicators are hemorrhage, sepsis, prolonged or obstructed labor, eclampsia/pre-eclampsia, complications from abortion, ruptured uterus and ectopic pregnancy.

The following brief reports present the data from the needs assessments in Morocco, Nicaragua and Sri Lanka undertaken in 2000, 2001 and 2002. Each report reflects 12 months of facility data. A needs assessment was the first step in carrying out

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Table 1  
Process indicators

Process indicator	Definition
Availability of EmOC	Number of facilities that provide EmOC per 500 000 population
Proportion of all births in EmOC facilities	Proportion of all births in EmOC facilities
Met need	Proportion of women estimated to have complications who are treated in EmOC facilities
Cesarean deliveries as a proportion of all births	Cesarean deliveries as a proportion of all births
Case fatality rate (CFR)	Proportion of women with obstetric complications admitted to a facility who die

the Averting Maternal Death and Disability (AMDD) Program in these three countries.

## 2. Results from Morocco 2000–2002 [5]

The scope of the needs assessment in Morocco was nationwide and included 510 government maternities and birthing centers. Private hospitals were not surveyed. The 16 regions have a population of less than 30 million inhabitants. The crude birth rate used to calculate the expected number of births was approximately 22.8 per 1000 population. The needs assessment was conducted by the Ministry of Health, Direction of Population and UNFPA over a period of 22 months between 2000 and 2002. The service statistics reflect obstetric admissions for the calendar year 2000.

### 2.1. Availability of EmOC

According to the UN recommendations, there should be one comprehensive and four basic EmOC facilities per 500 000 population as a minimum. For a country of its size, at least 58 comprehensive facilities are recommended and according to the needs assessment 61 hospital

maternities are fully functioning as comprehensive facilities (Table 2). Pregnant women in Morocco do not have the same availability of basic EmOC services. There are only 137 basic facilities when 231 are recommended. With some inputs from the government, 312 additional health facilities could be upgraded to basic EmOC status.

### 2.2. Proportion of births in EmOC facilities and all facilities

The UN indicator specifies ‘births in EmOC facilities,’ i.e. those facilities that can treat most if not all obstetric emergencies. An estimated 15% of pregnant women develop major obstetric complications that require medical care, therefore, the recommendation that at least 15% of births deliver in EmOC facilities [4].

Forty percent of expected births take place in basic and comprehensive EmOC facilities, while 49% take place in EmOC and all other facilities (Table 3). Regional differences range from 107% in the region of Oued Eddahab to 20% in Guelmim-Smara. It is likely that the size of the population of Oued Eddahab, a province with a highly mobile population (fishermen, military) was

Table 2  
Availability of EmOC

Population size	Baseline status		Recommended number per 500 000 population	
	Basic	Comprehensive	Basic	Comprehensive
28 866 680	137	61	231	58

Table 3  
Proportion of births in EmOC facilities and facilities

Type of facility	Number of births	Expected number of births	Proportion (%)	% of expected births in EmOC facilities Recommendation
EmOC facilities	265 845	656 904	40.5	> 15%
All facilities	324 572		49.4	

Table 4  
Met need at EmOC facilities and all facilities

Type of facility	Number of women with complications treated	Expected number of complications in population	Met need (%)	% of expected births with complications that are treated Recommendation
EmOC facilities	32 968	98 536	33.5	100
All facilities	36 151		36.7	

Table 5  
Cesarean deliveries as a proportion of all births

	Number of cesareans	Expected number of births	Proportion (%)	% of expected births in population delivered by cesarean Recommendation
All facilities	18 317	656 904	2.8	5–15%

underestimated, thus inflating this indicator. Unlike other provinces that have a number of private facilities, all health care in Oued Eddahab is provided by the public sector.

### 2.3. Met need at EmOC facilities and all facilities

The numerator of met need is comprised of women with major obstetric complications who are treated in EmOC facilities, i.e. those complications leading to the primary direct causes of death. The denominator is an estimate of the number of women expected to have a serious complication, i.e. 15% of the expected number of births in the population [4]. According to this definition, the EmOC facilities attend a third of the women expected to develop a major obstetric complication and this percentage increases to 37% if all facilities surveyed are included in the estimate (Table 4). Met

need ranged from 180% in the Oued Eddahab region to 15% in the region of Chaouia-Ouardigha.

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

The proportion of all births delivered by cesarean is based on the estimate of live births in the population (denominator) and the number of cesareans performed in the facilities surveyed (numerator). Cesarean deliveries are 2.8% of all births, falling short of the 5% minimum that the UN recommends (Table 5). The regions of Oued Eddahab, Rabat-Salé-Zemmour-Zaer, and Grand Casablanca presented rates slightly over 5%. (Cesareans from teaching hospitals are included in these last two regions). The lowest rates of cesarean deliveries (1.1%) are found in the regions of Tadla Azilal and Guelmim-Smara. However, it

Table 6  
Case fatality rate for comprehensive EmOC hospitals

	No. of maternal deaths/complications	Case fatality rate (%)	Recommended maximum (%)
All comprehensive EmOC hospitals	254/30 242	0.84	1

must be noted that cesareans provided by the private sector are not included.

2.5. Case fatality rate for comprehensive EmOC hospitals

The aggregate case fatality rate is calculated by dividing the number of intra-hospital deaths due to major or direct obstetric causes by the number of women treated for those complications in the same facilities. The case fatality rate based on all 61 comprehensive facilities is less than 1% (Table 6). However, numerous institutions reported no maternal death while a few reported deaths but very few complications. All comprehensive EmOC facilities are required to report maternal deaths, although some may be missed especially if the death does not occur on the maternity ward.

3. Results from Nicaragua 2001 [6]

The needs assessment covered 10 of the 17 SILAIS (the Nicaraguan administrative unit for health region that approximates the geographical unit of department), but the results presented here include only nine (the capital Managua was excluded). A total of 112 facilities provided service statistics, including 22 non-governmental or private institutions, that reflect women delivering or who were admitted for pregnancy-related complications between July of 1999 and June of 2000.

Table 7  
Availability of EmOC

Population size	Baseline availability		Recommended number of EmOC facilities	
	Basic –1	Comprehensive –1	Basic	Comprehensive
2 135 557	9	10	17	4

The needs assessment was conducted by UNFPA in collaboration with the local SILAIS between December of 2000 and March of 2001. The population census estimate of the nine regions was 2 135 557 with an estimated crude birth rate of 35 per 1000 population.

3.1. Availability of EmOC

One of the six signal functions for a basic EmOC facility is assisted vaginal delivery. Like a number of other Latin American countries, the use of forceps or vacuum extraction is uncommon in Nicaragua [3]. Thus, we have used the designation of Basic–1 or Comprehensive–1 to reflect the absence of assisted vaginal delivery.

For a population of 2.1 million inhabitants, four comprehensive and 17 basic EmOC facilities are recommended. For every comprehensive facility needed, two and half are functioning, but the same regions have only approximately half the number of basic facilities that is recommended (Table 7). Nevertheless, 19 functioning EmOC facilities instead of 21 suggest that availability of services for pregnant women is relatively good.

3.2. Proportion of births in EmOC facilities and all facilities

In the regions surveyed, approximately 29% of births occurred in the 19 EmOC facilities (Table

Table 8  
Proportion of births in EmOC facilities and all facilities

Type of facility	Number of births	Expected number of births	Proportion (%)	% of expected births in EmOC facilities Recommendation
EmOC facilities	21 455	74 744	28.7	> 15
All facilities	33 275		44.5	

8) while almost half of all estimated births delivered in all of the institutions surveyed.

### 3.3. Met need at EmOC facilities and all facilities

Approximately one in three of the women requiring medical attention in the nine regions received treatment at EmOC facilities (Table 9). However, if we remove the large number of women admitted with complications related to abortion from the numerator, met need provided by EmOC facilities drops to 15%.

Met need increases to 53% if we consider all the facilities surveyed. Almost half of the complications treated are abortion-related. For purposes of the needs assessment, if a woman was hospitalized for any complication related to abortion, no attempt was made to distinguish between women

with sepsis or hemorrhage and women admitted with less severe abortion-related complications.

### 3.4. Cesarean deliveries as a proportion of all births in EmOC and all facilities

Approximately 6% of deliveries are by cesarean, with more than 80% performed at EmOC facilities (Table 10). Several SILAIS had cesarean rates of 3.5% such as Río San Juan and Matagalpa while Estelí had a rate of almost 12%.

### 3.5. Case fatality rates for EmOC facilities and all facilities

The case fatality rate estimated from the EmOC facilities surveyed is below the 1% maximum (Table 11). Although no deaths were attributed to

Table 9  
Met need at EmOC facilities and all facilities

Type of facility	Number of women with complications treated	Expected number of births with complications in population	Met need (%)	% of expected births with complications that are treated Recommendation
<i>EmOC facilities</i>				
Includes women with complications from abortions	3460	11 212	30.8	100
Excludes women with complications from abortions	1649		14.7	
<i>All facilities</i>				
Includes women with complications from abortions	5899		52.6	
Excludes women with complications from abortions	3137		28.0	

Table 10  
Cesarean deliveries as a proportion of all births in EmOC and all facilities

Type of facility	Number of cesareans	Expected number of births	Proportion (%)	% of expected births in population delivered by cesarean Recommendation
EmOC Facilities	3840	74 744	5.1	5–15
All facilities	4701		6.3	

Table 11  
Case fatality rates for EmOC facilities and all facilities

Type of facility	Number of maternal deaths/complications	Case fatality rate (%)	Recommended maximum (%)
EmOC facilities	15/3460	0.43	1
All facilities	23/5899	0.39	

Table 12  
Availability of EmOC

	Population size	Baseline availability		Recommended number per 500 000 population	
		Basic	Comprehensive	Basic	Comprehensive
16 districts	14 621 000	23 <sup>a</sup>	33	117	29

<sup>a</sup> A sample of 82 intermediate level hospitals were surveyed and of these 10 had performed all six functions in the previous 3 months. Based on this sample, the study team estimates a total of 23 basic facilities.

abortion at the EmOC facilities, the denominator used in this calculation includes all women with complications of abortion (thus reducing the rate). However, the CFR based on all facilities does include one woman who died of abortion-related complications (but at a non-EmOC facility).

Some cause-specific case fatality rates exceeded 1%: the CFR for postpartum sepsis was 1.4% (4/287) and for hemorrhage 2.7% (13/483).

#### 4. Results from Sri Lanka 2001 [7]

The Facility Assessment Survey of Sri Lanka was undertaken in 16 of 25 districts. Conflict-affected districts were excluded. A total of 33 major hospitals and 82 intermediate level hospitals were covered in the survey. The 82 intermediate level hospitals were a random sample of 251 District Hospitals and Peripheral Units while the 33

major hospitals were the total number available within the 16 districts. To qualify as a major hospital, obstetric specialists are always available (Teaching Hospitals, General/Provincial Hospitals or Base Hospitals). The 16 districts have a population of 14.6 million (the national population estimate is 18.6 million) with a crude birth rate ranging from 11.7 to 19.9 live births per 1000 population with an average of 16.8 for the 16 districts. The survey was conducted in 2000 by the Family Health Bureau of the Ministry of Health in collaboration with the Sri Lanka College of Obstetricians & Gynaecologists and UNICEF Colombo. The service statistics reflect patients who presented between January 1 and December 31, 1999.

##### 4.1. Availability of EmOC

With 33 comprehensive facilities, the 16 districts more than meet the minimum recommendation of

Table 13  
Proportion of births in EmOC facilities

Type of facility	Number of births	Expected number of births	Proportion (%)	% of expected births in EmOC facilities Recommendation
Comprehensive EmOC facilities	179 590	246 317	72.9	> 15
Basic EmOC facilities	9319		3.8	
Basic—2 facilities <sup>a</sup>	23 719		9.6	

<sup>a</sup> Do not include removal of retained products and assisted vaginal delivery.

29 comprehensive facilities (Table 12). However, not all districts met the minimum recommendation of one comprehensive facility for every 500 000 population. Twenty-three basic facilities fall short of the 117 recommended. Another 31 of the 82 intermediate level institutions provided the first four functions (parenteral antibiotics, oxytocins, anticonvulsants and manual removal of the placenta), providing additional life-saving procedures, but requiring referral for others.

#### 4.2. Proportion of births in EmOC facilities

Three of four estimated births take place in fully functioning EmOC facilities while another 10% take place where four of the six basic functions are provided (Table 13). Thus, the majority of women who are likely to need life-saving obstetric care are delivering in health facilities that could, in fact, meet that need. Nevertheless, regional disparities exist. The proportion of estimated births in EmOC facilities varied from 37% in Nuwera Eliya to 111% in the district of Colombo, exceeding the estimate for the district because of women from neighboring districts who delivered in Colombo. In Nuwera Eliya another 45% of pregnant women

delivered in facilities that carry out the first four procedures that define a basic facility.

#### 4.3. Met need in EmOC facilities

Met need is high in Sri Lanka; three in four women estimated to have a major obstetric complication received care at an EmOC facility (Table 14), and if women attended at the Basic—2 level facilities were included, this proportion would be even higher. Of the 75%, eight percentage points are women who were referred to a higher level hospital in a neighboring district. Met need ranged from 31% in Nuwera Eliya to 131% in the district of Galle. It is likely that women from adjoining districts were treated at the Teaching Hospital in Galle.

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

The cesarean rate approaches the maximum level recommended of 15% of all births (Table 15). The districts of Moneragla and Nuwera Eliya recorded levels below 5% while Colombo, Galle, Matalle and Kalutara recorded levels higher than 15%.

Table 14  
Met need in EmOC facilities

	Number of women with complications treated	Expected number of complications in population	Met need (%)	% of expected births with complications that are treated Recommendation
EmOC facilities	27 778	36 948	75.2	100

Table 15  
 Cesarean deliveries as a proportion of all births

	Number of cesareans	Expected number of births	Proportion (%)	% of expected births in population delivered by cesarean Recommendation
Comprehensive EmOC facilities	33 756	246 317	13.7	5–15

4.5. Case fatality rates for comprehensive EmOC hospitals

The case fatality rate for major obstetric causes of death at comprehensive EmOC facilities is well below the maximum of 1% (Table 16). Only the CFR for indirect causes (heart or liver disease, severe anemia, etc.) reached 1%. Although relatively few cases of ruptured uterus took place, the cause-specific CFR for ruptured uterus was 5.56 (3 deaths/54 cases of ruptured uterus).

Most maternal deaths occurred in the 33 major hospitals; only three maternal deaths took place in the intermediate level hospitals and therefore were not included in this last analysis.

5. Conclusions

Morocco, Nicaragua and Sri Lanka represent three countries well advanced in the goal of making emergency obstetric care available to all pregnant women. Like a number of countries examined in the earlier Program Notes [1–3], these countries have more than adequate ratios of comprehensive facilities to the population, but fewer basic facilities. However, the combination of basic and comprehensive facilities suggests reasonable availability of EmOC.

Utilization of EmOC services is widespread as indicated by a high percentage of births taking place in institutions (86% in Sri Lanka, 49% in Morocco and 44% in Nicaragua). Women with obstetric complications are being treated as reflected by an elevated ‘met need’ (75% in Sri Lanka, 53% in Nicaragua and slightly lower in Morocco, 37%) and the proportion of all births by cesarean falls within the recommended range for both Nicaragua and Sri Lanka (and somewhat below the range in Morocco). Finally, the relatively low case fatality rates in each country suggest that facilities are responding quickly and appropriately to obstetric emergencies.

Morocco’s needs assessment, given its national scope and the number of facilities visited, was a major undertaking. At the regional level the results showed that the geographical distribution of EmOC remains an issue to be addressed. Regions and provinces with a proportionately more rural population tend to be less well served in all areas of medicine, including obstetrics, compared with the more urban areas. As recently as August 2002, the government of Morocco made a number of appointments of medical specialists and paramedical personnel to the southern regions of the country.

Table 16  
 Case fatality rates for comprehensive EmOC hospitals

Cause of maternal death	No. of deaths/ complications	Case fatality rate (%)	Recommended Maximum (%)
Major obstetric causes <sup>a</sup>	62/24 869	0.25	1
Other obstetric causes <sup>b</sup>	11/6141	0.18	
Indirect causes	34/3307	1.03	
All causes	107/34 317	0.31	

<sup>a</sup> Hemorrhage, sepsis, prolonged or obstructed labor, complications of abortion, ruptured uterus and ectopic pregnancy.

<sup>b</sup> Amniotic fluid embolism, pulmonary embolism, disseminated intravascular coagulopathy without any underlying cause, etc.

The regional data revealed variations that point to challenges in interpretation but also to where additional support is needed. Individual hospitals must strive to lower their case fatality rates and in some regions, low cesarean rates suggest that some women and their newborns may not be receiving the life-saving procedures that they need.

Assisted delivery, one of the basic EmOC functions, is completely missing from the arsenal of life-saving procedures in Nicaragua. Cesareans are performed below the 5% level in several of the regions studied. Although half of the women estimated to need emergency obstetric care are receiving it (met need of 53%), the level of met need is strongly influenced by the large number of women hospitalized for complications related to abortion. Complications from abortion outnumber any other obstetric complication and these women account for approximately half of met need. Not surprisingly, some SILAIS in Nicaragua demonstrated far better indicators than others. AMDD Program interventions are targeted at three of the departments with the least favorable indicators: Río San Juan, Chontales and Jinotega.

In Sri Lanka, learning to respond quickly to the medical needs of the casualties of civil war has surely benefited the responses to other medical emergencies. But as the authors of the needs assessment point out, district level disparities exist. Almost half of the population of Nuwera Eliya lives on plantations where emergency transport is difficult to obtain, the terrain is hilly, only one comprehensive facility exists and no fully functioning basic institution is available in the district. Other districts are also in need of focused interventions and with the peace process underway, Sri Lanka faces the challenge of assuring that EmOC services meet the standards of their national system in the former conflict areas.

Also in Sri Lanka, the case fatality rate for indirect causes is high compared to the CFR for major or direct causes of maternal death or the CFR of 'other' obstetric causes of death. Although indirect causes are attributed to approximately one-third of maternal deaths, increased attention to improving the management of these other causes of death is warranted.

The three countries featured in this Program Note demonstrate a level of commitment on the part of the public sector to improve their responses to women in life-threatening situations. Their achievements are considerable but difficult regional challenges persist.

### Appendix A: Participants of AMDD Working Group on Indicators

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