Distance Learning System on Population Issues

Course 6

Reducing Maternal Deaths: Selecting Priorities, Tracking Progress

MODULE 2:
Using Indicators to Assess Progress in Reducing Maternal Deaths

ACKNOWLEDGEMENTS

Theses modules were written by Nadia Hijab, Author and Development Consultant, New York with input from the following people :

- Marc Derveeuw, Regional RH/FP management adviser, UNFPA CST Harare,
- Mamadou Diallo, Regional Adviser on RH/FP, UNFPA CST Dakar;
- France Donnay, Acting Chief, Reproductive Health Branch, Technical Support Division, UNFPA New York;
- Elizabeth Goodburn, Reproductive Health Advisor, Centre for Sexual and Reproductive Health, John Snow International (UK), London;
- Jean-Claude Javet, Project Adviser, Reproductive Health Branch, Technical Support Division, UNFPA New York;
- Deborah Maine, Director, Averting Maternal Death and Disability Program, Columbia University, New York;

The production of this course was supported by the Averting Maternal Death and Disability (AMDD) Program of the Columbia University Mailman School of Public Health with funds from the Bill and Melinda Gates Foundation.

The modules in this course are the result of contributions by many people whose names and institutional affiliation are recorded below. The course is part of a joint effort by the United Nations Population Fund (UNFPA) and the United Nations System Staff College (UNSSC) to extend significantly the scope and range of training and learning on population issues world wide by the use of distance learning. It is supported by a generous grant from the United Nations Foundation (UNF) and a contribution in kind from the Government of France.

Responsibility for the implementation of the project lies with a project team located at the UNSSC in Turin, Italy; Arnfinn Jorgensen-Dahl, Project Manager, Laurence Dubois, Project Officer, and Martine Macouillard, Project Secretary, with extensive consultative contributions from two staff members of the Open University in the United Kingdom, Glyn Martin and Anthony Pearce.

We are also grateful for overall support from the Technical Support Division and the Internal and External Relations Division of UNFPA, New York and the UNFPA Country Support Teams.

Cover design and layout: Multimedia Design and Production – International Training Centre of the ILO – Turin, Italy
Photos: Nancy Durrell Mc Kenna, FAO, ILO, Alberto Ramella, Giò Palazzo.
Photos on pp. 2, 8, 12, 16, 25, 26, 27, 28, 29, 32 and 38 taken by Czikus Carriere on behalf of AMDD.

MODULE 2:
Using Indicators to Assess Progress in Reducing Maternal Deaths

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Section 5

Introduction

This is the second module of our course on maternal deaths. The full course consists of three modules. This module will provide you with the tools to assess both the extent of the problem as well as progress towards a solution. It will take you about 14 hours to cover the material in these pages.

You will remember that, in Module 1, I introduced you to the reasons for the continued problem of maternal deaths. When you get to Module 3, you will learn how to ensure that the problem of maternal deaths is targeted through national policies and programmes. Overall, it will take you about 40 hours to cover the entire course.

By the end of this module, you will be able to use the indicators issued by the United Nations Children's Fund (UNICEF), the World Health Organization (WHO), and the United Nations Population Fund (UNFPA), in order to determine what steps need to be taken to reduce maternal deaths in your country or in a specific province or district, and to assess progress towards addressing the problem.

In addition, you will understand some of the methodological issues relating to the measurement of maternal mortality. You will be able to define many of the terms used, and to explain the difference between impact indicators and Process Indicators. You will also be able to show why impact indicators are not helpful for programme design and monitoring.

You may think it odd to study tools that are used for monitoring, which you will be doing in this module, before addressing policy and programme design to reduce maternal deaths, which is the subject of the next module. The reason is that these tools are based on hard data, and they are useful for both design and monitoring. By becoming familiar with them at this stage, you will be better able to ensure that policies and programmes flow from concrete data.

I have included some practical exercises in the text so as to give you an opportunity to work through the material in ways that would be relevant to your work. I have also devised a number of self-assessment questions (SAQs) so that you can test yourself on how well you have mastered the material. Suggested answers to these SAQs are given in the back of this module.

Aim and Objectives of Module 2

Aim:

Use Process Indicators to measure progress in reducing maternal death

Objectives:

At the end of this module, you will be able to:

1. Define the following terms: indicators, impact indicators, Process Indicators, Basic Emergency Obstetric Care, Comprehensive EmOC, Met Need for Emergency Obstetric Care, case fatality rate, needs assessment, and participatory group discussions.
(SAQs 1, 2, 3)
2. Understand the issues involved in measuring maternal death. (SAQ 1)
3. Explain the difference between impact and process indicators. (SAQ 2)
4. Give the reasons why using impact indicators for monitoring interventions to reduce maternal deaths is not practical. (SAQs , 5)
5. Give examples of the questions that can be answered by using Process Indicators. (SAQs 6, 9)
6. Use Process Indicators to choose appropriate intervention strategies. (SAQs 7, 8, 10, 19, 20)
7. Use Process Indicators to track progress in reducing maternal deaths.
(SAQs 13, 16, 17, 18, 21, 22, 23, 24, 25)

Section 1: Measuring Progress in Reducing Maternal Deaths

1.0 Introduction

There are two main questions relating to the measurement of maternal deaths: why measure it and how to measure it. In this section, I am going to provide you with some of the reasons **why** planners and programme managers need to measure maternal deaths.

I will then show you **how** researchers and others have tried to measure maternal mortality over the years. I will define the terms used for two different ways of measuring maternal mortality: impact indicators and process indicators. I will then introduce the UN Process Indicators.

1.1 Why Measure Maternal Deaths?

Why do planners and programme managers wish to measure the problem of maternal deaths, or, indeed, any other problem? First, of course, they want to identify the extent of the problem. If the problem is not too serious, then the public's money and the planners' time would be better spent on more serious issues.

Second, they need accurate information to plan appropriate policy and programme interventions; otherwise, the money and time invested will be addressing the wrong issues. And, third, they need to know when progress is being made as a result of the plans and programmes they have put in place. If progress is not being made, then efforts will need to be redirected and refocused.

Discussions around the whole issue of measuring social problems - as well as the progress of nations in addressing these - reached a crescendo during the last decade of the 20th Century. The discussion was propelled by the series of international conferences that took place during the 1990s, on issues like children (New York, 1990), the environment and development (Rio, 1992), human rights (Vienna, 1993), population and development (Cairo, 1994), social development (1995), women

(Beijing,1995), shelter (Istanbul, 1996), and food security (Rome, 1997).

Governments realized that although they had a good sense of the extent of problems like poverty, disease and illiteracy, they had far weaker tools when it came to measuring progress through programme interventions.

Accordingly, donor countries, development agencies, and developing countries began to invest in tools to measure the impact of the funds they allocated to address different problems. Terms like "indicators of success" and "results-based management" became the bread and butter of development workers.

Box 1

Indicators help to determine the extent to which a programme or project is achieving the expected results. They are a means of measuring what actually happened against what was planned, in terms of quantity, quality, and time.

The search for appropriate measures was all part of a drive for accountability. Governments in developing and developed countries alike began to see the importance of accounting to the public in their countries about how public funds were being used - whether these funds came from taxes, community contributions, donor contributions, foreign loans or other sources.

Indicators are a way to show planners and programme managers if they're on track, or whether they need to redirect efforts, or to invest more resources. Indicators are constructed using a set of relevant data. Taken together, the data provide an indication of progress, or lack of it. I will return to the kind of data that are necessary to measure progress regarding maternal death in Section 2.

The general background I have set out above is part of the background to the specific problem of maternal death. You will remember that, in Module 1, I mentioned that the extent of the problem was highlighted as a source of major international concern in 1987, when the Safe Motherhood Conference was held in Nairobi.

It was estimated that nearly 515,000 women, the vast majority of whom were in developing countries, died each year as a result of a pregnancy-related cause. (WHO/UNICEF/UNFPA, 2001).

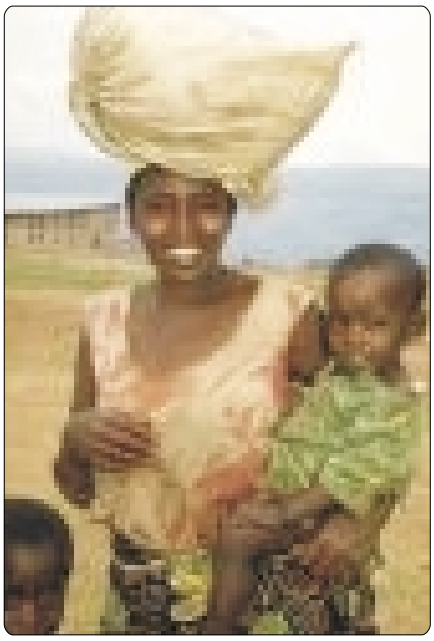
At the World Summit for Children in 1990, a target was introduced: to reduce maternal mortality in developing countries by half between 1990 and 2000. The target was reaffirmed at the International Conference on Population and Development in Cairo in 1994, and at the Fourth World Summit on Women in Beijing, in 1995.

During these conferences, governments set a number of other social goals and targets and identified the importance of indicators to track progress towards resolving these problems. See, for example, Box 2 for the statement made in the Plan of Action adopted World Summit for Children in 1990.

Box 2

Each country should establish appropriate mechanisms for the regular and timely collection, analysis and publication of data required to monitor relevant social indicators…. which record the progress being made towards the goals set forth in this Plan of Action and corresponding national plans of action. [paragraph 34(v)]

In other words, each government would find ways to collect data about the situation, so as to construct indicators and monitor progress towards the ultimate goal of, in our case, reducing maternal deaths. To enable the world as a whole to record progress, the data collected would need to be comparable across countries.



In the five year review of progress in implementing the goals of the Population and Development Conference (ICPD+5), the United Nations General Assembly endorsed a number of actions regarding maternal mortality, including "access to quality obstetric care and well-trained staff to attend deliveries" (Key actions, chapter IVC).

In Module 1, you looked into the reasons for the continued high incidence of maternal death in developing countries. You learned that the majority of deaths were due to direct medical causes which require emergency obstetric care (EmOC). I showed how, where EmOC was available and used, then women's lives could be saved, and how the absence of EmOC was responsible for the continued high number of deaths.

I noted that, while many programmes to promote community health had been introduced in developing countries, these did not specifically address the central issue of EmOC. In recent years, there has been more understanding of the central role of EmOC, and specific programmes are now being implemented to make adequate services available and to ensure that women use them. The question remains: how is it possible to measure the extent of the problem, or the success or failure of interventions to address it? This is the topic of the next section.

1.2 How Can You Measure Progress Towards Reducing Maternal Deaths?

There are two ways to measure progress in efforts to reduce maternal deaths. The first is by using impact indicators, and the second is by using process indicators. Impact indicators show changes in a given event (such as maternal death), while process indicators show changes in the activities that lead to the event. These two types of indicators are used in areas other than maternal death.

Box 3

Impact indicators of maternal mortality show changes in maternal deaths.

Box 4

Process indicators of maternal mortality show changes in those activities or circumstances that are known to contribute to or to prevent maternal death.

Let me explain a little more about each. I described some impact indicators in Module 1. In fact, I introduced you to three impact indicators: the maternal mortality ratio, the maternal mortality rate, and women's lifetime risk. These are three ways to express changes in the deaths themselves. This sounds good. In theory, repeated measurements over time could be used to monitor trends in maternal death, and help us measure progress in reducing maternal deaths. But in practice? I'll return to this question in Section 2.

As for process indicators, let me give you an example from another health problem, infant mortality. You know that immunization during infancy can prevent certain life-threatening diseases, such as measles. Deaths from measles are difficult to count. Therefore, efforts to evaluate progress usually focus on the process (proportion of children who have been immunized) rather than on the impact (death rates due to measles).

If, for example, a target has been set in an action plan to immunize all children in a province, and programmes have been shown to do so, then planners and programme managers can be reasonably certain that they have acted to prevent the majority of deaths from measles.

Similarly, since we know from Module 1 that EmOC is central to reducing maternal deaths, then indicators that give us information about whether EmOC is available or not will tell us if we are on track in reducing maternal deaths. Let me give you some examples, drawing on something you and I have studied together before. This is the case of the population of Matlab in Bangladesh, which I set out in some detail in Module 1 of this course.

In Matlab, EmOC services were becoming more broadly available to the population, both through a special programme intervention in half the area, as well as through government and private sector facilities available to the whole area.

This is a fact that is easily available to me. I also know that, by 1990, about half the population could reach health facilities providing EmOC services within two hours. (You will remember that the fastest kind of emergency obstetric complication - postpartum haemorrhage - is estimated to take about two hours on average to result in death).

So, if I am a planner, I already have two indications about changes in the situation just from this information. The first indicator is that some functioning EmOC facilities exist. And the second indicator is that these facilities are well distributed in geographical terms, as far as half the population is concerned. I know this is good news, because I know that EmOC is central to reducing maternal deaths. These are two of the process indicators to monitor progress in reducing maternal deaths.

Now, of course, as a planner I will need some other process indicators to know if women's lives are being saved. I will need something that tells me whether women are using the facilities. If I find out they are not using the facilities, I will try to find out why, and address that issue through my programme interventions.

I will also need an indicator to tell me what kind of care women get when they reach the facilities. If I find out they are still dying at the facility, then I will look into the standard of care, and then address this through my programme.

A set of six such indicators were in fact issued in *Guidelines for Monitoring the Availability and Use of Obstetric Services* (UNICEF, 1992), and refined in a new edition (UNICEF/WHO/UNFPA, 1997). These UN Process Indicators were field tested in Bangladesh, India, and Morocco, and are now being used in dozens of countries around the world. Much of the material in this Module is drawn from the *Guidelines* (see Further Reading), and I will be referring to them frequently, using the term Process Indicators.

I will return to the subject in more detail in Sections 2 and 3. All I wanted to do at this point was give you a sense of what process indicators are and how they differ from impact indicators. To sum up, impact indicators measure the changes in maternal deaths, while process indicators measure the changes in the circumstances that can lead to or prevent maternal deaths.

You probably have many questions to ask. In particular, how useful are these two different sets of indicators for your work? Which indicators really help to identify the extent of the problem, plan appropriate interventions, and monitor progress in implementing programmes and projects?

In Section 2, I will answer these questions by reviewing the pluses and minuses of each set of indicators: impact indicators vs. Process Indicators. But first, a few SAQs. Attempt each one before looking at the answers given at the back of this module. In this way you will be able to tell if you have understood the preceding material!

SAQ 1

Why are data important to address problems like maternal death?

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SAQ 2

What is measured by impact indicators? What is measured by process indicators? Give one example of each.

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SAQ 3

(Revision) Describe what is measured by each of the following: maternal mortality ratio, rate, and lifetime risk.

Maternal mortality ratio.....

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Rate. .....

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Lifetime risk .....

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1.3 Summary of Section 1

In this section, you learned why planners and programme managers need to know about the extent of the problem of maternal deaths, and ways they use to find out. You also learned that indicators are useful to measure the extent of a problem, to set priorities, design programmes and monitor interventions. The international community now attaches great importance to the gathering and analysis of data to monitor progress regarding social problems. You learned about two types of indicators, impact indicators and process indicators.

Section 2: Choosing the Right Indicators

2.0 Introduction

In this section, I am going to describe some of the data needed to construct impact indicators as well as Process Indicators. I will refer to the problems that arise in collecting the data for impact indicators. These include: under-reporting of maternal deaths, misreporting the cause of death, and frequency of deaths. I will also describe the set of Process Indicators that will help assess the problem and track programme progress in addressing it.

2.1 Data Problems Regarding Impact Indicators

I mentioned above that impact indicators tell us about the changes in an event. I gave you three examples of impact indicators: the maternal mortality ratio, the maternal mortality rate, and the lifetime risk.

The data needed to calculate each of these impact indicators can be obtained from government records, and from different kinds of household surveys. Only a few pieces of information are needed to calculate these indicators:

- To calculate the maternal mortality ratio, you need three figures: the number of maternal deaths in the population, the crude birthrate (the births per 1,000 population per year), and the size of the population.
- For the maternal mortality rate, you just need two figures: the number of maternal deaths in the population and the number of women aged 15 to 49.
- For the lifetime risk, you need four figures: the number of maternal deaths in the population, the crude birthrate, the total fertility rate, and the size of population.

You will have noted that one figure is common across all three impact indicators: the number of maternal deaths. The problem is, this figure is very difficult to obtain. And this fact goes to the heart of the problem of calculating impact indicators in ways that are useful to set priorities for plans, as well as to design and

monitor programmes. Let me give you examples of the kinds of problems that arise when efforts are made to measure maternal deaths.

The first problem is underreporting. In most developing countries, death usually takes place at home or on the way to the hospital. This is especially true of people living in poverty. Thus, many deaths are simply not recorded. This is clearly shown when researchers compare the number of deaths recorded by hospitals to those occurring in the community. For example, in a study in India, in 1984-85, only18% of maternal deaths in rural areas were recorded, and only 69% of deaths in urban areas (Bhatia, 1985). The discrepancies are revealed when researchers examine the official records and then conduct house-by-house surveys in the community.

The second problem is misreporting of the cause of death. In many cases, death is recorded, but it is not recorded as a maternal death. In Module 1, I quoted the WHO definition of a maternal death. A maternal death is one that is caused by a complication related to a woman's pregnancy. This complication can occur while she is pregnant, or up to 42 days after the pregnancy ends.

Thus, it is not enough to know that a woman has died, but also the cause and timing of death to classify this as a maternal death. By contrast, if a child dies, all you need to know is the age of the child to classify this as infant mortality. The problems in classifying deaths as maternal deaths in developing countries include:

- Even where records exist, the cause of death is often missing.
- Women may die of obstetric complications in emergency wards or medical wards, as opposed to maternity wards, and their deaths may not be reported as maternal deaths.
- Death from complications of abortion is a maternal death. But in many countries, women seeking abortions are likely to conceal this fact, and if a woman dies as a result of unsafe abortion, then the reasons for this death are also likely to be concealed.
- Some women die from obstetric complications before they or the relatives who report the death know that they are pregnant, and these deaths are not recorded as maternal deaths.

These are problems even in developed countries. In England and Wales, 22% of maternal deaths were missing from official reports between 1982 and 1984, as researchers who conducted indepth surveys in the community discovered (Turnbull et al, 1989). In the United States, there were reportedly findings that maternal deaths were under-reported by some 50% as recently as the 1990s.

The underreporting and misreporting of maternal deaths are two serious obstacles to calculating accurate impact indicators. Another serious problem with the data needed for impact indicators is the relatively low frequency of deaths in a population over a short period of time. Maternal deaths are the most common cause of death amongst young adult women in developing countries, but deaths of any kind in this age group are relatively rare.

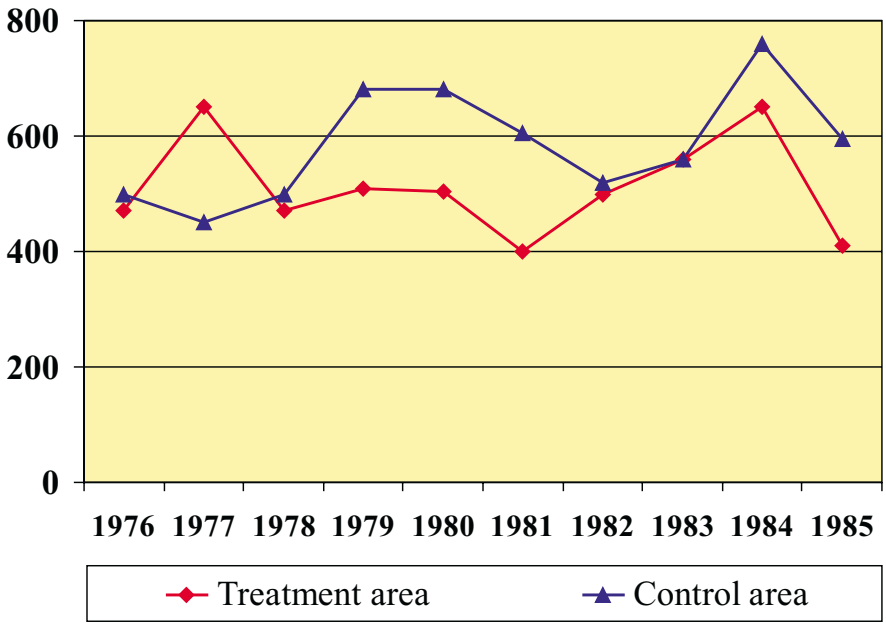
For example, you probably remember that the area of Matlab in Bangladesh is one of the most studied areas in the developing world. So there is more accuracy in reporting maternal deaths in Matlab than in other parts of the world. But there are still problems.

A group of researchers tracked all deaths for a population of 21,000 Matlab women of reproductive age between 1984 and 1986 (Fauveau et al). They recorded only 40 maternal deaths during the entire three-year period. You will remember from Module 1 that the maternal mortality ratio commonly given for Bangladesh is 850.

In other words, although maternal mortality for the entire population of Bangladesh is fairly high, when it comes to small population groups over a short period of time maternal deaths are relatively few.

The small number of deaths each year also makes the rates appear to jump around. When another group of researchers looked at maternal deaths in two different parts of Matlab between 1976 and 1985, the maternal mortality ratio jumped around in a way that made it hard to come to conclusions regarding whether and why matters were improving in an area receiving services as opposed to an area that was not (Koenig, M., 1990). This is clearly not useful if a planner wants to track the effectiveness of programme interventions.

Figure 1
Maternal deaths per 100,000 live births, Matlab, Bangladesh, 1976 - 1985
(Based on Koenig, M., 1990, reproduced in the *Guidelines*)



Now if you want to calculate the maternal mortality ratio and be accurate about it, you can do so by studying large populations. Statisticians estimate that you would require a sample size of 50,000 births - or, in other words, about 200,000 households - to document a maternal mortality ratio of 400 with some degree of confidence (see the *Guidelines* for more details). This would put you within a 20 per cent margin of error. If you wanted to aim for a 10 per cent margin of error, then you would need a sample size of 800,000 households. This is clearly very costly and time-consuming.

Some researchers have devised new ways of gathering data on maternal deaths, such as the "sisterhood" method, which do not require a very large sample size to achieve the same degree of confidence (say, around 2,000 respondents). In this type of household survey, data are collected by asking every adult in the household about deaths amongst their own sisters from pregnancy-related causes.

The main problem with sisterhood surveys is that they collect data on periods in the past - between six to 12 years in the past - depending on the sample size used. This time lag means that sisterhood surveys do not provide useful information about programmes being implemented in the present day.

If you are interested in more detail about the ways to calculate impact indicators, then I refer you to Appendix A of the UNICEF/WHO/UNFPA *Guidelines* (1997). For the purposes of this course, I would just say that there are major methodological issues regarding the calculation of accurate impact indicators.

To summarize, these problems include:

- Many of the countries with high maternal mortality do not have adequate systems to register vital statistics, and deaths are under-reported.
- Maternal deaths are misreported, even in countries with more complete records.
- The population sample for household surveys has to be very large to achieve reliable results; this is costly and time-consuming.
- The most cost-effective household survey method to obtain information on maternal deaths (the "sisterhood" method) provides estimates for a point in time 6 - 12 years before the study, which is not useful to measure the impact of ongoing programmes.

But what if we assume for a moment that, through some miracle of modern technology and human organization, you can get accurate maternal mortality ratios delivered to your desk every year? How helpful would these be to you, if you were designing programmes to reduce maternal deaths?

Certainly, they would show you that an unacceptably high number of women are dying in your country, perhaps 200 women per 100,000 live births, or 400, or 800. But beyond that, these ratios tell you very little indeed. Where are the problems, and where should you plan for solutions? Are there enough health facilities in the country? Are they functioning well, poorly, or not at all? Do people use them? These are all questions that need to be answered to design and monitor programmes to reduce maternal deaths. Impact indicators do not help you do so.

If this is the case, you may ask, what can you do to assess the effect of your plans and programmes on reducing maternal deaths? This is where the Process Indicators come in, as I will describe in the next section. But first, some SAQs…

SAQ 4

Which of the following are reasons why impact indicators are not practical for monitoring programmes to reduce maternal deaths?

a. Cost.

b. Sample size.

c. Irrelevance to programme needs.

a b c

✏ SAQ 5

Describe three problems you would face in calculating impact indicators.

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2. .....

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3. .....

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2.2 How Process Indicators Work

As I mentioned above, Process Indicators help track the changes in the circumstances that lead to or prevent maternal deaths. As such, they are better suited than impact indicators to monitor the results of plans and programmes. Specifically, they are better in three ways:

- They provide information on where the problems are, which is useful for planning at the national level; this information can be amplified through further studies at the subnational level for targeted programme design.
- They are sensitive to change and can alert a planner quickly to both positive and negative changes in obstetric services.
- Collecting the data for the indicators is a relatively inexpensive and straightforward exercise, since most of the information is collected at the health facilities. And, once the initial work has been done to upgrade and standardize facility record systems, they are inexpensive to monitor, which can be done as part of day-to-day work.

I will give you examples to illustrate these three points at the end of Section 3, which covers the content of the indicators in detail.

Given that EmOC is central to saving the lives of women who experience obstetric complications, the design of indicators to monitor the availability and use of obstetric services is a major contribution by the *Guidelines* to efforts to address the problem of maternal deaths.

As will become clear over the next few pages, the Process Indicators help a planner or programme manager to answer four questions to monitor maternal deaths:

1. Do EmOC services exist?
2. Are these services well distributed?
3. Are the services being used by pregnant women, especially those who really need them?
4. Is the standard of service adequate? (In other words, are the EmOC services that exist functioning?)

The first two questions deal with the coverage of the population, the third deals with utilization, and the last question deals with the performance of the facilities. I want to immediately clarify that I am not saying that all births should take place in health facilities. In other words, the aim is not to ensure that all women deliver in hospitals, but to meet the need of women who might need EmOC.

Many women - particularly in developing countries - prefer to deliver at home. And it is fine to do so. In any case, few developing countries have the resources to build or staff the facilities to accommodate all deliveries. The point is that those pregnant women who develop obstetric complications should be able to have prompt access to functioning EmOC facilities.

As for the last question dealing with the performance of facilities, clearly EmOC facilities should be functioning up to a certain standard. It is pointless for a woman to reach a health facility that cannot provide adequate treatment in a timely fashion.

The *Guidelines* contain a set of six indicators to answer the questions planners and programme managers should ask as they struggle to address the problem of maternal deaths.
The indicators are set out in Table 1.

Table 1
Process Indicators

Indicator	Question addressed
1. Amount of EmOC services available	This indicator answers the question of whether EmOC services exist
2. Geographical distribution of EmOC facilities	This indicator addresses whether services are located where women can access them
3. Proportion of all births in EmOC facilities	These three indicators address the issue of whether services are being used by women, especially women who really need them
4. Met need for EmOC services	
5. Caesarean sections as a percentage of all births	
6. Case fatality rate	This is a rough measure of how well facilities are functioning

I'm sure you have a lot of questions as you read this Table. For example, what's a met need, and what's a case fatality rate? I'll explain all the terms in this table in Section 3. I'll also explain in Section 3 which data are necessary to construct these indicators.

It is important to note that the Process Indicators were developed for monitoring at the national level. They also work well at the subnational level, but planners and programme managers will find they need to have more detail to answer all their questions, and to collect additional information through specific studies. Also, most data systems don't have information on complications of pregnancy, so upgrading record systems will often be necessary. Moreover, staff will need training and some supervision to maintain data quality. Finally, these indicators are not yet familiar to many people in government.

In other words, the indicators will tell you when you're on the right track (or on the wrong track), but they will not on their own give you enough detail for programme design. By definition, an indicator doesn't tell us everything. It just gives us an indication that things are on track, or not as the case may be. Some of the approaches used to further assess a situation are given in Section 3.8, after discussion of the indicators themselves.

SAQ 6

What kinds of questions do the Process Indicators help planners and programme managers answer?

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SAQ 7

Which of the following can you do with Process Indicators?

a. Assess the functioning of the obstetric care delivery system

b. Track changes in maternal deaths

c. Assess whether women are making use of EmOC facilities

a b c

SAQ 8

Which of the following can you do with impact indicators?

a. Identify gaps in services

b. Identify priority interventions

c. Estimate the level of maternal mortality

a b c

SAQ 9

Which of the following questions cannot be answered using the Process Indicators?

a. Are there enough facilities providing EmOC in the area?

b. Are the EmOC services preventing obstetric complications?

c. Are the facilities providing enough Caesarean sections?

a b c

2.3 Summary of Section 2

In this section, you learned more about impact indicators and about Process Indicators. You found out about the problems of associated with tracking the number of maternal deaths, a figure necessary to calculate impact indicators. You also learned that even 100% accurate impact indicators (a technical impossibility) do not help monitor plans and programmes. I covered the types of questions that can be addressed by using Process Indicators, and enumerated the six Process Indicators.

Section 3
Calculating Process Indicators

3.0 Introduction

In this section, I will explain the purpose of each of the six Process Indicators I set out in Section 2, and walk you through the data needed to calculate each one of them. The six indicators are:

1. amount of EmOC services available;
2. geographical distribution of EmOC facilities;
3. proportion of all births in EmOC facilities;
4. met need for EmOC services;
5. Caesarean sections as a percentage of all births; and
6. case fatality rate.

You'll learn these new terms: Basic EmOC, Comprehensive EmOC, met need for EmOC, case fatality rate, needs assessment; participatory group discussions. You'll also learn what kind of information is useful to supplement the facts brought to light by the Process Indicators. By the end of Section 3, you will be ready to begin using Process Indicators.

3.1 Amount of EmOC Services

The first of the six Process Indicators is the amount of EmOC services that exists. To be able to tell if sufficient services exist, there are a number of things we need to know. For a start, what services are necessary to provide to save women's lives? And does every facility need to have the same level of service?

To answer these questions, the *Guidelines* address the services that need to be provided to save women's lives. A short list of functions has been drawn up to "signal" to planners whether these services in fact exist or not (see Table 2). These are the signal functions I introduced you to in Section 5.1 of Module 1. The functions are a signal to planners of the availability (or otherwise) of EmOC services. These signal functions are divided into two sets, Basic EmOC and Comprehensive EmOC, as set out in Boxes 5 and 6.

Box 5

Basic EmOC are those functions that can be provided by an experienced nurse/midwife, physician, or other qualified medical practitioner at a health centre or clinic; these functions help save the lives of many women, and also stabilize women who need to travel further for more sophisticated treatment.

Box 6

Comprehensive EmOC consists of Basic EmOC functions as well as functions that need the services of medical practitioners experienced in obstetric surgery, specifically blood transfusions and Caesarean sections.

The reason for dividing the EmOC signal functions into Basic and Comprehensive EmOC is that not all women who develop serious complications would experience problems of the same severity. Some of the complications need less sophisticated facilities and skills than others, and could, for example, be treated by nurses at clinics rather than by surgeons at hospitals.

Dividing the functions into two sets of services makes it possible to plan for Basic EmOC in health centres in rural areas, increasing coverage of the population. This is an important distinction for planners trying to assign scarce human and financial resources.

Table 2
Signal functions to identify Basic and Comprehensive EmOC.

Basic EmOC Services	Comprehensive EmOC Services
Administer parenteral antibiotics	*All Basic EmOC services, plus*
Administer parenteral oxytocic drugs	Perform surgery (Caesarean sections)
Administer parenteral anticonvulsants for pre-eclampsia and eclampsia	Perform blood transfusions
Perform manual removal of placenta	
Perform removal of retained products	
Perform assisted vaginal delivery	

A facility with Basic EmOC services would perform all six functions listed in the first column of Table 2, while a facility with Comprehensive EmOC would provide those six functions plus blood transfusions and Caesarean sections.

The lives of many women can be saved at facilities performing Basic EmOC functions. Therefore, there is no need to spend scarce resources on making Comprehensive EmOC available in all facilities. In addition, well-trained staff at a Basic EmOC facility can help to stabilize the condition of women who need to travel further away to reach a Comprehensive EmOC facility. For example, if a woman needs a Caesarean section, her chances of survival are increased if she does not arrive at the hospital dehydrated and infected. Administration of intravenous fluids and antibiotics at the Basic EmOC facilities would be very helpful.

There are many side benefits to dividing services into Basic and Comprehensive EmOC. One of these side benefits, which you will be aware of if you're related to anyone in the medical profession, is this: it is important for practitioners to have a reasonable case load to keep up their competency in their field. Trying to do Caesarean sections in all facilities might not provide enough cases to keep skills sharp.

Now, of course, there are some important functions for Comprehensive EmOC that are not listed on Table 2 - eg. you cannot perform surgery without anaesthesia. The functions that are listed in Table 2 are simply those signal functions that will enable planners and programme managers to monitor whether sufficient EmOC services exist. By definition, signal functions do not represent a complete list of services.

The signal functions help us to construct the first two of the six Process Indicators regarding progress in reducing maternal deaths: amount of EmOC. To collect the information for these indicators, you would make an inventory of the health facilities that are actually providing Basic EmOC Services and those that provide Comprehensive EmOC.

For the purposes of this indicator, a population size of 500,000 is used in the *Guidelines*. It is estimated that a population of 500,000 would need at least 1 Comprehensive EmOC facility and 4 Basic EmOC facilities to be well-served. In an inventory of facilities for the area of 500,000 people, you might find more than five such facilities, which is fine. But you would need to find at least five facilities - 1 Comprehensive, 4 Basic - to feel sure that a minimum level of service exists to meet the population's need for EmOC.

You would, of course, make sure that the services are actually provided in practice and do not just exist on paper. For example, in many countries medical personnel are required to serve in rural areas after graduation, so the paper records may show that the facility has a qualified practitioner on staff, which

in theory means that it is possible to perform Caesarean sections at that facility. However, the practitioner may have had little experience or obstetric training, and may even be reluctant to perform an assisted vaginal delivery. In Bangladesh, district hospitals are supposed to perform Comprehensive EmOC functions, but a 1993 survey of 20 hospitals found that six - that is, almost a third of them - only provided Basic EmOC. (Mostafa and Ali Haque, 1993).

Indeed, the Process Indicators require, by definition, that services should have been provided in the three months prior to the assessment being conducted. Detailed notes and worksheets to calculate this as well as the other five Process Indicators are given in Chapter 4 of the *Guidelines*.

A point of clarification here: you will remember that, in Module 1, I introduced you to the terms EmOC and Essential Obstetric Care (EOC), and, in fact, the *Guidelines* use EOC instead of EmOC. Because the purpose of this Course is to facilitate the selection of priorities and the monitoring of programmes, I use the term "emergency obstetric care" - basic and comprehensive – to reflect the need for urgent care in most, if not all, cases.

The term "essential obstetric care" can be used interchangeably for the purpose of data collection or program implementation, as long as the purpose is clear, and the list of signal functions is kept to a minimum for programmes to be doable and sustainable. This list of signal functions, by definition, does not include every service that ought to be provided to pregnant women, or even to women with complicated pregnancies. WHO has issued several publications presenting the list of services that should be provided during pregnancy and childbirth, for example, the *Mother Baby Package* and *Managing Complications of Pregnancy and Childbirth (MCPC)*.

I just wanted to clarify that before moving on. Now, when you inventory your functioning facilities, you will identify the gaps in service which will help you plan the action necessary to address those gaps by, for example, upgrading existing facilities to provide Basic EmOC, or finding ways to improve transport between Basic and Comprehensive EmOC facilities.

As noted above, the *Guidelines* state that the minimum level of *functioning* EmOC services acceptable to meet the needs of a population of 500,000 people is 1 Comprehensive EmOC facility and four Basic EmOC facilities. This is the first Process Indicator.

1st Process Indicator	Minimum acceptable level for every 500,000 population
Amount of EmOC	
Basic	4 Basic EmOC facilities
Comprehensive	1 Comprehensive EmOC facility

A point to emphasize here is that spreading the services through five facilities rather than having them all grouped into a single facility provides more coverage for the population, since women need to be reasonably close to a facility in case of emergency. This reality is the basis for the second obstetric service indicator, described below. But first, some SAQs

SAQ 10

Which of the signal functions below are included in the definition of Basic EmOC services?

a. Perform manual removal of placenta

b. Perform blood transfusions

c. Perform assisted vaginal deliveries

a b c

SAQ 11

What are two reasons for dividing EmOC services into Basic and Comprehensive services?

1 .....

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2 .....

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SAQ 12

Why is it important to spread EmOC services through at least five facilities in a population of 500,000?

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3.2 Geographical Distribution of EmOC

The second Process Indicator is the geographical distribution of EmOC facilities. Clearly, if the lives of women experiencing obstetric complications are to be saved, they must be able to reach these facilities in time.

You may recall from Module 1 that post-partum haemorrhage is the only obstetric complication that often leads to death in under two hours. The remaining obstetric complications generally lead to death within 12 hours to six days (see Table 3).

Table 3
Estimated average time from onset of complication to death

Complication	Hours	Days
Haemorrhage		
Postpartum	2	
Antepartum	12	
Eclampsia		2
Obstructed labour		3
Infection		6

Ideally, a reasonable standard for the availability of services would be to have Basic EmOC available within two hours' travel of most women, and Comprehensive EmOC available within 6 - 12 hours. Unfortunately, as you probably know, most health services in developing countries are clustered in the major cities, and, often, there are few services in rural areas.

To be able to assess whether Basic and Comprehensive EmOC are reasonably located from most women in the country, your best bet is to divide the country or province into geographic areas based on existing divisions of population. For example, an average district in Bangladesh consists of about two million people. Looking at a map, you would be able to see where the facilities are located. Perhaps all the hospitals are clustered in the main town, or perhaps there are large population areas without centres providing basic EmOC.

By dividing the country and districts into subnational areas, you would be better able to inventory the services available to population groups of 500,000, using the same methods described for the first indicator. Therefore, the minimum acceptable level for distribution of EmOC services is the same as that for the amount of EmOC services, but applied to smaller geographical areas. The second Process Indicator is:

2nd Process Indicator	Minimum acceptable level
Geographical distribution	Minimum level for amount of EmOC is met in each subnational area (that is, 1 Comprehensive and 4 Basic EmOC per 500,000 population)

3.3 Proportion of All Births in Basic and Comprehensive EmOC Facilities

After a programme manager has ensured that EmOC facilities exist and are well distributed, he or she must then find out if all women experiencing obstetric complications are in fact using the EmOC facilities available to them. If you spotted a flaw in that last sentence, you were right. No one can really know if every single one of the women who experience obstetric complications make it to health facilities.

So the best option for planners and programme managers is to approximate this knowledge, as is done in Process Indicator 3, proportion of all births, covered in this section, and Process Indicator 4, "met need", covered in the next section (met need simply means that the women who need EmOC services receive it). Since the information required for met need is not currently available in many places, it is helpful to look at the proportion of all births that take place in EmOC facilities in order to get a sense of how many women are making use of the facilities.

To calculate the proportion of all births in EmOC facilities, you need to know the birth rate (the birth rate is the number of births per 1,000 population per year), and the number of births at the facilities in the population you are studying.

Now, you may ask: what proportion of births should I expect to find at an EmOC facility to know I'm on track? This is an excellent question. What's the point of finding out the proportion of births in EmOC facilities if there is no standard to compare it against.

In fact, there is a figure that can help us out here. A number of authors have shown that the proportion of pregnant women who develop serious complications is likely to be at least 15% of the total number of pregnant women. Indeed, a Technical Working Group assembled by the World Health Organization agreed in 1993 to use 15% as the minimum proportion of pregnant women who require medical care in order to avoid death or disability (WHO, 1994).

Now, wait a minute, you may say. In Module 1, it was clearly stated that it is impossible to predict or prevent obstetric complications. Isn't this a flagrant contradiction of what was said before? Well, no, it's not. It is absolutely true that no one can predict with certainty which woman will develop an obstetric complication, or prevent her from developing most complications.

The fact is, in any population, regardless of the level of development, out of any 100 pregnant women, at least 15% are likely to develop direct obstetric complications (with the spread of HIV and AIDS, this percentage is probably higher in many developing countries, and is likely to increase). No one knows which women will develop obstetric complications; what is known is that the complications will occur. And it is also known that almost all of these complications can be treated. That's why making EmOC available is so crucial.

An obstetric complication is a reality faced by pregnant women everywhere in the world, not just in developing countries. The main difference between developed and developing countries is that in developed countries women receive prompt and adequate treatment, thus ensuring that complications are dealt with at an early stage and before they become fatal.

So, since it is estimated that 15% of pregnant women will develop serious obstetric complications, then the number of women receiving care in an EmOC facility should be at least 15% of all women giving birth in the population. This would be the minimum acceptable level.

The third indicator is useful because data on births in facilities are usually available, and if the births taking places in facilities that provide EmOC are fewer than 15%, this is an indication that there is a problem and that there are obstetric complications in the population that are going untreated.

Thus, the Process Indicator indicator is:

3rd Process Indicator	Minimum acceptable level
Proportion of all births in Basic and Comprehensive EmOC Facilities	At least 15% of all births in the population take place in either Basic or Comprehensive EmOC facilities

3.4 Met Need for EmOC

The "met need for EmOC" means the proportion of those women who need treatment for obstetric complications who receive it. Therefore, if all the women in the population who develop obstetric complications are able to receive EmOC services, then the met need would be 100%.

The concept of Met Need is not new. Family planning programmes commonly express the gap between what is provided and used, and what is required, as "unmet need". In this case the number of women with a "need" for contraception is computed by adding the number who want to delay their next pregnancy, to the number of women who want no more children. In the case of family planning, researchers find out about these women's intentions by asking them during household surveys. The proportion of these women who are not using an effective method of contraception is the "unmet need" for family planning.

Box 7

The met need for EmOC is the percentage of the women estimated to need treatment for obstetric complications admitted to EmOC facilities.

The met need Process Indicator builds on the third indicator that I already described, which deals with the proportion of all births that take place in an EmOC facility. If you think about it, as I had to, it is clearly not enough to know that 15% of all births take place in a facility providing EmOC. After all, many women who have normal deliveries may decide to deliver in a health centre or hospital. So the 15% of all births in facilities can include both normal and complicated births. This doesn't tell me enough about what's happening to women with complications.

The reason for saying "at least" 100% is because, in some cases, more than 15% of pregnant women in a population will develop complications and will make it to a health facility. This is especially the case where there is a high incidence of unsafe abortion or HIV/AIDS. Also, in some parts of the world, there is a tendency to over-diagnose complications, which will also make the ratio greater than 100%. These are some of the reasons why the met need you are looking for should be "at least 100%".

I should also note that there is a difference between the numerator and the denominator in calculating this ratio. The denominator is 15% of births in the population as a whole. The numerator includes many women who are experiencing obstetric complications without giving birth, for example, women admitted with postpartum haemorrhage or infection, or women who are treated for complications of abortion.

Box 8

The Process Indicator for met need for EmOC is: the proportion of women with obstetric complications who are treated in Basic or Comprehensive EmOC facilities is at least 100%.

Now you may wonder what types of complications you are looking for. For the purposes of this indicator, the working definition of a complicated case is one that involves: haemorrhage, whether postpartum or antepartum; prolonged or obstructed labour; pre-eclampsia and eclampsia; infection; ectopic pregnancy; ruptured uterus; and complications of abortion.

What this fourth indicator will show is the proportion of women that are receiving treatment for complications out of the total number who need such treatment. For example, in India a study conducted by UNICEF in 10 districts in 1993 showed that the percentage of expected obstetric complications that reached health facilities ranged from 2% to 40% (Nirupam and Yuster, 1995). That is, in the best case, met need was only 40%, and the remaining women who developed obstetric complications and needed treatment were simply not being helped.

There could be several reasons why existing facilities are not being used by women who need them: poor performance of the facilities, cost, misperception about the quality of service, lack of information. Although the next two indicators would tell you a bit more about where your problems lie, you would need more information to address the problems through programme interventions, and would carry out some of the kinds of assessment described in 3.8.

Meanwhile, the fourth Process Indicator is:

4th Process Indicator	Minimum acceptable level
Met need for EmOC	The proportion of all women with obstetric complications who are treated in Basic or Comprehensive EmOC facilities is at least 100%

SAQ 13

The proportion of pregnant women needing EmOC services is likely to be

a. 5%

b. 15%

c. 85%

a b c

SAQ 14

If you know that 15% of all births are taking place in facilities with EmOC services, can you be sure that all women experiencing complications are receiving treatment?

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SAQ 15

Why is met need for EmOC defined as "at least 100%" of the proportion of all women with obstetric complications who are treated in Basic or Comprehensive EmOC facilities?

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3.5 Caesarean Sections as a Proportion of All Births

The fifth Process Indicator is the proportion of Caesarean sections amongst all births. Just as in the case of indicators 3 and 4, there is a figure that gives a standard for the number of Caesarean sections you should expect to find.

About 5% of all pregnant women are believed to require Caesarean sections. In other words, at least one third of the women who develop serious complications will need treatment in a Comprehensive EmOC facility (5/15 = .33). So, for at least 5% of pregnant women, living close to a functioning Basic EmOC facility is not enough to save their lives. They need to be able to get to a facility where surgery is available.

This information provides the basis for a valuable indicator - although it needs to be used with some caution.
The information is valuable because, of all the various treatments for obstetric complications that can arise, Caesarean sections are the ones most likely to be recorded at health facilities. So this information is more readily available than that about other types of treatment.

Yet it needs to be used with some caution because some doctors perform Caesareans whether these are necessary or not, since they may be more convenient or bring in more money than regular births. In some cases, too, women prefer to have Caesareans rather than to give birth normally. Such factors can result in high Caesarean section rates. For example, the proportion of Caesarean sections to all births was as high as 32% in Brazil (Notzon, 1990).

The performance of Caesarean sections that are unnecessary should be discouraged. Like any major surgery, a Caesarean section carries the risk of injury or death for the patient. In the case of a complication like obstructed labour, then the benefits to the patient clearly outweigh the risks. If a Caesarean section is not performed, a woman will die or be severely maimed. However, if a woman is able to have a normal delivery, then the risks outweigh the benefits.

For all of the above reasons, it is important to establish a maximum as well as a minimum acceptable level for Caesarean sections as a proportion of all births. Indeed, the Technical Working Group established by the World Health Organization adopted 5% of all births as a minimum acceptable level, and 15% of all births as a maximum acceptable level (WHO, 1994).

Setting a minimum and maximum level helps make the indicator more useful to planners and programme managers. However, there are another couple of factors to be kept in mind. One is the fact that there will be discrepancies between rural and urban areas in terms of women's access to EmOC facilities. Women in cities are more easily able to reach hospitals than women in rural areas.

Moreover, there may well be a difference in the percentages of Caesareans in births at private sector facilities versus public sector facilities. This would reflect the different ability of people to pay for services. This is another factor that needs to be taken into account when looking for the information for this indicator. In general, the point is to look at the data by different groupings (urban vs. rural, by hospital, by district) to identify patterns of over- and under-use.

The best way to ensure that this indicator provides useful information is to provide training and briefings for obstetricians about the various issues discussed above, both at the health facilities themselves, and through national societies of gynaecologists and obstetricians. That way, they can monitor the level of Caesarean sections and draw appropriate conclusions about whether women who need EmOC services are able to access these.

As with the other indicators, statistics that are too high or too low are a sign that something is going wrong, and that there is need for additional information and action. In this case, you might conduct a study of Caesarean section practices in hospital to find out what is really going on.

Once you are fairly sure about the adequacy of your data, it becomes possible for you to calculate the number of Caesareans you would expect to find in a Comprehensive EmOC facility without too much difficulty. For example, a team of researchers examined the records for 10 rural hospitals in Kenya, Tanzania, Sudan and Ethiopia for the years 1979 to 1981 (Nordberg, 1984).

The researchers calculated that between 200 and 250 Caesarean sections a year would be necessary, given the size of the population in the hospitals' catchment area (the population administratively assigned to that hospital). However, the records showed that only about a tenth of the expected number of Caesareans was performed. This is a strong indication that women experiencing complications were not reaching facilities with EmOC services.

To sum, the fifth Process Indicator is

5th Process Indicator	Minimum and maximum acceptable levels
Caesarean sections as a % of all births in the population	Not less than 5% and not more than 15%

SAQ 16

What percentage of all births would be Caesarean sections at an average Basic EmOC facility?

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SAQ 17

Give three potential problems that you may identify in using Caesarean sections as a percentage of all births as one of your Process Indicators.

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3.6 Case Fatality Rates

The five Process Indicators I have described above show whether facilities with EmOC services exist (amount of EmOC), their accessibility to women who need them (geographic distribution of EmOC), whether women are making use of these facilities (15% of all births), and whether women who need them are making use of the facilities (met need for EmOC and percentage of births that are Caesarean section).

In short, the first five indicators reveal the extent of existence, access to and use of EmOC. All five indicators relate to the coverage of the population. By monitoring these indicators, a planner or programme manager can learn whether

- A reasonable number of EmOC facilities exist,
- These facilities are reasonably well distributed within the country,
- The facilities are serving a reasonable proportion of women,
- The facilities are serving the kinds of women who need them most, and
- They are providing life-saving services such as Caesarean sections.

The sixth Process Indicator, the case fatality rate, reveals something about the quality of service that women find when they reach a facility with Basic or Comprehensive EmOC services.

Box 9

The case fatality rate is the number of maternal deaths among women with obstetric complications in the health facility being studied.

As you can see from Box 9, all the information required to calculate the case fatality rate is available at the health facility concerned (to work out the rate, you divide the number of maternal deaths by the number of women with obstetric complications). Data from hospitals in West African countries in the late 1980s showed a case fatality rate ranging from a low of 1.2% to a high of 8% (PMM Network, 1995). In a study of 654 US hospitals in the late 1970s, the rate was 0.03% (Petitti et al, 1982).

Based on these and other data, the maximum acceptable level for the case fatality rate for maternal death has been set at 1%. Given current levels of maternal death in developing countries, this is of course an ambitious level, and will be difficult to achieve. However, it is not impossible, as the efforts of committed medical workers around the world have shown, and it should be the goal.

The case fatality rate is calculated at the health facility whose services are being assessed. In fact, you would only calculate this rate for a health facility that offers Comprehensive EmOC. This is because facilities that offer Basic EmOC usually refer very serious cases to Comprehensive EmOC facilities, and so not that many women actually die there in Basic EmOC facilities. So there is generally no point calculating the case fatality rate at Basic EmOC facilities, because this will give you an inaccurate picture of the situation.

There are some factors that need to be taken into account when interpreting case fatality rates. For example, there may be a difference between district hospitals and teaching hospitals, because very serious cases may be referred to the teaching hospital, where the women may die. Thus, this would not give you a good idea about the standard of service at the district hospital.

Another factor is that a teaching hospital may have a high case fatality rate, but you may find that women arrive at the hospital in very poor condition. For example, they may be dehydrated or infected from being in labour for days. So the standard of care at the hospital may be good, but patients may be arriving there on the point of death, and the problem may lie at the Basic EmOC facilities where staff may not know how to manage emergency complications. Or there may be a problem regarding the distribution of hospitals in the area.

One way to address this factor is to collect some data about the condition in which patients arrive. This would help to disentangle the data about the patients' condition from data about the quality of care they receive. As I noted earlier, the Process Indicators were designed to monitor the situation in large areas, and more focused studies are needed to collect the information to understand what is going on in smaller areas.

An important point here is the quality of the record-keeping at the Comprehensive EmOC facilities: if it is poor, or if patients are sent home to die, then the case fatality rate will be too low. Also, of course, a low case fatality rate (even if accurate) in a hospital that treats few women is not necessarily a good thing.

Now you may point out that the case fatality rate does not reveal any information about maternal deaths that take place outside the health facilities themselves. And you would be right. However, the rate is still a very useful indicator to judge the standard of care at the facilities. And it contributes to your information about the functioning of the health system as a whole because, of course, you are not using this indicator on its own. It is one of six indicators.

So if you know that EmOC facilities exist and are well distributed (Process Indicators 1 and 2), and you know that these facilities are being used by women who need them (Indicators 3, 4, and 5), then finding out about the standard of care in these facilities (Indicator 6) will give you a good overall picture of the health system in your country, as regards your target of reducing maternal deaths.

To sum up, the sixth Process Indicator is

6th Process Indicator	Maximum acceptable level
Case fatality rate among women with obstetric complications	Less than 1% of women with complications in Comprehensive EmOC facilities

SAQ 18

What are two factors you need to consider when interpreting data for case fatality rates?

1 .....

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2 .....

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SAQ 19

Which of the following
are acceptable case fatality rates?

a. 0.8%

b. 1.08%

c. 8.01%

a b c

SAQ 20

What can you tell if the case fatality rate is 8% at a Basic EmOC facility?

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3.7 The Six Process Indicators

In Sections 3.1 to 3.6, I reviewed the purpose of the six Process Indicators that help a planner or programme manager track the progress of interventions to reduce maternal deaths. Table 4 below lists all six together, for easy reference.

Table 4
Six Process Indicators

Process Indicator	Minimum acceptable level
1. Amount of EmOC Basic EmOC facilities Comprehensive EmOC facilities	For every 500,000 population, At least 4 Basic EmOC facilities At least 1 Comprehensive EmOC facility
2. Geographical distribution of EmOC facilities	Minimum level for amount of EmOC is met in each subnational area (that is, 1 Comprehensive and 4 Basic EmOC per 500,000 population)
3. Proportion of all births in Basic and Comprehensive EmOC Facilities	At least 15% of all births in the population take place in either Basic or Comprehensive EmOC facilities
4. Met need for EmOC Proportion of all women with obstetric complications who are treated in EmOC facilities	At least 100% of women estimated to have complications are treated in EmOC facilities
5. Caesarean sections as a % of all births	Caesarean sections should account for not less than 5% and not more than 15%
6. Case fatality rate among women with obstetric complications	The case fatality rate among women with obstetric complications in EmOC facilities is less than 1%

In the previous sections, I mentioned the kind of data you need to calculate the indicators. For ease of reference, the data are summarized below in Table 5. In fact, as noted earlier, most of these data can be gathered at the health facilities. In addition you need population data, and data on birth rates, usually available from government records or surveys such as District Household Surveys.

Table 5
Types of data used to construct indicators

Type of data	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5	Indicator 6
Population size	●	●	●	●	●	
Birth rate			●	●	●	
Health Facility Data EmOC signal functions	●	●				
Number of births			●			
Number of complicated cases				●		●
Number of Caesarean sections					●	
Number of maternal deaths						●

Chapter 4 of the *Guidelines* contains detailed information on how to collect data for Process Indicators, together with worksheets and notes regarding each indicator. See the end of this module for the detailed reference information.

To sum up, the Process Indicators help to monitor the situation at a national level, and are also useful at the subnational level. They point to problem areas, and show if programmes are on track. The benefits of the Process Indicators include:

Sensitivity to change For example, if you invest in enhancing your health facilities, you may be able to use Process Indicators to monitor progress within 6 - 12 months, through a increase in the number of people using the facilities, or a drop in the case fatality rate. You can imagine the positive impact on staff morale, among other benefits. On the other hand, if your programme intervention is not on track, this will also show up quickly too.

Low maintenance Once you've made the initial investment in improving record systems so that they generate data for calculating the process indicators, monitoring is inexpensive and can be factored into day-to-day work, although data quality should be monitored periodically.

Internal consistency You will have noticed that several of the indicators reinforce each other, so you have several ways of

checking the validity of the information you receive. For example, if the district health director reports that the met need has gone up, but no other indicators appear to have changed, you will wonder if there is not more or less to this than meets the eye.

In the next section, I will review some of the additional information which you will want to collect to supplement the findings of the indicators. But first, some SAQs.

SAQ 21

Your Process Indicators show a lack of functioning EmOC facilities in the area. Which of the following steps would you consider next?

a. A focused study to see what the problem is

b. Explore a training program for Traditional Birth Attendants

c. Build new hospitals.

a b c

SAQ 22

Your Process Indicators showed sufficient EmOC facilities in the area, but low utilization by women. Which of the following steps would you consider next?

a. Training programs for hospital staff

b. Examine the fee structure of the health services

c. Hold discussions with the community, staff and patients

a b c

SAQ 23

Your indicators show sufficient EmOC facilities and good utilization by women, but high case fatality rates in the hospital. Which of the following steps would you consider?

a. A community education campaign

b. Weekly meetings of medical staff to discuss cases

c. Assess the availability of blood and drugs in the hospital

a b c

3.8 Conducting Needs Assessments

Although the term needs assessment might seem self-explanatory, it is good to be clear how such a term is used. So in this short section, I will define this term, as well as the term participatory group discussion, and give you some examples of what they are.

Box 10

A needs assessment is a review that a planner or programme manager conducts before designing an intervention, to gain a deeper understanding of the problems a population faces and to ensure that programmes address these specific problems.

In the case of maternal death, the six Process Indicators I have described in 3.1 to 3.6 alert a planner or programme manager are the start of your needs assessment. Sometimes, particularly at the local level, more detailed information is necessary to understand exactly how a problem works.

If the Process Indicators reveal problems at the EmOC facilities, then you would further study the facility itself. If the Process Indicators reveal problems in use of the facilities by the community, then you would conduct a study in the community. One of the tools that can be used both at the facilities and in the community is a participatory group discussion.

Box 11

A participatory group discussion brings together the range of people involved in a given problem to better understand the nature of the problem.

To ensure that a group discussion leads to an honest and thorough appraisal of the problem, a neutral facilitator is usually called upon to facilitate it. This can be a social scientist, or a psychologist, or any other person with good people skills.

Two examples are given in Boxes 12 and 13 of the kinds of things further study will reveal, the first at EmOC facilities, and the second in the community. These examples are both taken from the manual: *The Design and Evaluation of Maternal Mortality Programs.*

Box 12

Needs assessment findings at the hospital in Zaria, Nigeria.
Interviews with doctors and nurses and a review of records at the teaching hospital revealed two reasons for delays in treatment. First, drugs and surgical supplies needed to be purchased from pharmacies outside the hospital before treatment could begin. Second, the operating theatre in the maternity ward was not functional, primarily due to a broken anaesthetic machine. Average time from admission to treatment for women needing emergency surgery was almost four hours.

Needs assessment findings at the health centre in Zaria, Nigeria.
A lack of drugs and materials - such as intravenous infusions, antibiotics, and antimalarials - was identified as a major constraint to providing basic emergency care at the rural health centre. Moreover, patients referred to the teaching hospital were responsible for arranging their own transportation, which often contributed to substantial delay.

Box 13

Needs assessment findings in the community in Zaria, Nigeria.
Group discussions in the community revealed several factors contributing to delays in seeking treatment. Women could not leave home without their husbands' consent. When the husband was not available, often no one would give their permission. Other factors contributing to delay in seeking care were the high cost of transportation, drugs and medical supplies, and the traditional custom of women labouring in solitude.

These examples show you the kinds of problems that a needs assessment reveals. It is important to keep in mind that the situation differs from country to country, and from community to community. In the case of Zaria, customs played an important role. In other communities, the cost of transport, poor roads, insufficient information about the nature of obstetric complications, and/or other factors may be important. However, as we noted in the case of Matlab in Bangladesh, which shares many cultural factors with Zaria, confinement of women may not be a very important factor if functioning facilities are available and communities are aware of their services.

3.9 Summary of Section 3

In this Section, you have learned about each of the six Process Indicators that you can use to identify gaps in the services to reduce maternal deaths in your country, and to monitor the effectiveness of programmes and projects.

The six indicators are summed up in Table 4. They tell you if EmOC facilities exist and are well distributed (indicators 1 and 2), whether these facilities are being used by women who need them (indicators 3, 4, and 5), and about the standard of care in these facilities (indicator 6). You learned about the benefits of using these indicators: sensitivity to change, low cost and internal consistency.

I covered the kind of data you need to calculate Process Indicators, and explained the terms needs assessment and participatory group discussions.

Section 4: Using Process Indicators

In this section, I will paint three different scenarios, and ask you to think through what you would do in each situation. This will help you test yourself on using the six Process Indicators set out Sections 3.1 to 3.6.

4.1 Scenario 1

You are an official of the Ministry of Health in the fictitious country of "Rezikstan". You are concerned about the high numbers of maternal deaths in the Mountain District, where 950,000 people live, and you want to do something about it. You have sent a team of researchers to Mountain District to collect data for the Process Indicators. Your team worked fast, and they have just submitted their report to you. This is their report.

Process Indicators for Mountain District in Rezikstan

1. Amount of EmOC: 2 Basic EmOC facilities; 1 Comprehensive EmOC facility
2. Geographic distribution of EmOC facilities: mostly in district capital
3. Proportion of all births in Basic and Comprehensive EmOC facilities: 10%
4. Met need for EmOC: 8%
5. Cesarean sections as a percentage of all births: 0.7%
6. Case fatality rate: 5%

SAQ 24

Looking at the report of your team in Scenario 1, please identify five priority activities to improve the situation for women with obstetric complications. List your five activities in order of priority.

1 .....

2 .....

3 .....

4 .....

5 .....

4.2 Scenario 2

You are now an official of the Ministry of Health in the country of Belgravia. You have heard that maternal death is a serious problem in the Plains District. About 950,000 people live in that district. You train a team of researchers on the Process Indicators, and despatch them to Plains District. Here is their report.

Process Indicators for Plains District in Belgravia

1. Amount of EmOC: 7 Basic EmOC facilities, 2 Comprehensive EmOC facilities
2. Geographic distribution of EmOC facilities: Some rural, some urban.
3. Proportion of all births in Basic and Comprehensive EmOC facilities: 10%
4. Met need for EmOC: 8%
5. Caesarean sections as a percentage of all births: 2%
6. Case fatality rate: 2%

SAQ 25

Looking at the report of your team in Scenario 2, please identify five priority activities to improve the situation for women with obstetric complications. List your five activities in order of priority.

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4.3 Scenario 3

You are now an official of the Ministry of Health in the country of Palmatia. You are happy about most of the health indicators in your country, because your Government has made a substantial investment in both basic and comprehensive health facilities and in community education campaigns. Still, you are hearing some worrying reports about maternal deaths in the Two Rivers Province. About 950,000 people live in that province. You train a team of researchers on the Process Indicators, and despatch them to Two Rivers Province. Here is their report.

Process Indicators for the Two Rivers Province in Palmatia

1. Amount of EmOC: 10 Basic EmOC facilities; 3 Comprehensive EmOC facilities
2. Geographic distribution of EmOC facilities: Some urban, some rural
3. Proportion of all births in Basic and Comprehensive EmOC facilities: 25%
4. Met need for EmOC: 65%
5. Caesarean sections as a percentage of all births: 12%
6. Case fatality rate: 15%

SAQ 26

Looking at the report of your team in Scenario 3, please identify five priority activities to improve the situation for women with obstetric complications. List your five activities in order of priority.

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Section 5
Summary of Module 2

In this Module, I discussed two ways to measure progress in reducing maternal mortality: impact indicators and Process Indicators. Impact indicators reveal changes in the outcome of interest, while Process Indicators show changes in the circumstances that lead to that outcome.

I presented the methodological problems that arise in using impact indicators, and particularly the difficulty of calculating maternal mortality with any accuracy. Moreover, this type of indicator is not useful in identifying problem areas and in tracking progress.

I explained the six Process Indicators that have been designed to help planners and programme managers identify the extent of the problem and track the effectiveness of interventions. These six indicators are: amount of Emergency Obstetric Care (EmOC) services available; geographical distribution of EmOC facilities; proportion of all births in EmOC facilities; met need for EmOC services; Caesarean sections as a percentage of all births; and case fatality rate.

I showed how most of the data necessary to calculate these indicators can be obtained from the EmOC facilities themselves, and the rest from existing studies and statistics. I walked you through several ways to use these different Process Indicators. I also touched briefly on the terms needs assessment and participatory group discussions, and gave you examples of each.

I summarized the benefits of the Process Indicators, which include sensitivity to change, low cost, and internal consistency.

You are now ready to go on to Module 3, which will examine in detail how the six Process Indicators can be used to ensure that plans and programmes reduce maternal deaths.

I want to note one thing. In the three modules of this course, my aim was to give you an overview to the issues relating to maternal deaths and how to address them. If you want to gain more indepth expertise in programme design and evaluation to reduce maternal deaths, then I suggest that you turn to the *Guidelines*.

SAQ Answers

SAQ 1 Answer

Data help governments to identify the extent of a problem. Data also helps planners to set priorities in action plans, and managers to monitor the progress of programme interventions to address a problem.

SAQ 2 Answer

Impact indicators measure the change in number of maternal deaths, for example, the number of women dying per 100,000 live births. Process Indicators measure the progress towards reducing the number of maternal deaths, for example, the change in the number of health facilities factors that offer emergency obstetric care.

SAQ 3 Answer

The ratio tells us how many women die per 100,000 live births. The rate tells us how many women die per 100,000 women of reproductive age (generally 15 to 49 years old). The lifetime risk calculates the chances of death from pregnancy over the course of an average woman's lifetime, keeping in mind that a woman faces the risk of dying each time she becomes pregnant.

SAQ 4 Answer

All three - a, b, and c.

SAQ 5 Answer

To calculate impact indicators, I need to know the number of maternal deaths. But the problems I would face include (if you answered any three of the following, you were correct):

Maternal deaths are often under-reported, especially in developing countries where systems to collect vital statistics are weak.

Maternal deaths are often mis-reported in developing countries, and even in developed countries.

The low frequency of deaths in a small population over a short period of time will not give me a stable picture: the rates or ratios will appear to jump around.

If I want to get an accurate picture by using household surveys, I would need a huge population size, which would be expensive and time-consuming to do just for my programme.

If I use a type of household survey known as the "sisterhood method" in order to save money and time, the data I would get would be between six and 12 years old, which would not help me monitor the impact of my programme on women's lives today or in the next few years.

SAQ 6 Answer

Process Indicators help planners and programme managers find out: whether EmOC services exist, if these services are well-distributed, if services are being used by women, and some indication about the adequacy of the service.

SAQ 7 Answer.

a. and c.

SAQ 8 Answer.

c.

SAQ 9 Answer.

b. (In fact, as you know, no indicators of any kind can answer question b; most obstetric complications are neither predictable nor preventable - the only way to deal with them is to treat them when they happen to stop them becoming life-threatening).

SAQ 10 Answer

a and c

SAQ 11 Answer

First, not all women will experience the same severity of obstetric complications; that means that many lives can be saved at facilities with Basic EmOC. Second, if women need more comprehensive treatment like blood transfusions or Caesarean Sections, staff at Basic EmOC facilities can help ensure that these women reach hospitals without infections and without suffering from dehydration.

SAQ 12 Answer

Because women experiencing obstetric complications need to be at a reasonable distance from a facility that provides EmOC.

SAQ 13 Answer

15%

SAQ 14 Answer

If the 15% of all births taking place in EmOC facilities include both complications and normal deliveries, then there are women in the population who are experiencing complications without receiving treatment. For me to be sure that women experiencing complications are receiving treatment, then the births with complications being treated in EmOC facilities should equal at least 15% of all births in the population.

SAQ 15 Answer

Because more than 15% of women in a certain population could develop obstetric complications at a given time. Also because, in some parts of the world, health facilities tend to over-diagnose complications.

SAQ 16 Answer

None. By definition, a Basic EmOC facility is one where Caesarean sections are not performed.

SAQ 17 Answer

More Caesarean sections may be being performed than necessary.

Women in rural areas are less likely to reach Comprehensive EmOC facilities than women in urban areas.

Poor women are less likely to make it to a Comprehensive EmOC facility than women who are well-off.

SAQ 18 Answer.

I would look at the condition in which the patient arrives at the facility; and at whether the facility refers severe complications to another facility with more sophisticated services (eg. from a district hospital to a teaching hospital).

SAQ 19 Answer.

a. The case fatality rate should be lower than 1%.

SAQ 20 Answer.

You would not usually collect data about case fatality rates at Basic EmOC facilities, because these facilities send women with severe complications to Comprehensive EmOC facilities, and therefore their records will not show many maternal deaths. However, if you did find such a high case fatality rate at a Basic facility, you would want to address the problem, perhaps by upgrading it to a Comprehensive facility.

SAQ 21 Answer.

The correct answer is (a). You will need more information before you can judge. If the facilities exist but are not functioning well, then the reasons are likely to be lack of trained staff and/or

necessary equipment and supplies. And it is generally more cost-effective to upgrade existing facilities by providing training for staff or posting new staff than to build new hospitals (answer c). As for answer b, you will remember from Module 1 that Traditional Birth Attendants do not have the skills to treat obstetric complications, so b is definitely wrong.

SAQ 22 Answer.

All three. As regards suggested intervention a, hospital staff may need refresher training to build their confidence. Or they may be skilled practitioners, but they may need training in people skills; if women feel that hospital staff are rude to them, they are reluctant to use facilities. As for suggested intervention b, if the cost of service is too high, then women will clearly not use the facilities. The third intervention, c, could also be necessary to find out exactly why women are not using the facilities. In any case, you may always learn something by listening to people.

SAQ 23 Answer.

b. and c. Staff need to be aware of and think through the issues that are causing high case fatality rates. Also, if the supplies are not available, then no amount of trained staff can solve the problem. Answer a is wrong: a community education campaign will not address what is clearly a problem at the facilities.

SAQ 24 Answer

I find all of the Process Indicators in Rezikstan very worrying indeed. Taking the indicators from 1 to 6, this what I should read:

1. *For a population of 950,000, I know I need 8 Basic EmOC facilities and 2 Comprehensive EmOC facilities, and not 2 Basic and 1 Comprehensive. Therefore, obstetric complications are not being treated and women are dying.*
2. *I know that the facilities should not be concentrated in the district capital, but spread out to be within two or three hours of the various population clusters. Women with complications are not reaching the facilities; they are dying.*
3. *The proportion of all births in Basic and Comprehensive EmOC facilities should be at least 15% and not 10%.*
4. *Met need for EmOC should be at least 100% of women with obstetric complications, and not 8%. This tells me that most of the obstetric complications are not making it for treatment; women are dying.*
5. *Caesarean sections should be at least 5% of all births in the population, and not 0.7%. Women who need Caesareans are not getting them; they are dying.*
6. *The case fatality rate of 5% is very, very high - it should be less than 1%. Even if they make it to an EmOC facility, women are dying.*

So, here are the five priority activities I would plan - in order of priority:

1. *I would identify existing health facilities located within two hours of main population clusters in the rural areas.*
2. *I would upgrade 6 facilities to provide Basic EmOC services and 1 facility to provide Comprehensive EmOC, posting staff with appropriate skills, and making sure the right equipment and supplies are available.*
3. *I would conduct a study to examine services at the existing Comprehensive EmOC facility to find out why the case fatality rate is so high.*
4. *I would take appropriate action to enhance services at the existing Comprehensive EmOC facility, for example, posting staff with the right skills, and ensure that the blood bank is appropriately stocked.*

5. *Once I am sure that the facilities have been appropriately enhanced, if utilization is still low, I would conduct a study to find out why the community is not using the facilities. I would follow this up with a community information campaign to alert families to the obstetric complications that lead to death. I would make sure to reach women of reproductive age, as well as their husbands, relatives, and children, traditional birth attendants or community health workers. I would also want to inform the community that the facilities have been enhanced to deal with these complications, and to see what support the community needs to get the women to the facilities on time.*

SAQ 25 Answer

The situation in Belgravia is certainly better than that in Rezikstan. Still, there are some worrying indicators. If I compare the Process Indicators I find with the established standard, this is what I see:

1. *I am only missing one Basic EmOC facility, since for a population of 950,000 I need 8 Basic EmOC and 2 Comprehensive EmOC.*
2. *The geographic distribution is good, since the facilities are spread out through rural as well as urban areas.*
3. *The proportion of all births in EmOC facilities is only 10% - it should be at least 15%. This means some women with obstetric complications are not receiving treatment. Women are dying.*
4. *The met need for EmOC is a worrying 8%, whereas it should be at least 100%. This means the vast majority of obstetric complications are not treated. Women are dying.*
5. *Caesarean sections are only 2%, whereas they should be at least 5%. Again, the majority of obstetric complications are not receiving treatment. Women are dying.*
6. *The case fatality rate is high at 2%, whereas it should be less than 1%. Women are dying.*

My Process Indicators show me that the facilities are there, but are not being used sufficiently, according to indicators 3, 4, and 5. Also, there is still a fairly high case fatality rate at the Comprehensive EmOC facilities. Therefore, my five priority activities would be, in order of priority:

1. *I would conduct a study to find out what the standard of service is like in the two Comprehensive EmOC facilities that exist, and take the measures necessary to improve services. For example, I would ensure that the appropriate skills and supplies exist, or organize weekly meetings for medical staff to discuss what is going wrong.*
2. *I would conduct group discussions amongst the community to find out why they are not using the services, which is revealed by Process Indicators 3, 4, and 5. Is it because of lack of information? Misperceptions about the services? Dissatisfaction with the services received? Lack of funds? Some of the findings would relate to the facilities, and some would relate to the community. (By the way, there is a reason that I would make this my second priority rather than my first priority, even though the indicators tell me that this is the most serious problem. This is because I think I may be able to move immediately on the facilities, since I am an official of the Health Ministry, which is in charge of standards. And I know that the community will not use the facilities unless they are convinced they will find adequate services)*
3. *I would address findings from the group discussions that are specific to the facilities. For example, if the community believe they are being treated poorly by staff, I would provide training for medical professionals on people skills. It is important to bring the facilities up to*

standard before encouraging the community to use them.

4. *I would address findings from the group discussions that are specific to the community, for example, by providing appropriate information, clarifying misperceptions, helping the community to organize community loan funds, etc.*

5. *I would add one Basic EmOC facility close to the population cluster that needs it most.*

SAQ 26 Answer

I was right to be so concerned: my team has identified a 15% case fatality rate. That's terrible. That's much worse than either Belgravia and Rezikstan, and those two countries have made nowhere near the kind of investment my Government has made in new clinics and hospitals, and in staff and equipment. When I look at all six Process Indicators, here is how I read them:

1. *I have more than enough EmOC facilities to meet the population's needs, two more Basic EmOC and 1 more Comprehensive EmOC than the minimum.*

2. *The facilities are well distributed amongst rural and urban areas.*

3. *At 25%, the proportion of all births in EmOC facilities is higher than the minimum.*

4. *Met need is 65%. Now that's good but needs improvement, since it needs to be at least 100%. That means the community is not making as much use of the facilities as they need to be.*

5. *Caesarean sections are 12% of all births - which is fine. It's higher than the minimum of 5% but it's below the maximum of 15%. Of course, I would want to talk with the hospital staff about how they decide when to do a Caesarean section.*

6. *15% case fatality rate - if that's not a printing mistake, it's a disastrous figure. The case fatality rate should be below 1%. Women are reaching the Comprehensive EmOC facilities, and then dying in unacceptably high numbers.*

Here are my five priority actions, in order of priority.

1. *Find out what's really going on at the three Comprehensive EmOC facilities. Are the physicians sufficiently trained to deal with obstetric complications? Do the right supplies and equipment exist? In what condition are patients arriving from the 10 Basic EmOC facilities?*

2. *Address the problems identified at the Comprehensive EmOC facilities.*

3. *Address the problems identified at the Basic EmOC facilities. (If the major problem turns out to be in the Basic EmOC facilities, I would make this priority 2)*

4. *Conduct group discussions to find out why the community is not making as much use of the facilities as they need to, which is revealed by indicator 4.*

5. *Address the findings from the community discussions, whether there are financial constraints, misperceptions, and so on.*

Course Glossary

Anaemia	abnormally low level of red blood cells or low levels of haemoglobin
Antepartum	occurring before childbirth
Antepartum haemorrhage	loss of blood that occurs at any time before delivery
Anti-convulsants	drugs to prevent or relieve convulsions (such as valium)
Basic EmOC	Functions that can be provided by an experienced nurse/midwife or physician, saving the lives of many women, and stabilizing women who need to go further for more sophisticated treatment.
Catchment area	official description of the population and area a health facility is meant to serve
Caesarean section	removal of the foetus by means of an incision into the uterus
Case fatality rate	the number of deaths from a specific condition divided by the number of people with that condition.
Childbearing years	a woman's childbearing years are generally considered to be between ages 15 and 49.
Comprehensive EmOC	includes Basic EmOC functions as well as blood transfusions and Caesarean sections.
Crude birthrate	the births per 1,000 population per year
Direct obstetric death	one due to complications of pregnancy, delivery or the postpartum period.
Eclampsia	coma and convulsive seizures that occur in pregnancy, often around delivery
Ectopic pregnancy	the fertilized egg becomes implanted outside the uterus - to the abdominal cavity, ovary, fallopian tube or cervix
Embolism	obstruction of a blood vessel, usually by a blood clot
Fistula	an abnormal passage between two cavities (vagina/bladder, vagina/rectum)

Haemorrhage	loss of blood
Hepatitis	inflammation of the liver of viral or toxic origin
Hypertension	high blood pressure, usually above 140/90.
Impact indicators	these give an indication of changes in the target event, eg in the numbers of maternal deaths
Indicators	Measurements or statistics used for assessing needs, tracking implementation, and evaluating progress
Indirect obstetric death	one due to existing medical conditions that are made worse by pregnancy or delivery
Lifetime risk of maternal death	the likelihood that an average woman will die of maternal causes. This is calculated using both the average risk associated with pregnancy, and the average number of times a woman becomes pregnant
Live births	a term used for statistical purposes indicating an infant born with signs of life
Maternal deaths	the death of a women while pregnant or within 42 days of termination or pregnancy.
Maternal morbidity	pregnancy-related illness and/or disability
Maternal mortality	a statistic based on the number of maternal deaths
Maternal Mortality Rate	the number of maternal deaths per 100,000 women of reproductive age per year
Maternal Mortality Ratio	the number of maternal deaths per 100,000 live births
Met need for EmOC	the proportion of women who need treatment for obstetric complications that receive such treatment
Midwife	a professional practitioner who has undergone comprehensive training in an accredited midwifery programme, and is equipped to assist normal births and to diagnose and manage complications during childbirth
Needs assessment	a review to gain a deeper understanding of the problems a population, or a health facility, or government ministry faces in order to design programmes that address these specific problems.

Obstetric services indicator	a statistic that measures the availability , utilization, or quality of obstetric care
Obstructed labour	occurs when the infant cannot pass through the mother's pelvis, either because the infant's head is too large, or the infant is incorrectly positioned for the journey through the birth canal
Oxytocic drugs	a term applied to any drug that stimulates contractions of the uterus in order to induce or accelerate labour
Parenteral	any route other than the alimentary canal, eg. intravenous
Placenta	the spongy structure in the uterus through which the foetus derives its nourishment
Postpartum	occurring after childbirth
Postpartum haemorrhage	excessive loss of blood that occurs after childbirth, usually in the first two days after delivery
Participatory group discussion	this brings together the range of people involved in a given problem to better understand the nature of the problem.
Pre-eclampsia	a condition in pregnancy characterized by hypertension, headaches, and swelling of the feet and legs
Process indicators	these measure changes in activities that contribute to or prevent a specific occurrence, such as maternal deaths.
Ruptured uterus	split in wall of uterus, often due to unrelieved obstructed labour
Signal functions	those functions that are absolutely necessary to save women's lives in case of obstetric complication
Total Fertility rate	average number of children per woman at current fertility rates
Traditional birth attendant	person without formal medical training who assists women during pregnancy or at delivery

Further Reading

Most of the material in this module is based on:

UNICEF/WHO/UNFPA, *Guidelines for Monitoring the Availability and Use of Obstetric Services*, UNICEF, New York, October 1997.

This together with four other publications constitute the suggested further reading for this course:

Columbia University, *Prevention of Maternal Mortality Network: PMM Results Conference Abstracts*, New York, 1996.

Healthlink Worldwide, *HIV and Safe Motherhood*, 2000.

Maine, Deborah, *Safe Motherhood Programs: Options and Issues*, Columbia University, New York, 1991.

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