Programme Manager's Planning Monitoring & Evaluation Toolkit

Technical Support Division **March 2004**

Tool Number 6: Programme Indicators

Part II: Indicators for Reducing Maternal Mortality

I. Introduction

The toolkit is a supplement to the UNFPA programming guidelines. It provides guidance and options for UNFPA country office staff to improve planning, monitoring and evaluation activities. It is also useful for other programme managers at headquarters and national levels.

Each year more than 500,000 women die from pregnancy related causes. Most of these deaths (98%) occur in the developing world, and nearly all could be prevented. Maternal mortality reduction was highlighted at the International Conference on Population and Development (ICPD) in 1994 and at its review in 1999 (ICPD+5), and was selected as one of eight primary development goals at the United Nations Millennium Summit in 2000. The 5th Millennium Development Goal calls for a reduction of the maternal mortality ratio by three quarters between 1990 and 2015. This is an achievable goal, but only if interventions are planned based on validated strategies that successfully reduce the incidence of maternal deaths.

Tool Number 6, Part II was produced by the Technical Support Division, UNFPA, in collaboration with the Division for Oversight Services and the UNFPA Evaluation and Maternal Mortality Networks. Sections II and III of the tool highlight the major causes of maternal death and describe effective strategies to prevent its occurrence. Section IV provides indicators proven to be practical and effective both for needs assessments to plan maternal mortality interventions and for tracking progress while implementing them. It also highlights sources of data for each indicator. The indicators described in this tool are currently used in several maternal mortality reduction programmes supported by UNFPA as well as other organizations. The functionality of the indicators is being assessed through these interventions.

While the tool mentions key issues regarding demand of emergency obstetric care services such as those related to the policy environment, individual and community awareness and commitment to reducing maternal mortality, it mainly addresses issues pertaining to supply of Emergency Obstetric Care (EmOC) services. Indicators for results related to demand for maternal mortality reduction would be the subject of a future tool.

II. Medical Causes of Maternal Death

When addressing maternal mortality in any country it is essential to keep in mind several medical factors. The overwhelming majority of complications in pregnancy cannot be predicted, nor can they be prevented. Some risk factors have been determined, but it remains nearly impossible to predict which individual women will develop complications. In fact, *all* pregnant women are at random risk for developing life-threatening complications. Evidence shows that 15% of all pregnancies result in complications. Most women who develop complications have been considered to be "low risk." The four complications that most often lead to death are haemorrhage, sepsis (infection), eclampsia (pregnancy - induced hypertension), and obstructed labour. Together with unsafe abortion, these complications are responsible for more than two-thirds of maternal deaths. The remaining third are due to indirect causes or an existing medical condition—usually malaria, anaemia, hepatitis, or AIDS—that is worsened by pregnancy or delivery.

III. Reducing the Incidence of Maternal Deaths—A Chain of Results

Learning from History

For many years, maternal mortality reduction programmes focused on two main components: antenatal care and the training of traditional birth attendants and community members to recognize complications during delivery. The intent of these programmes was that women with life-threatening complications would be transferred to a higher level of care in a timely fashion. Unfortunately, this strategy did not address several key aspects of the problem. Perhaps the most significant weakness of this approach was the failure to address the availability of care at higher levels of the system. Countries with high rates of maternal mortality nearly always have a dearth of facilities offering EmOC. Any programme that seeks to increase referrals to a higher level of care will fail if such services are not available.

Another weakness, as shown by many studies, is that traditional birth attendants simply do not have the skills to recognize complications, even when trained, because they often attend relatively few complicated deliveries during their "careers." They may also lack the authority to convince the family to transfer a labouring woman to a hospital. And, even in communities where traditional birth attendants are influential, they may still lack the skills to save women's lives in the event of a medical emergency.

Much of the current thinking about maternal mortality comes from observing countries that have been successful in dramatically reducing maternal mortality such as the United States and European countries in the 18th, 19th and 20th century[1]. In Sweden, a concerted effort was made in the late nineteenth century to promote skilled attendance at birth. Midwives were trained and deployed, resulting in a precipitous drop in maternal mortality. After World War II there was a second drop in maternal mortality in both Europe and North America. This was a direct result of the introduction of antibiotics, blood transfusions and readily available Caesarean sections. These interventions are effective in preventing most causes of maternal deaths: sepsis, haemorrhage, and obstructed labour.

[1] Maternal mortality ratios (i.e. the number of maternal deaths per 100,000 live births) in Sweden, Great Britain and the USA reached levels of 250–400 per 100,000 live births in the mid-19th-century. A previous drop from 800–1000 had occurred between 1750 and 1850 through the gradual increase in the proportion of births attended by skilled professionals, mostly midwives.

In several resource poor countries such as Cuba, Sri Lanka, Malaysia and Tunisia, the Western model of maternal mortality reduction has been replicated over the past 30–50 years. In these countries the establishment of national birth and death registers that include the causes of death enabled monitoring of maternal mortality trends. Analysis of improved vital statistics registers revealed the high toll of maternal deaths and brought about an awareness of the problem, which then led to an increase in political will and a swift legislative effort to improve access to skilled care at birth.

Box 1. Key features of successful maternal mortality reduction programmes.

- Consistent political commitment at the highest level
- Professionalisation of midwifery care
- Skilled attendance at 90% of deliveries
- Access to family planning/contraceptive services
- Access to quality Emergency Obstetric Care including medical technologies such as antibiotics, anticonvulsants and oxytocics
- Continuous service monitoring and quality improvement including maternal death audits

Box 1 highlights some key factors for the success of maternal mortality interventions currently implemented in both poor and rich countries.

How and When to Intervene

Programme planners and managers are concerned with planning and implementing maternal mortality reduction programmes that work and are most likely to achieve the desired impact.

The first strategy is to prevent unwanted pregnancies from occurring at all. Then, once a pregnancy has occurred, the focus should be on the critical and dangerous time of delivery and the immediate postpartum period. Experience shows that women who die in childbirth experienced at least one of the classic three delays illustrated in **box 2**.

Political will to reduce maternal mortality is essential, since maternal mortality requires a long-term commitment of funds, infrastructure development and appropriate policies. An influx of resources to maternal health is most effective when part of an effort to strengthen the entire health sector. Indeed, in countries that experience a decline in maternal mortality the common element has been the political commitment to strengthening the health sector as a whole

The Maternal Mortality Chain of Results (see **figure 1**) visualizes in a schematic fashion the key interventions required to reduce maternal mortality based on current knowledge of what works in maternal mortality reduction[2]. In this context, and considering a results-based approach to programme

[2] It should be noted that the chain of result depicted in figure 1 does not illustrate strategic interventions and activities necessary to achieve the outputs.

management, the figure illustrates a change process over time and the type of results (outputs[3]) that UNFPA funded programmes could be responsible for delivering. The figure clarifies that donor funded programmes have increasingly reduced influence on achievement of higher level results such as outcomes and impact due to many intervening factors external to the programme. Developing a chain of results indicating the possible process through which maternal mortality could be reduced is useful to guide both programme design and progress monitoring and is an essential first step in identifying effective indicators that allow managers to track change.

Box 2. The Three Delays

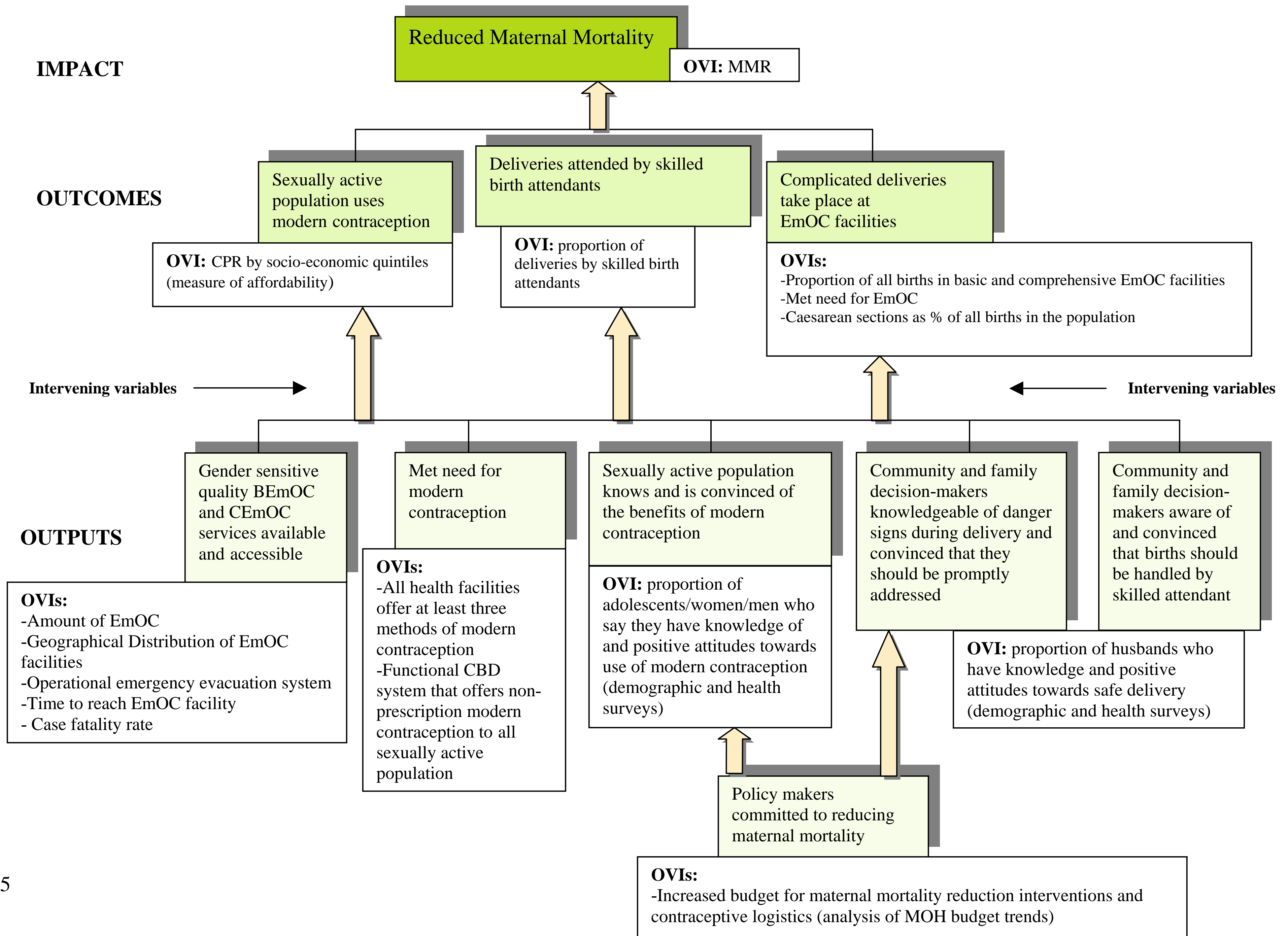
The first delay is the delay in deciding to seek care for an obstetric complication. This may occur for several reasons, including late recognition that there is a problem, fear of the hospital or of the costs that will be incurred there, or the lack of an available decision maker.

The second delay occurs after the decision has been made to seek care. This is a delay in physically reaching the care facility and is usually caused by difficulty in finding or paying for transportation. Many villages have very few transportation options and are connected by poor roads. Some communities have developed innovative ways of addressing this problem, including prepayment schemes, community transportation funds, and a strengthening of links between community practitioners and the formal health system.

The third delay is the delay in obtaining care once present at the facility. This is one of the most unfortunate issues in maternal mortality. Often, women wait for many hours at the referral centre because of poor staffing, prepayment policies, or difficulties in obtaining blood supplies, equipment or an operating theatre. The third delay is the area that many planners feel is easiest to correct. Once a woman has actually reached an EmOC facility many of the economic and socio-cultural barriers have already been overcome. Focusing on improving services in existing centres is a major component in promoting access to EmOC. Programs designed to address the first two delays (i.e. programmes that educate communities to recognise complications and encourage them to seek care, or programmes designed to improve transportation to a facility offering a higher level of care) are of no use if the facilities themselves are not adequate.

[3] The following definitions have been approved by the UN Task Force on Simplification and Harmonisation of which UNFPA is a member: **"Outputs** are the products and services that result from the completion of activities within a development intervention. **Outcomes** are the intended or achieved short-term and medium-term effects of an intervention's outputs, usually requiring the collective effort of partners. Outcomes represent changes in development conditions that occur between the completion of outputs and the achievement of impact. **Impacts** are the positive and negative long-term effects on identifiable population groups produced by a development intervention, directly or indirectly, intended or unintended. These effects can be economic, socio-cultural, institutional, environmental, technological or health and demographic."

Figure 1: Chain of Results for Maternal Mortality Reduction: Results and their Objectively Verifiable Indicators (OVIs)



UNFPA's three-pronged Approach to Improving Maternal Health

Based on the knowledge of what works described above, UNFPA has adopted a *three-pronged approach* to reducing maternal mortality complemented by policy level advocacy and behaviour change communication interventions. The "three prongs" are described below.

1. Family Planning

Meeting the existing demand for family planning services alone would reduce pregnancies in developing countries by 20% and maternal deaths and injuries by a similar degree or more. UNFPA's strategy has been refined over the past 30 years to ensure that family planning services are of high quality; that there is an adequate supply of a wide range of contraceptives and reproductive health supplies, including male and female condoms; and, that individual choice is respected. While access to family planning will do little to reduce maternal mortality *ratios* it does a great deal to reduce the overall rate of deaths related to pregnancy and unsafe abortions[4]. FP is a cost-effective means to lower maternal mortality rates by:
1) reducing the absolute number of complications due to fewer pregnancies; 2) reducing the incidence of abortion by averting unwanted and unplanned pregnancies; 3) averting pregnancies that occur too early, too late or too frequently during the woman's reproductive cycle, and those that are inadequately spaced.

2. Skilled Attendance at Birth

Most obstetric complications occur at the time of labour and delivery. It takes a skilled attendant to swiftly recognize life-threatening complications and to intervene in time to save the mother's life. **Box 3** illustrates what is meant by "skilled attendant." In spite of overwhelming historical evidence that the use of doctors, midwives and nurses in deliveries is a crucial factor in reducing maternal mortality, only 58% of deliveries worldwide currently take place in the presence of a skilled attendant.

Box 3. Who is a Skilled Attendant?

The term "skilled attendant" refers exclusively to people with midwifery skills (for example, doctors, midwives, nurses) who have been trained to proficiency in the skills necessary to manage normal deliveries and diagnose or refer obstetric complications

Ideally, skilled attendants live, in, and are part of, the community they serve. They must be able to manage normal labour and delivery, recognize the onset of complications, perform essential interventions, start treatment, and supervise the referral of mother and baby for interventions that are beyond their competence or not possible in that particular setting. Depending on the setting, other healthcare providers, such as auxiliary nurse/midwives, community midwives, village midwives and other health visitors, may also have acquired appropriate skills *if they have been specially trained*. These individuals frequently form the backbone of maternity services at the periphery, and pregnancy and labour outcomes can be improved by making use of their services, especially if they are supervised by well trained midwives.

There are many reasons for this discrepancy. One is simply a lack of skilled attendants. Another factor is a poor distribution of attendants, with most professionals preferring to remain in urban areas. UNFPA is seeking to address this

[4] A **maternal mortality *rate*** is defined as: pregnancy related deaths per 100,000 women aged 15–49 per year. A **maternal mortality *ratio*** is defined as pregnancy-related deaths per 100,000 live births.

Box 3. Cont'd – Who is a Skilled Attendant?

In developed countries and in many urban areas in developing countries, skilled care at delivery is usually provided in a health facility. However, birth can take place in a range of appropriate places, from home to tertiary referral center, depending upon availability and need, and WHO does not recommend any particular setting. Home delivery may be appropriate for a normal delivery, provided that the person attending the delivery is suitably trained and equipped[1] and that the referral to a higher level of care is an option.

[1] In many countries, TBAs have received training in order to promote safer birth practices, including clean delivery and avoidance of harmful practices. However, to fulfill all the requirements for management of normal pregnancies and births and for identification and management or referral of complications, the education, training, and skills of TBAs are insufficient. Their background may also mean that their practices are conditioned by strong cultural and traditional norms, which may also impede the effectiveness of their training.

Source: WHO/UNFPA/UNICEF/The World Bank, Joint statement on Reduction of Maternal Mortality, 1999.

problem by promoting the training of professionals and innovative programmes to retain them in the regions of greatest need. This includes providing incentives like housing and distance learning programmes to midwives and doctors working in rural and semi-rural areas, and promoting rotation systems with a mix of public and private practice. In addition, decentralization of training that is adapted to the local context may help to retain some skilled professionals in the rural areas, especially those in the intermediate categories such as auxiliary-nurse-midwife, family welfare visitor, or lady health worker.

3. Emergency Obstetric Care

Emergency obstetric care (EmOC) refers to a series of crucial life-saving functions, ideally performed in a medical facility, which can prevent the death of a woman experiencing the start of complications during pregnancy, delivery, or the post-partum period. EmOC is a medical response to a life-threatening condition and is not a standard for all deliveries. EmOC functions are often divided into two categories: (1) **basic EmOC**, which can take place at a health centre and be performed by a nurse, midwife or doctor, and (2) **comprehensive EmOC**, which usually requires the facilities of a district hospital with an operating theatre. The essential functions are listed in **table 1** below:

Table 1. Basic and Comprehensive EmOC Functions

Basic EmOC Functions Performed in a health centre without operating theatre	**Comprehensive EmOC Functions** Requires an operating theatre and is usually performed in district hospitals
▪ Intravenous antibiotics ▪ Intravenous oxytocics ▪ Intravenous anticonvulsants ▪ Manual removal of placenta ▪ Assisted vaginal delivery ▪ Removal (by aspiration) of retained products	All six Basic EmOC functions plus: ▪ Caesarean section ▪ Blood transfusion

The basic EmOC functions consist of administering medications by injection. These are usually antibiotics to treat an infection, anticonvulsants to treat a seizure, or oxytocics to treat excessive bleeding

by helping the uterus to contract. Assisted vaginal delivery refers to the use of a vacuum extractor preferably to the use of forceps. A placenta that has failed to be expelled naturally can cause both excessive bleeding and infection. The same is true for retained products of incomplete miscarriage or abortion. Removal of placenta can usually be done manually. Removal of retained products can be done under light anaesthesia and usually requires a minor surgical procedure like a manual vacuum aspiration.

Comprehensive EmOC refers to the ability to perform more complex surgical interventions such as a caesarean section to relieve obstructed labour. It also refers to the ability to administer a blood transfusion to treat life-threatening haemorrhage. Blood must be safely collected, screened and stored; therefore, a complete blood bank is required.

Improving the availability of services is a crucial first step to increase access to EmOC. In many cases only limited inputs are needed to expand existing health facilities and enable them to provide EmOC services. These interventions may include: renovating existing operating theatres or equipping new ones; repairing or purchasing surgical and sterilization equipment; training doctors and nurses in life-saving skills; and improving health services management. Health service management improvements include adequate staffing of health facilities, a steady supply of drugs and other supplies, maintenance of the health infrastructure and equipment, a system allowing 24-hour readiness, and fair health-care service pricing policies. It also means promoting monitoring and evaluation, and constant improvement in the quality of services.

IV. Using Output and Outcome Indicators to Monitor Progress

Introduction

It is difficult to determine whether maternal mortality programme interventions have been successful, as impact indicators such as maternal mortality rates and ratios are often unavailable. Reasons for this unavailability include the poor quality of vital statistics reported by many developing countries and the fact that, when recorded, maternal deaths are often not distinguished from deaths by other causes[5]. It is therefore recommended that programmes rely on internationally agreed upon indicators: the MDG indicator of skilled attendance at birth and the six "UN EmOC process indicators" agreed upon by UNICEF, WHO and UNFPA[6]. These indicators describe the functionality of health services and the capacity of health systems to address life-threatening complications arising during pregnancy and delivery. It is recommended to also use behaviour change and policy-related indicators to monitor the demand for EmOC and the policy environment.

[5] Other reasons include: (1) estimates of maternal mortality are based on measurement of these ratios in samples of the population through expensive surveys with wide confidence intervals; (2) only retrospective data can be obtained so it is difficult to measure recent progress; and, (3) maternal mortality ratios may provide an overall national picture but lacks sufficient detail for local level decision-making.

[6] Maine, Deborah et al. *Guidelines for Monitoring the Availability and Use of Obstetric Services*. UNICEF, WHO, UNFPA. August 1997.

Current experiences in using the UN Process Indicators in Malawi[7] concluded that although the UN EmOC Process Indicators have limitations, this monitoring system has provided information vital to health providers, managers and policy makers that enabled them to increase the availability, distribution and quality of services.

Box 4 highlights experiences in using EmOC process indicators for obstetric service baseline assessments.

Box 4. Findings from obstetric service baseline assessments

In 2000-2001, UNFPA country offices in Cameroon, India, Morocco, Mozambique, Nicaragua, Niger, and Senegal carried out assessments of obstetric services using EmOc process indicators.

Common trends emerge from these surveys: for instance, the real challenge is to expand availability of basic EmOC facilities; the geographic distribution of facilities is skewed and much more effort is needed to make services accessible in rural areas, a problem often compounded by poor roads and lack of transportation; and the case fatality rate cannot be used alone as an indicator of poor quality of services at the facility. Late arrival to the facility rather than quality of services could be the reason for a maternal death.

Source: International Journal of Obstetrics and Gynecology (IJGO) in 2002 and 2003, UNFPA /AMDD Making Safe Motherhood a Reality in West Africa – Using Indicators to Programme for Results. 2003.

The DOPA[8] indicators and corresponding means of verification (MOVs) outlined in **figure 1** and **table 2** have become important tools to monitor UNFPA's contribution to reducing maternal mortality. For each indicator, a precise definition of how the indicator is constructed, the minimum and/or maximum levels required, and the sources of data used are provided on the following pages.

[7] Hussein J, Goodburn E A, Damisoni H, Lema V and Graham W. (2001). *Monitoring obstetric services: putting the 'UN Guidelines' into practice in Malawi: 3 years on." Int'l Journal of OB & Gyn 75, 63-73.*

[8] **DOPA**: Direct, Objective, Practical & Adequate. For further explanation, see The Programme Manager's Monitoring and Evaluation Toolkit Tool 6, Part I: Programme Indicators—The Basic Concepts.

Table 2. Indicators for monitoring EmOC in Maternal Mortality Reduction programmes

Indicator	Optimal Levels
1. Proportion of deliveries assisted by skilled health personnel[9]	According to ICPD: **60% of deliveries** According to the MDGs: **90% of deliveries** There is usually a national target.
2. Amount of Basic and Comprehensive EmOC facilities available per population	For every **500,000 population**, there should be: **- At least 4 Basic** EmOC facilities **- At least 1 Comprehensive** EmOC facility
3. Geographical distribution of EmOC facilities (sub-indicators: time to reach EmOC facility and proportion of households within 2 hours of Basic EmOC facility)	Ideally, basic EmOC facilities should be located so they can be accessed within a maximum of 2 hours. Comprehensive EmOC facilities should be accessible within a maximum of 12 hours.
4. Proportion of all births in Basic and Comprehensive EmOC facilities	**At least 15% of all births** in the population should take place in basic or comprehensive EmOC facilities
5. Met need for EmOC: Proportion of women with obstetric complications who are treated in EmOC facilities	**100%** of women with obstetric complications should be treated in EmOC facilities.
6. Caesarean sections as a proportion (%) of all births	Caesarean sections should account for **no less than 5% and no more than 15%** of all births (C-sections performed for emergency purposes only)
7. Obstetric Case Fatality Rate	The case fatality rate among women with obstetric complications in EmOC facilities should be **less than 1%** (indicator best interpreted at facility level)

Source: Except for the first indicator, the others are adapted from Maine, Deborah et al. Guidelines for Monitoring the Availability and Use of Obstetric Services. UNICEF, WHO, UNFPA. August 1997

Table 3 provides an overview of data required to construct the indicators.

Table 3. Types of Data Used to Construct Indicators

Type of Data	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5	Indicator 6	Indicator 7
Population Size	•	•	•	•	•	•	
Birth Rate	•			•	•	•	
Number of births assisted by skilled birth attendants	•						
Health Facility Data: EmOC signal functions		•	•	•			
Number of births	•			•		•	
Number of complicated cases in EmOC facilities					•		•
Number of C-sections						•	
Number of maternal deaths (direct causes)							•

Source: Adapted from Distance Learning Courses on Population Issues: Course 6, Module 2. UNFPA. 2002.

[9] This indicator, proposed to monitor the MDG No.5, is not part of the 6 UN EmOC process indicators originally proposed in the referenced source.

Indicator 1: Proportion of deliveries assisted by skilled birth attendants

Indicator 1, which is not included in the six "UN EmOC process indicators", should be used to report on the Millennium Development Goal of reducing maternal mortality at both global and national levels. It is irrelevant whether the delivery has taken place at home or in a health facility. It may be difficult to collect accurate data regarding skilled attendance from the community due to recall bias (women responding to surveys may have difficulty identifying the skills of their attendant and may not know the exact training their attendant had received).

Indicator 1	Definition	Numerator	Denominator	Optimal Level
Proportion of deliveries assisted by a skilled attendant (regardless of the place of delivery)	Proportion of all deliveries assisted by either a qualified midwife, nurse midwife or trained doctor capable of performing the six basic EmOC functions	Number of deliveries assisted by a skilled birth attendant	Total number of expected deliveries in the catchment area in one year (provided by the simple calculation of *crude birth rate* multiplied by *estimated population in the area* (based on last census and updates))	According to the MDGs: 90% of deliveries
MOV: Numerator: demographic and health surveys; **Denominator:** census information				

Indicator 2: Amount of functional Emergency Obstetric Care facilities

It is essential to assess the availability of facilities for a given population in order to determine if they are sufficient. In general, research has shown that 15% of pregnancies will result in life threatening complications. Based on this figure and knowing the number of expected births in a given population, it is easy to determine the number of women expected to need EmOC services. The standard of four basic and one comprehensive EmOC facility per 500,000 persons has been established by observation in several developing countries. Application of this standard may vary according to the population density, the nature of the geographical terrain, the time to reach facilities from scattered homes, and other variables. More important is the qualification of a facility as basic or comprehensive EmOC facility. Clearly a facility can only be considered a "basic EmOC" facility if all six basic functions have been performed in the past three months. Similarly, a facility can only be considered a "comprehensive EmOC" facility if all six, plus the extra two, functions have been performed in the past three months. Use of this service indicator requires periodic investigations to ensure that facilities labelled as basic and comprehensive are actually performing the appropriate functions.

Indicator 2	Definition	Numerator	Denominator	Optimal Level
Amount of Basic EmOC facilities	Number of health facilities having provided the 6 basic EmOC functions in the last 3 months, per 500,000 population	Number of facilities having provided the 6 basic EmOC functions in the last 3 months in a given area	Population of catchment area	4 units per 500,000 population
Amount of Comprehensive EmOC facilities	Number of health facilities having provided the 6+2 EmOC functions in the past three months, per 500,000 population	Number of facilities having provided the 6+2 EmOC functions in the past three months	Population of catchment area	1 unit per 500,000 population
MOV: Numerator: supervision reports; facility surveys; **Denominator:** census information				

Indicator 3: Geographic Distribution of EmOC facilities

Simply having enough EmOC facilities is not sufficient; their geographic distribution must also be considered. If all comprehensive EmOC facilities are clustered in urban areas, a large number of women—especially those living in rural areas—will be unable to access services in a timely manner. Unlike the other indicators in this document, Indicator 3 can only be measured by performing spatial analysis with the use of a map or an interactive Geographic Information System (GIS).

In many developing countries, the terrain is rough and communications, roads and transportation are poor. Traditionally, distance has been the indicator used to assess physical service accessibility. In actuality, the time it takes to reach an EmOC facility is a more accurate indicator of physical access. Travelling even relatively short distances may take a very long time. Often the journey to a health-care facility is made on foot, horseback or by donkey cart. Therefore, a useful proxy indicator may be the proportion of households within a given travel time for a woman to reach a basic or comprehensive EmOC facility. Optimally, all women should live within two hours of a basic EmOC facility. This number was selected as a maximum limit because haemorrhage, the most rapidly fatal complication of pregnancy, can kill a mother in two hours. In order to save the maximum number of lives, facilities must be able to treat pregnant women within this timeframe. This complication can be treated at a basic EmOC facility, though some cases may need to be referred to a comprehensive facility for blood transfusions. Therefore, an ideal geographic distribution of facilities would ensure that all women live within two hours of a basic EmOC facility and twelve hours of a comprehensive one. This is clearly an ambitious goal, involving improvements in communication and transportation systems and roads.

Indicator 3	Definition	Mode of Measurement	Optimal Level
Geographic distribution of EmOC facilities	Assessment (by map or GIS), or actual measurement, of physical accessibility to EmOC facilities	Spatial analysis conducted with use of GIS, or proportion of households within 2 hours of a basic EmOC facility	Ideally, all basic EmOC facilities are within two hours travel time and comprehensive EmOC facilities are within 12 hours travel time for women of reproductive age
MOV: supervision reports; accreditation meetings; GIS maps			

Indicator 4: Proportion of all births in functional EmOC facilities

This service indicator measures actual utilization of EmOC facilities. Once it is confirmed that appropriate facilities exist, provide the appropriate services (six or eight functions) and are evenly distributed, it must be determined whether patients are, in fact, utilizing those services. If 15% of women are estimated to experience complications, then at least 15% of births should be taking place in EmOC facilities. Obviously, this crude indicator does not allow for the assessment of which births take place in EmOC facilities. It is conceivable that only non-complicated births are taking place in EmOC facilities and that all complicated ones take place in homes or elsewhere. This indicator should therefore be combined with the indicator of met need for EmOC explained below.

Indicator 4	Definition	Numerator	Denominator	Optimal Level
Proportion of deliveries taking place in EmOC facilities	Proportion of all deliveries taking place in functional EmOC facilities	Number of births taking place in functional EmOC facilities in the catchment area within one year	Total number of expected deliveries in the catchment area in one year	At least 15% take place in a EmOC facility (hoping to "catch" the maximum proportion of complicated cases…)
MOV: Numerator: demographic and health surveys; health service survey; health MIS; **Denominator:** census information				

Indicator 5: Met Need for EmOC

Met need for EmOC means ensuring that all women with complications are appropriately treated. The goal is that all (100%) women who experience complications are treated at the appropriate level of care. Simply establishing that at least 15% of births are taking place in EmOC facilities does not ensure that all women with complications are being served. Mechanisms should be in place at all EmOC facilities to record (a) whether a woman was actually experiencing a complication, and (b) the type and severity of

that complication. The UN Guidelines of 1997 offer a list of seven complications that must be adhered to when assessing this indicator. Some women may choose to have normal deliveries in EmOC facilities, so the percentage of all births taking place in EmOC facilities may include both normal and complicated deliveries. The percentage of complicated deliveries among those births will vary between rural and urban populations, and at public and private facilities.

Indicator 5	Definition	Numerator	Denominator	Optimal Level
Met need for EmOC	Proportion of women with complications who are treated in EmOC facilities	Number of women admitted to EmOC facilities with one or more of the seven complications described in the UN Guidelines of 1997	Total number of expected deliveries with complications (calculated as 15% of expected births in the catchment population)	All (100%) women with obstetric complications are treated in EmOC facilities
MOV: Numerator: health MIS; maternity admission registers; **Denominator:** census information				

Indicator 6: Proportion of Caesarean Sections

The proportion of Caesarean sections is a useful service indicator for many reasons. One is that it is likely that C-sections will be adequately recorded in hospital records. Studies indicate that 5% of all births will have complications (e.g. obstructed labour) that require a C-section to ensure maternal survival. A minimum of 5% of births should, therefore, be performed by C-section. This is not an infallible measure, however. In many countries, C-sections are performed in the absence of maternal life-threatening complications for reasons related to the newborn, or for profit, patient preference or hospital protocol. It is important to examine hospital records to determine the number of C-sections performed on women who were experiencing complications. To ensure that C-sections are not performed needlessly (since non-necessary operations carry a risk and have consequences for future births), a maximum level of 15% of all deliveries has been established as a standard.

Indicator 6	Definition	Numerator	Denominator	Minimum/ Maximum Level
Proportion of C-sections	Proportion of C-sections to all births in the population	Number of C-sections in all EmOC facilities in the catchment population in one year	Total number of expected deliveries in the catchment area in one year	At least 5% and not more than 15% of all deliveries
MOV: Numerator: demographic and health surveys; health MIS (facility records); health service surveys; **Denominator:** census information				

Indicator 7: Obstetric Case Fatality Rate

The final standard service indicator is the obstetric case fatality rate at EmOC facilities. This is a measure of the quality of services at each facility. It is it not calculated only for comprehensive EmOC facilities.

It is measured as the number of women with pregnancy-related complications who die in an EmOC facility divided by the number of women with an obstetric complication treated at that facility. In order to obtain a national or regional obstetric case fatality rate, it is necessary to aggregate the data provided by each EmOC facility. In large hospitals, it is possible to disaggregate the obstetric case fatality rate for each type of complication (each complication carries a different type of treatment, which can be assessed separately). Ideally, each facility should have an obstetric case fatality rate of 1% or less.

This measure is most useful to track progress in the quality of services within a certain facility over time. However, it does not take into account the condition of the patients upon arrival at the facility. This makes it difficult to make comparisons among facilities in drastically different locations, or those that serve dramatically different populations. Careful interpretation of facility records is necessary if record keeping at the comprehensive EmOC facility is poor. Additionally, one should be aware that the obstetric case fatality rate may be low if it is practice at the given facility to send women with complications home to die, or if women with severe complications are transferred to intensive care units and lost to follow-up.

Indicator 7	Definition	Numerator	Denominator	Optimal Level
Obstetric case fatality rate in EmOC facilities	Proportion of women with an obstetric complication who die in EmOC facilities	Number of direct obstetric deaths in EmOC facility(ies) in one year	Number of obstetric complications in the same facility(ies) in one year	Obstetric case fatality rate should be less than 1%
MOV: Numerator: facility service statistics; maternal mortality audit; **Denominator:** census information				

A number of public health researchers have questioned the relevance of the indicator of "skilled attendance at birth" and the UN EmOC process indicators to track maternal mortality. **Box 5** provides a summary of some of their concerns.

Box 5. Process Indicators for EmOC: How Useful Are They?

Addressing Utilization

Proportion of births attended by skilled health personnel: While this indicator reflects national trends in **access** to skilled care at birth, it does not indicate which specific components of the health system need strengthening. Is it the care provided on the spot, at home or at the first referral level, or at the second referral level? It is also difficult to obtain information on the "skills" of the birth attendant when interviewing patients or relatives during community-based surveys.

Proportion of C-sections: Population-based estimates of the proportion of C-sections performed may reflect the extent to which pregnant women access EmOC services. However, as C-section proportions rise, it may be possible that the majority of these deliveries are performed to avoid problems, whether they truly exist or not. It would be important to differentiate C-sections performed in emergency from those performed for convenience.

Proportion of births in EmOC facilities: The 1997 joint UNICEF/WHO/UNFPA guidelines suggest that at least 15% of all women should deliver in basic and comprehensive EmOC facilities. While this indicator can be useful in determining utilization, the numerator may contain women with a normal delivery, and not necessarily those experiencing emergency obstetric complications. Further, the assumption that 15% of pregnant women are bound to experience obstetric emergencies is not supported by empirical evidence.

Addressing Met Need

Proportion of all women with complications who are treated in EmOC facilities: This indicator has widely been accepted as an indicator of "met need." However, before using this indicator, the following four issues must be addressed: (1) it is necessary to define "complications"; (2) while abortion and ectopic pregnancy may be important causes of maternal death, they are more difficult to incorporate in the list of obstetric complications because they tend to appear in the earlier stages of pregnancy; (3) it has never been empirically verified that 15% of all births are "complicated," nor is there any reason to believe that the incidence of obstetric complications is constant across population groups (see above); and, (4) a limitation of this indicator is the assumption that EmOC for the broad range of complications specified can only be delivered in health facilities. If skilled attendants are present during home births, they may perform basic functions, which will prevent death, and contribute to a decline in maternal mortality rates.

Source: adapted from Ronsmans C, Campbell O, Mc Dermott J and Koblinsky M (2002) "Questioning the indicators of need for obstetric care "Bulletin of the World Health Organization, 80(4) 317-324.

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This tool is subject to constant improvement. We welcome any comments and suggestions you may have on its content. We also encourage you to send us information on experiences from UNFPA-funded and other population programmes and projects that illustrate the issues addressed by this tool. Please send your inputs to:

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