Distance Learning System on Population Issues

Course 6

Reducing Maternal Deaths: Selecting Priorities, Tracking Progress

MODULE 1: Understanding the Causes of Maternal Deaths

ACKNOWLEDGEMENTS

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

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- 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. 15, 31, 36, and 41 taken by Czikus Carriere on behalf of AMDD.

MODULE 1:
Understanding the Causes of Maternal Deaths

Table of Contents

Section 6

"For our project on maternal mortality, I was asked to spend 24 hours in a rural health clinic, and to observe everything that happened. During the night, a woman was admitted for delivery. She delivered safely, and both mother and child were fine.

"Suddenly, the woman started having fits. The two staff members on duty had no idea what to do. They had never faced an emergency like this before. I asked them for some drugs to relieve the patient's seizures, but there were no drugs of any kind at the clinic, not even valium.

"I am a nurse-midwife with 20 years' experience. But without any supplies there was nothing I could do for this woman, except to stop her swallowing her tongue. I watched helplessly as she had fits for five hours. And then she died.... and then she died."

Kenyan nurse-midwife

1999

Introduction to the course

This is the first module of our course on maternal deaths. The full course consists of three modules and should take you around 40 hours of study to complete. This module will provide you with an introduction to the subject of maternal deaths.

As the author of this course, what I would like to achieve in writing it is spelt out in the course aim which follows immediately after this page. What I hope that you will be able to do after completing the course is defined in the course objectives which follows the course aim.

It will take you about 14 hours to cover the material in these pages. Now, 14 hours may seem to you like a long time to spend on an introduction. The reason is that Module 1 will give you the foundation you will need to acquire the tools to increase the likelihood that policies and programmes tackle maternal deaths effectively.

By the end of this module, you will be able to list the main causes of death, and to define many of the terms used in dealing with the issue. You will also be able to point to the ways in which maternal mortality differs from other health problems, such as infant mortality.

Once you have studied this module, you will be able to explain why emergency obstetric care is central to reducing maternal deaths. You will also be able to explain why most of the complications that cause maternal deaths can neither be predicted nor prevented - yet can be successfully treated once they occur. You will understand the reasons for the continued high incidence of maternal mortality in developing countries.

The two remaining modules in this course will provide you with indicators that are used to assess progress on maternal mortality (Module 2), as well as ways to ensure that the reduction of maternal deaths is targeted through national policies and programmes (Module 3).

I have included illustrations and case studies in the text so as to provide you with examples from real-life experience of the problems encountered in dealing with avoidable maternal deaths. Many health practitioners have struggled with these issues. They have found ways to ensure that women who need emergency obstetric care are able to get it on time, making it possible to save most of the lives at risk. It can be done.

As you study this course, you will find a number of self-assessment questions (SAQs). These are included so that you can test yourself on how well you have mastered the material before moving on to the next section of the course. You should attempt these when you reach them in the text. I have provided suggested answers to the SAQs in the back of this module. To derive the maximum benefit from the questions, you should attempt to answer the questions in writing before looking at the answer provided.

Aim and objectives of Module 1

Aim:

Understand the central role of emergency obstetric care in reducing maternal deaths.

Objectives:

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

1. Explain these terms - maternal deaths, maternal mortality, maternal morbidity, maternal mortality ratio, maternal mortality rate, lifetime risk, professional midwives, traditional birth attendants, essential obstetric care (EOC), and emergency obstetric care (EMOC).
   (SAQ1, SAQ2, SAQ3, SAQ4).
2. List the five main direct causes of maternal deaths
   (SAQ5, SAQ6, SAQ7).
3. Explain why most serious obstetric complications are not predictable or preventable.
   (SAQ8, SAQ9, SAQ10).
4. Explain why community-based initiatives alone are not sufficient to reduce maternal deaths.
   (SAQ11, SAQ12, SAQ13, SAQ14, SAQ15).
5. List some differences between maternal mortality and infant mortality.
   (SAQ16, SAQ17).
6. Show how lack of emergency obstetric care sustains a high incidence of maternal mortality.
   (SAQ18, SAQ19).
7. Show how availability of emergency obstetric care reduces maternal deaths.
   (SAQ20, SAQ21, SAQ22).
8. Understand the reasons for the continued high rate of maternal mortality in developing countries.
   (SAQ23).

Section 1: Maternal Deaths

1.0 Introduction to Maternal Deaths

In this section, I am going to provide you with a short introduction to the problem of maternal deaths, and to give you some information about where this problem is most serious today. I will also provide you with definitions for the following terms: maternal deaths, maternal mortality, maternal morbidity, maternal mortality ratio, maternal mortality rate, and lifetime risk. At the end of this section you will be able to describe the size of the problem and to relate it to your own country.

1.1 Definition of Maternal Deaths

The World Health Organization (WHO) estimates that there are 515,000 maternal deaths world wide every year (WHO/UNICEF/UNFPA, 2001). This is more than one every minute.
The WHO definition of a maternal death is given in Box 1.

The WHO definition very clearly establishes those deaths we can include when we talk about maternal mortality. The death must have been caused by a complication related to a woman's pregnancy. This complication can occur while she is pregnant, during delivery, or up to 42 days after the pregnancy ends.

So, for example, if a pregnant woman dies in a car accident, this is tragic, but it is not a maternal death: the cause of her death is not related to her pregnancy. I will provide you with the main causes of pregnancy-related deaths in Section 2.

You may wonder where the 42 days, or six weeks, came from. It is in a sense an arbitrary cut-off point. In many cultures, a period of 40 days is traditionally considered necessary for women to fully recover from pregnancy.
Yet some women may well die of pregnancy-related factors after 42 days. For the purposes of this course, the WHO definition is used.

Box 1

A maternal death is "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration or site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental causes"

World Health Organization

You have probably often come across the term “maternal mortality”. The meaning is the same as in maternal deaths, except that this is the term used when referring to statistics about maternal deaths. For example, you will see that I refer to the maternal mortality ratio in Section 1.2.

During this course, I will refer to “maternal deaths” to describe the problem itself, and to “maternal mortality” when referring to statistics about the problem.

In addition to maternal deaths, between 18 and 60 million women a year are estimated to suffer illness and disability as a result of pregnancy (UNICEF, 1999). One of the most serious illnesses is obstetric fistula (this can occur after obstructed labour and leads to continual leakage of urine or faeces). The term maternal morbidity refers to pregnancy-related illness and disability.

I will mostly be dealing with maternal deaths rather than morbidity in this course. I just wanted to define the term “maternal morbidity” for you, and to let you know that many of the emergencies that lead to chronic maternal morbidity can be addressed by the same interventions to prevent maternal deaths.

Where do maternal deaths take place today? Of these deaths, 99% occur in Africa, Asia, and Latin America, ie in the developing countries. Only 1% occur in developed countries. You might think that this is to be expected because most unnecessary deaths of all sorts occur in developing countries, due to factors like poverty and illiteracy. **However, the discrepancy between developed and developing countries is much greater for maternal deaths than for most other health problems.**

For example, in Bangladesh, Egypt, India, and Indonesia, more than one out of every five deaths among women in their childbearing years is related to pregnancy (Maine, 1991). By contrast, in the United States, only one out of every 200 deaths among childbearing women is a maternal death.

Overall, maternal deaths often account for more than one quarter of deaths among women in developing countries. By contrast, such deaths represent less than 1% of deaths among women in developed countries.

1.2 "Conventional" Ways Used to Measure Maternal Mortality

How do we measure progress in reducing maternal mortality? In the next few paragraphs, I will walk you through two ways that are generally used: the first is a ratio, and the second is a rate.

Box 2

Maternal Mortality Ratio: number of maternal deaths per 100,000 live births

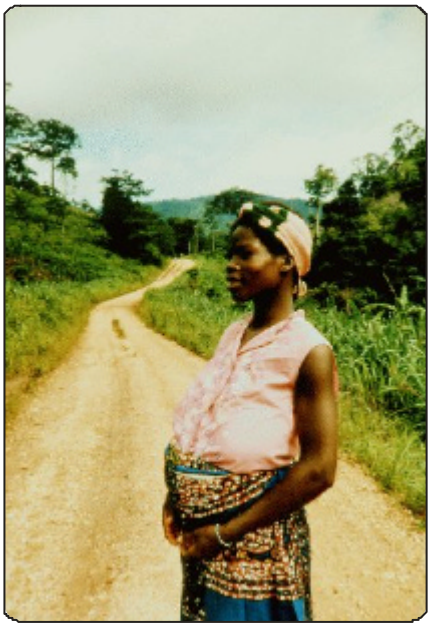
Box 3

Maternal Mortality Rate: number of maternal deaths per 100,000 women of reproductive age per year

You should take care to understand the difference between Maternal Mortality Rate and Maternal Mortality Ratio as these terms are very important and will occur frequently in the course.

The maternal mortality ratio is the most commonly used measurement. This is defined as the number of maternal deaths per 100,000 live births. In other words, it expresses the risk of death amongst women once they become pregnant.

The ratio provides a startling snapshot of the risks pregnant women are likely to face in each country. For example, the maternal mortality ratio is estimated to be 850 in Bangladesh (WHO and UNICEF, 1996). In India, the estimated ratio is 570. In Ethiopia it is 1,400, Indonesia 650, Egypt 170, Jamaica 120, and Colombia 100. What makes the statistic more horrifying, is that almost all the women who die can be saved. In the United States, the ratio is 12.



Now, you should note that some people refer to the maternal mortality ratio as the maternal mortality "rate". However, this statistic is not really a rate, because the numerator (maternal deaths), is not part of the denominator (live births), and the element of time has not been factored in.

The true maternal mortality rate is the number of women who die from maternal causes per 100,000 women of childbearing age, each year. In this case, the numerator (maternal deaths) is part of the denominator (women of reproductive age), and the element of time has been factored in. This rate shows us the annual impact of maternal deaths on the total population of women of reproductive age.

The maternal mortality rate is less commonly used than the maternal mortality ratio. Some examples of national maternal mortality rates calculated in the early 1990s are: Malawi, where each year 160 women out of every 100,000 women of childbearing age are likely to die from pregnancy-related complications; Senegal, where the rate is 110; Bolivia 60; Indonesia, 40; Egypt; and the Philippines 30. In the United States, the maternal mortality rate is just three (Stanton, 1997).

The rate tells us what the impact of maternal deaths is on the population of women. But there is another, more eloquent, way to look at the problem, and that is how it affects an average woman. As you know, most women become pregnant more than once. But what you may not have given much thought to - I certainly hadn't - is this: every time a woman becomes pregnant, she runs the risk of maternal death all over again.

This is known as a woman's lifetime risk. It is the average risk associated with pregnancy (the maternal mortality ratio), together with the average number of times a woman becomes pregnant. Estimates of lifetime risk have been calculated for different geographic regions: 1 in 16 for Africa, in 65 for Asia, in 130 for Latin America and the Caribbean, and in 3,200 in Western Europe. (WHO and UNICEF, 1996)

In other words, at current levels of fertility and mortality, one out of every 16 women in Africa will die of complications related to pregnancy or delivery, whereas this is only likely to happen to one out of every 3,200 women in Europe.

Table 1
Estimates of Maternal Mortality by United Nations Regions, 1990

	Maternal Mortality Ratio	Lifetime Risk of Maternal Death - 1 in:
World Total	430	60
Africa	870	16
Asia	390	65
Europe	36	1,400
Western Europe	17	3,200
Latin America & Caribbean	190	130
North America	11	3,700
Australia-New Zealand	10	3,600

Source: WHO and UNICEF, 1996

At this point, you may be wondering whether the maternal mortality ratio has been calculated or estimated for your country. If it does not take too much of your time, it would be useful for you to look up the maternal mortality ratio for your country. One reference you could use is WHO and UNICEF, 1996. See for yourself how much at risk women in your country are thought to be, between the ratio of 1,400 women per 100,000 live births for Ethiopia and that of 100 women per 100,000 live births for Colombia.

However, if you do not find the ratio for your country, you should not spend too much time tracking it down. Experience shows that maternal mortality is very difficult to measure accurately. Even in developed countries, where almost all deaths are recorded, there is often no record of the fact that a woman was pregnant at or shortly before her death. In developing countries, many deaths are not recorded, and the cause of death is often not given.

So, the figures I have given you above are estimates, even though they are based on the best information available, and are in general use. The value of these estimates is to highlight the severity of this problem, and to show us the disparity between developed and developing countries.

It would cost a huge amount of money - and take an enormous amount of time - to measure the exact maternal mortality ratio for any given country. This is money that would be better spent on programmes to reduce maternal deaths.

If that is the case, you might ask, then how can we know the size of the problem we are facing in order to design appropriate interventions? And how do we know when our programmes are making a difference?

These are good questions. And, thanks to the joint efforts of the United Nations, Columbia University, and others, we now have some ways of measuring and comparing data. We can use process indicators to measure problems and monitor progress in a way that is relevant to national policies and programmes. These indicators will be the main subject of Module 2.

1.3 Summary of Section 1

In this Section, I have defined the terms maternal deaths, maternal mortality and morbidity, as well as maternal mortality ratio, maternal mortality rate, and lifetime risk. I have also described the size of the problem, and helped you see how it relates to your own country. I have noted that there are some problems in achieving accurate measurements of maternal mortality, and I will go into more detail about these problems in Module 2.

In the remaining four sections of this module, I will cover the major causes of maternal deaths, give you a brief history of the efforts to address this problem, point out some of the ways that maternal mortality differs from infant mortality, and explain the central role of emergency obstetric care.

But first, some SAQs. Attempt each of the questions below before looking at the answers given in the back of this module. If you have made a reasonable attempt at them and feel that you understand the material covered so far, move on to Section 2. If you had trouble in getting near to the given answers, you may consider it worthwhile to rework parts of Section 1.

SAQ 1

In 30 words or less, define the term “maternal deaths”.

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SAQ 2

Give the estimated maternal mortality ratio for Egypt, Colombia, and Bangladesh.

COUNTRY	Maternal Mortality ratio
Egypt	
Colombia	
Bangladesh	

SAQ 3

In 30 words or less, define the difference between a maternal mortality ratio and a maternal mortality rate.

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SAQ 4

Make three statements to describe the magnitude of maternal deaths in developing countries.

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2. .....

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3. .....

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Section 2: The Causes of Maternal Deaths

2.0 Introduction to the Causes of Maternal Deaths

In this short section, I will take you through the major causes of maternal deaths. You will learn that there are five medical conditions that cause of the majority of maternal deaths in developing countries. You will also learn that the technology to deal with most of the likely complications of pregnancy has existed for decades.

2.1 The Causes of Maternal Deaths

Maternal deaths happen for two reasons: either a complication that develops directly as a result of pregnancy, delivery or the postpartum period (a "direct obstetric death"), or due to an existing medical condition (an "indirect obstetric death").

Box 4

Direct obstetric death: a maternal death due to complications during pregnancy, delivery or in the postpartum period.

Box 5

Indirect obstetric death: one due to existing medical conditions that are made worse by pregnancy or delivery.

Indirect obstetric deaths stem from existing conditions which a woman in a developing country may suffer, such as malaria, anaemia, hepatitis, rheumatic heart disease, or HIV and AIDS. These conditions may be made worse by pregnancy, and may lead to death.

Indirect obstetric deaths account for about 25% of all maternal deaths in developing countries. This percentage is increasing because of the impact of HIV and AIDS, which is sweeping through sub-Saharan Africa and other countries with devastating effect. (In 1988, it was estimated that approximately two million HIV-positive women worldwide would give birth.) In several major towns in eastern and southern Africa, more than a quarter of pregnant women are now HIV positive. Women with HIV are more likely to have complications during pregnancy and delivery, or abortion.

Direct obstetric deaths account for about 75% of all maternal deaths in developing countries. In other words, there are three times as many direct obstetric deaths as there are indirect obstetric deaths. There are five major medical causes of direct obstetric death. Listed in order of importance, they are:

- haemorrhage
- complications of unsafe abortion
- pregnancy-induced hypertension (eclampsia)
- obstructed labour (including ruptured uterus)
- Infection.

As you can see in Figure 1, the five medical causes account for the vast majority (86%) of direct obstetric deaths; the remaining 14% of direct obstetric deaths are caused by a variety of other medical causes.

If you then turn to Figure 2, you will see that, in fact, the five medical causes of direct obstetric death account for nearly two-thirds of all maternal deaths. (As I noted above, HIV/AIDS may change this picture).

Figure 1
Direct Obstetric Deaths

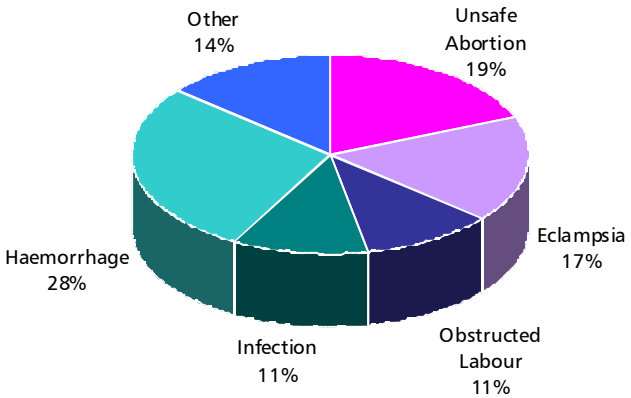
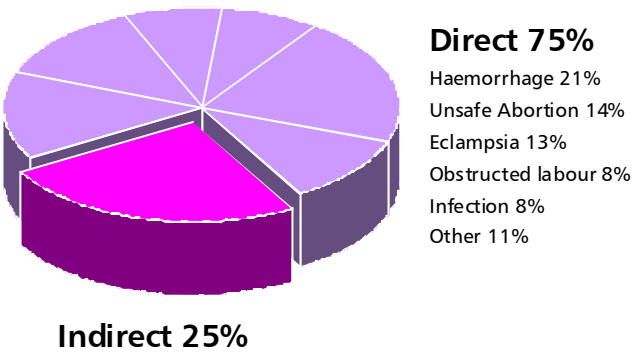


Figure 2
All maternal Deaths



The tragedy here is that these causes do not have to lead to death. If they can be treated in time, almost all women who develop such complications can be saved. Indeed, the medical technology to prevent almost all deaths from common obstetric complications has been available for nearly half a century.

Many of these complications can be treated before they become emergencies, and almost all can be treated even if they do become emergencies. You may wonder if developing countries can really afford the technology to deal with these emergencies. In fact, the technology is relatively simple and inexpensive. It includes, for example, blood transfusions, antibiotics and other drugs, caesarean sections, and safe abortion procedures.

Today, in developed countries, where the technology exists, deaths rarely take place from complications such as haemorrhage and infection, which account for 21% and 8% respectively of maternal deaths in developing countries. As I noted in the previous section, the maternal mortality ratio in a country like the United States is only 12 per 100,000 live births. Most of the maternal deaths in the United States stem from medical problems that are more difficult to treat, such as embolism.

2.2 Summary of Section 2

In this Section, I have defined the terms direct and indirect obstetric death. I have explained the causes of maternal deaths, and showed that five medical causes account for the majority of all maternal deaths. I mentioned that the technology to deal with these causes has existed for decades, and that women in developed countries rarely die from the common obstetric complications that lead to death in developing countries.

SAQ 5

List the five major medical causes of maternal deaths.

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2. .....

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4. .....

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5. .....

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SAQ 6

True or False?

		TRUE	FALSE
a.	The most significant medical cause of maternal deaths in developing countries is obstructed labour.		
b.	In general, pre-existing medical conditions account for the majority of maternal deaths.		
c.	An estimated 75% of maternal deaths are due to complications of pregnancy, delivery, or the postpartum period.		

SAQ 7

What is the major medical cause of maternal deaths?

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Section 3: Some Previous Efforts to Address Maternal Deaths

3.0 Introduction

In the two previous sections, you learned how to define maternal deaths, and the statistics (eg. ratio and rate) that are generally used to assess the scale of maternal mortality. You also learned about the five major medical causes of maternal deaths.

In this section, I will review some of the attempts to address and reduce the problem of maternal deaths in developing countries over the past two decades. You will see that some of these have focused on predicting which women are at risk of developing obstetric complications, in an effort to prevent such complications. Other attempts have highlighted training "traditional birth attendants" (TBAs). Still other initiatives have focused on informing the community.

I will provide you with case studies that show why it is, in fact, almost impossible to predict or prevent most serious obstetric complications. By the end of the section, you will have the background necessary to move on to Section 4, and will understand the central role of emergency obstetric care in reducing maternal deaths.

3.1 Previous Efforts to Address Maternal Deaths in Developing Countries

The world's interest in and commitment to addressing the problem of maternal deaths in developing countries was given expression at an international conference convened in Nairobi, Kenya in 1987, which launched the Safe Motherhood Initiative.

The goal of reducing maternal deaths was reaffirmed at a series of international conferences during the 1990s, which set as a target the reduction of maternal mortality by half by the year 2000. These included: the 1990 World Summit for Children, organized by the United Nations Children's Fund (UNICEF) in New York, the 1994 International Conference on Population and

Development, organized by UNFPA in Cairo, and the 1995 Fourth World Conference on Women organized by the United Nations in Beijing.

In July 1999, the five-year review of progress since the International Conference on Population Development (ICPD+5), reaffirmed the commitment to reducing maternal mortality as a health sector priority.

Unfortunately, maternal deaths continue to be unacceptably high in developing countries. This is why it is so important to understand the reasons for the continued occurrence of maternal deaths at such high frequency, which is the focus of this module.

In order to understand what initiatives can really reduce the numbers of maternal deaths, it is useful to review some of the efforts that have been made over the years. In the next few pages, I will review three types of initiative: screening women in an effort to predict and prevent obstetric complications; training traditional birth attendants; and informing the community.

3.1.1 Prediction and Prevention

On the face of it, it does sound like a good idea to try to identify which women are most likely to develop obstetric complications. For example, I mentioned in Section 2 that pre-existing health problems lead to 25% of maternal deaths in developing countries. These include HIV/AIDS, malaria, anaemia, and hepatitis.

In developed countries, most pregnant women visit doctors and clinics throughout their pregnancy. In developing countries, these visits are far less frequent, due in part to the lack of resources to establish clinics, and to other factors such as the distances in rural areas that women have to travel to reach such facilities.

Prenatal visits do promote the overall health of the woman and the child she is expecting. Such visits can certainly identify and treat pre-existing health problems which are among the indirect causes of obstetric death.

But what do these visits tell us about the direct obstetric causes of maternal deaths, which we know account for about 75% of such deaths? Should we try to screen all pregnant women to identify such causes? The specific question I would like you to keep in mind as we work through the rest of this Section is this: Will screening pregnant women tell us who is at risk of developing obstetric complications and help us to prevent such complications?

There are some problems that arise during pregnancy and that can be detected during prenatal visits, for example, minor bleeding, mal-positioning of the foetus, hypertension, and other problems. Minor bleeding may be a warning sign that a major

haemorrhage could occur during pregnancy and before birth (antepartum haemorrhage). Similarly, hypertension can be detected, and bed rest, sedatives, and anti-hypertension drugs can be prescribed to help avoid this becoming life-threatening.

The fact is, if these problems are detected, it means they have already occurred. As such, they were not predicted or prevented, but rather they were treated before they developed into life-threatening complications. And, in spite of the precautions, a major antepartum haemorrhage could still occur. And, if and when it occurs, such a haemorrhage must be dealt with at a facility equipped for surgery - which, by the way, most prenatal clinics are not.

More importantly, no amount of screening can predict major haemorrhages after delivery (postpartum haemorrhage). You will remember that haemorrhage is the major cause of death for pregnant women in developing countries. It is responsible for a third of direct obstetric deaths and a fifth of all maternal deaths. We can neither predict nor prevent most postpartum haemorrhages. We need to have the skilled staff, equipment, and supplies to deal with this when it happens.

As for eclampsia, research has shown that many eclampsia cases can occur without warning during or after delivery. In developing countries, eclampsia is responsible for 17% of direct obstetric deaths and 13% of all maternal deaths.

Eclampsia was the cause of death in the story related by the Kenyan nurse-midwife at the beginning of this module. It happened after delivery. Its onset was sudden and completely unpredictable. Still, it could have been dealt with as soon as it happened. There was plenty of time to do so.

However, at the rural clinic where this nurse-midwife was conducting her observation, the staff were not trained to deal with emergencies. And the clinic had neither the equipment nor the supplies necessary to treat eclampsia. The woman had fits for five hours, “and then she died”.

In short, we cannot prevent bleeding during pregnancy and hypertension, but we can treat these so as to avoid their becoming life-threatening. Often, we can neither predict nor prevent major haemorrhage, whether antepartum or postpartum, or full-blown eclampsia, but we can treat these emergencies if we have the right staff, supplies and equipment.

It is a fact that complications from unsafe abortion are a major medical cause of death. They account for an estimated 14% of all maternal deaths. As with other complications that lead to maternal death, complications from unsafe abortions can be treated given the right staff, supplies, and equipment.

UNFPA does not, as a matter of policy, support abortion as a method of family planning. The organization believes that prevention of abortion is achieved by maximising access to the widest possible range of family planning methods for all women

and men of reproductive age. The organization will support programmes to prevent, manage and treat the complications of unsafe abortions and to provide post-abortion counselling and family planning.

As for the other two major medical causes of maternal deaths - obstructed labour and infection - in many cases they can neither be predicted nor prevented. It is worth noting that prolonged labour itself leads to infection. Yet these two complications can be treated if addressed in time. Together, these two medical causes account for 16% of all maternal deaths in developing countries.

The fact is, there is no way to tell which pregnant women will develop obstetric complications. All pregnant women are at risk. It is possible to identify some of the high-risk groups, for example, women who have experienced complications during an earlier pregnancy, or women whose youth or age puts them at risk. But even within such groups, it is not possible to identify the individual women who will develop complications. This is the case in developed countries as well as in developing countries.

According to a study published in the Lancet in 1980 (Hall et al), researchers in Aberdeen, United Kingdom, found that the majority of antenatal admissions to the hospital - other than for delivery - were for conditions that had arisen despite routine antenatal care. Antenatal vists had neither detected nor prevented the complications from occurring.

The impossibility of predicting or preventing most obstetric complications is illustrated by the case study from the

Box 6

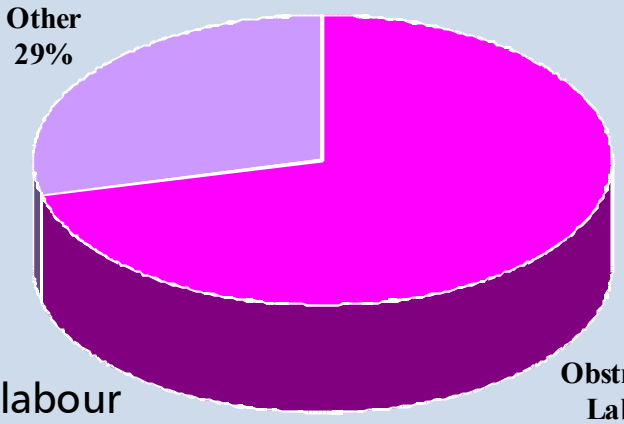
Between 1971 and 1975, pregnant women who came to the Kasongo health centre in Congo were evaluated for their risk of developing obstetric complications (Kasongo Project Team, 1984).

The researchers found that women who had previously had a stillbirth or an infant that had died during the first week of life, or who had required medical intervention during delivery were almost 10 times as likely as women without this kind of history to have an obstructed labour during their current pregnancy.

Thus, women with a "bad obstetric history" were considered to be "high risk". This also included women who were too young or too old, or who had had multiple pregnancies. Other women were considered to be "low risk".

But when the researchers studied how many women actually experienced obstructed labour during delivery, they found that 71% of the cases of obstructed labour were in the "low risk" group, and their complication had not been predicted by the screening programme. Thus, the majority of cases of obstructed labour were not predicted, as is shown in Figure 3.

Figure 3

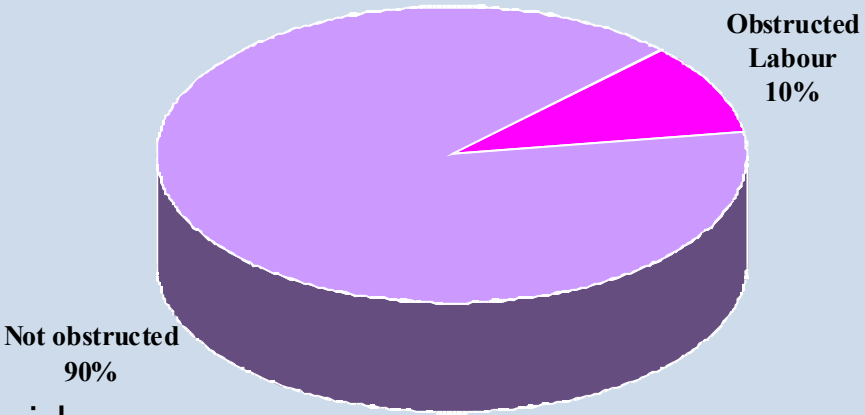


71% of obstructed labour cases occurred amongst women in the "low risk" group

This means that a large number of women who were considered “low risk” developed the kind of complication that could lead to death. In fact, the so-called “low risk” women accounted for twice as many cases as the “high-risk” women. Screening had not predicted the fact that they would develop complications.

Meanwhile, if you looked at the “high risk” women as a group, you would see that 90% of the women who were thought to be “high risk” - that is, women who did have a bad obstetric history - did not develop obstructed labour.

Figure 4



90% of high-risk women had normal deliveries

In other words, the vast majority of women who were thought to be “high risk” were not. They went on to have perfectly normal pregnancies, as is shown in Figure 4.

Democratic Republic of Congo (which was known as Zaire at the time of the study) which I provide in Box 6.

What the case study in Box 6 shows us is that there is no such thing as “no risk” women. All pregnant women are at risk. In the Congo example, seven out of 10 of the obstructed labour cases were not predicted; and nine out of 10 predictions were wrong.

This is not just the case in developing countries. It is also the case in developed countries. Take an example from the United States. In a programme to intensively screen a group of women who wanted to give birth in nonhospital birth centres, the women were screened for existing medical conditions and risk factors (Weatherby, 1990). The aim was to ensure that “low risk” women delivered in birth centres, and that “high risk” women delivered in hospitals.

In all, 11,910 women were screened. Despite this intensive screening, 7.6% of these women experienced a serious complication. Half of the women who developed these complications had no previous medical or obstetric risk factors. This shows that screening does not predict complications. And, of course, the fact that complications actually occurred shows that screening does not prevent complications. When a complication occurs, women need to be treated by staff with the right skills, drugs, and equipment.

What the evidence from Congo and the United States shows us is that we have no way of knowing which women will develop complications. To put it another way, any pregnant woman can develop complications at any time during pregnancy, at delivery, or in the postpartum period.

This means that all pregnant women are at risk. We cannot predict or prevent most of the obstetric complications that lead to death. What is also clear from the examples from Congo and the United States, is that these complications occur very suddenly. Even in a developed country like the United States or the United Kingdom, their occurrence cannot be prevented. However, they can be treated when they occur. In developed countries, there are the facilities to do so, and, in developed countries, the maternal mortality ratio is now very low.

This is particularly significant in terms of planning programmes to address the problem of maternal deaths in developing countries, where resources are scarce. Resources to address maternal deaths should not be spent trying to predict which women will develop complications, since we will never be able to do so. Funds need to be spent where they will make a difference, and that means making adequate treatment available to women who develop complications.

I do not want you to get the impression from the above discussion that all women have to deliver in hospitals in order to reduce maternal deaths. Even if women wanted to - which many

do not - most developing countries simply do not have the resources to provide hospital deliveries for all women.

There are other ways to ensure that obstetric complications are dealt with when they arise, and I will cover these in more detail in Modules 2 and 3. And now, a few more SAQs!

SAQ 8

In 50 words or less, describe the kind of obstetric complications that could be detected during prenatal visits. Can we prevent these complications?

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SAQ 9

In Kasongo, Congo, what proportion of women with bad obstetric history suffered from obstructed labour during their next pregnancy? What proportion of women without a bad obstetric history suffered from this complication?

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SAQ 10

Give examples of three serious obstetric complications that cannot be detected through screening. What percentage of all maternal deaths do such complications account for? Do not write more than 40 words.

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3.1.2 Training Traditional Birth Attendants

I mentioned in the introduction to this Section that you would learn about three things: efforts to predict and prevent obstetric complications, training of traditional birth attendants, and informing the community. You have covered the problems associated with prediction and prevention. Now I will set out the issues related to training traditional birth attendants, before moving on to the question of educating the community.

Traditional birth attendant (TBA) is a term used to refer to a person who provides a range of services to a community, from assisting during pregnancy to assisting in delivery. In some cases, the TBA is a clearly identified job, in others, the TBA is a relative who helps members of the family. TBAs do not have formal medical training, though some have been trained to avoid dangerous or unclean practices.

Many agencies support programmes to train TBAs. They generally give one or more of the following reasons: most women in developing countries still deliver at home; TBAs already live in rural areas, where people have least access to modern medical care; TBAs are paid by women and their families, and so do not pose a burden to the public purse; TBAs are often respected members of the community.

These sound like good reasons to train TBAs. It should be possible to train TBAs on nutrition and hygiene. Ensuring that the umbilical cord is cut cleanly reduces the risk of neonatal tetanus. Moreover, in theory, postpartum infection could be prevented through clean delivery. Unfortunately, recent research shows that this is often not the case and that programmes to train TBAs should be re-evaluated (Goodburn et al, 2000).

In addition, some TBAs mistakenly believe that certain practices help women during delivery, although these in fact cause harm. Examples of such procedures include pushing on the abdomen to hasten delivery or cutting a slit in the vagina. Training of TBAs could at least help to stop negative practices. The reality of life in many developing countries is that women use TBAs because they have no other choice.

In any case, the key question I would like you to reflect on is this: what can TBAs actually do to help reduce maternal deaths? More specifically, what can they do to deal with the obstetric complications that we know cause the majority of maternal deaths?

By definition, TBAs are not medical professionals. They do not have the lifesaving skills necessary to deal with life-threatening problems. They cannot treat women with haemorrhage, eclampsia, obstructed labour, or other obstetric complications which are the main causes of maternal deaths.

It is especially important to note that TBAs are not the same as midwives. A midwife is a professional practitioner who has undergone training in an accredited midwifery programme, and is equipped to assist normal births and to diagnose and manage complications during childbirth

TBAs, as well as other members of the community, can be shown how to recognize obstetric complications, and how to ensure that women experiencing these complications are referred immediately to functioning clinics or hospital that have the staff, equipment and supplies to deal with these emergencies. This is, of course, assuming that such facilities exist and are within reach.

In short, when it comes to reducing maternal deaths, the most we can expect from TBAs is, like other members of a community, to recognize signs of danger and to help women reach an adequate health facility. Thus, we should focus the resources available to us on making sure that appropriate facilities exist within close enough range to save women's lives, and that these are functioning facilities with the right staff, supplies and equipment.

SAQ 11

Based on what you have studied, what do you think TBAs can do to help reduce the number of maternal deaths? Do not write more than 100 words.

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SAQ 12

If you had a million dollars for a health programme, and your aim was to reduce maternal deaths, which would you make your highest priority: screening programmes; training programmes for TBAs; upgrading supplies, skills and equipment at health facilities? Answer in 70 words or less.

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3.1.3 Information and Mobilization Initiatives in the Community

Increasing attention is being paid to the role of the community in health programmes, both in terms of identifying problems and organizing solutions. Even so, often, central governments or external agents still underestimate the extent to which communities make rational decisions based on the information they have. They also underestimate the resources communities can mobilize once they are convinced that a course of action is correct.

As I pointed out in the section on TBAs above, if functioning health facilities are not within reach of women facing obstetric complications, then there is nothing a family or community can do to save women's lives, no matter how much time is spent on information and mobilization campaigns.

Box 7

"It is cheaper for our women to die at home. You make us send them to the rural clinic when they experience a problem in pregnancy. The clinic sends them to the hospital in the provincial capital. The provincial hospital sends them to the hospital in the capital city. And there they die. And then we have to pay to bring the body back"

African community leader

To repeat: if functioning health facilities are not available, then no amount of information and mobilization in the community will convince them that they should send their women to these facilities for treatment. Thus, there are two types of mobilization activities for the community I want to consider: the first, if adequate facilities exist, and the second, if adequate facilities do not exist.

In the first type of situation, I am assuming that adequate facilities do exist within reasonable reach of a community. In this case, an information and mobilization programme for the community should focus on those issues that may be preventing the community from using them. There may be misperceptions about such facilities; if so, these need to be corrected. If, for example, women with prolonged labour stay at home because they are afraid of the hospital, then their chances of dying increase. A project in which community members were given a tour of the facility and encouraged to ask questions or make suggestions might correct these misperceptions.

Families may be too poor to organize transport, or taxi drivers may be reluctant to transport emergency cases. In these cases, communities can establish a general fund that would be available for any family facing an emergency, on condition that families repay the fund when they are able to do so. Communities can also organize arrangements with local transport unions. In some cases, cultural factors may be at play. If women live in parts of the world where only the husband can make the decision and the husband is absent, then their chances of surviving obstetric complications are slim.

There are other realities that communities face, such as impassable roads and long distances to reach functioning facilities. In many rural areas, rains make the roads impassable for weeks on end.

Another reality regarding access to health care is the cost of treatment and supplies. In many African countries, patients and their families must now buy essential supplies (such as drugs,

gloves, and sutures), before treatment can begin. Again, community loan funds or other measures can help.

These are all issues that can be addressed through information and mobilization initiatives in the community. In addition, if functioning facilities are available, it is also important to provide the community, including TBAs, with information about the signs of danger, as set out in Table 2 below. This is because the person who makes the decision to seek treatment may be a TBA, husband, mother-in-law, village elder or religious leader who makes the decision. Indeed, an adolescent may be the only person at home when a woman begins to haemorrhage.

Table 2
Danger Signals of the Need for Medical Care

During Pregnancy	During Labour	After Delivery
Bleeding, with or without pain	Excessive bleeding	Excessive bleeding
Convulsions	Convulsions	Convulsions
Passing fluid that is not urine	Fever, chills, and discharge	Fever, chills, and discharge
Swollen hands, face & feet; headaches	No progress in 12 hours	

Informing the community helps them realize that these developments are not a normal part of pregnancy. In rural areas, important indications of obstetric problems may not be recognized as danger signals, and women may believe that fever, dizziness and pallor are part of a normal pregnancy.

Now, the second type of community initiative I mentioned was one that would deal with a situation where well-functioning facilities were not available within reasonable reach of a community. In this case, an information and mobilization campaign would focus on sensitizing the community to the fact that their women's lives can be saved if they can receive adequate treatment in time.

The purpose of such an information campaign would be quite different from the earlier purpose I described. The purpose here would be to give the community arguments to use with local government to provide reasonable services, and to enable the community to organize itself to address gaps in services, such as in the supply of drugs. Communities mobilize very effectively if they find a need to do so (see examples in Columbia University, 1996).

SAQ 13

Explain, in 70 words or less, why a community-based initiative alone would not be sufficient to reduce maternal deaths.

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SAQ 14

In 20 words or less, what are three of the problems a community may face even if well-equipped health services exist?

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SAQ 15

If you had to plan an information and mobilization campaign for a community, would you plan the same campaign for all communities? What is the main difference between two campaigns you might plan? Write under 70 words.

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3.2 Summary of Section 3

From the material presented in Section 3, you have learned that we can neither predict nor prevent most obstetric complications, but that we can treat them when they occur. This means that women must reach a functioning facility with appropriate staff, equipment, and supplies in time for treatment.

You have also learned about the role of TBAs, and about some of the issues that face the community when a pregnant woman develops obstetric complications. I have noted that efforts to train TBAs and to educate the community will not reduce maternal deaths if the necessary treatment is not available in time. Neither TBAs nor community members have the life-saving skills that trained midwives and doctors have to save women's lives when obstetric emergencies occur. In Section 4, I will address the distinctive nature of maternal mortality.

Section 4:
Distinctive Nature of Maternal Mortality

In this short section I want describe the difference between maternal mortality and infant mortality. This is important to do because many planners believe that programmes designed to address infant deaths will also address maternal deaths. However as you will see, this is not the case.

In order to explain why not, I will draw on a study conducted by Irvine Loudon (1991), who has analyzed the factors affecting infant and maternal mortality in the West during the first half of the 20th Century.

In 1915, there were 100 infant deaths per 1,000 live births in the United States, and 608 maternal deaths per 100,000 live births - that is, almost as high as they are in Africa today. Between 1915 and 1933, infant mortality in the United States fell by over 40%, in response to a general improvement in living conditions. Similarly, in the United Kingdom, between 1900 and 1930, infant mortality declined by more than half.

However, in both countries, maternal mortality remained undiminished during this period. Moreover, until the late 1930s, the immediate causes of death were remarkably constant all over the world. As Loudon puts it, “The well known triad of fever, haemorrhage and toxaemia predominated in the past and is still to be found in some third world countries today”. Thus, the main causes of maternal deaths in the West were similar to those in developing countries.

So the data from developed countries show that, while infant mortality declined, maternal mortality remained the same until the mid-1930s. After the mid-1930s, there was “a steep and sustained decline which has continued in most Western countries at much the same rate for over fifty years”, Loudon notes. Even in countries which had different ratios in 1920, like the United States (689), England and Wales (433), and the Netherlands (240), the ratio had fallen to the same level in all these countries - between 37 and 39 - by 1960.

What happened in the mid-1930s to affect the incidence of maternal mortality so dramatically? A key factor was the development at that time and use thereafter of effective treatments for obstetric complications, such as antibiotics for infection, and blood transfusions for haemorrhage. In other words, effective obstetric services were necessary to reduce maternal deaths.

So, what can we conclude about the different behaviour of infant mortality and maternal mortality? Infant mortality was sensitive to social and economic conditions. By contrast, maternal mortality was determined most of all by the standard of obstetric care.

For the purpose of this course, perhaps Loudon's most important conclusion is this: "Measures designed to reduce maternal and infant mortality required quite different approaches. This has some relevance to certain third world countries today in which levels of maternal and infant mortality are similar to, an sometimes exceed, those seen in the West in the early years of the twentieth century".

In other words, women need different interventions from those required by children, when it comes to the question of reducing deaths. This is vital to keep in mind during the design of health policies and programmes.

SAQ 16

In less than 50 words, describe the different conditions affecting infant mortality and maternal mortality.

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SAQ 17

What was the maternal mortality ratio in the Netherlands in 1960? How high had it been in 1920?

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Section 5:
The Central Role of Emergency Obstetric Care

5.0 Introduction

In this Section, I will begin by defining Emergency Obstetric Care (EmOC), and the difference between this and Essential Obstetric Care (EOC). I will go on to give you case studies from different parts of the world to illustrate the situation regarding maternal deaths when emergency care is not available as compared to when it is available. I will then present some information about the time and money aspects of EmOC.

5.1 Definition of Emergency Obstetric Care

WHO has issued several publications presenting the full list of services that should be provided during pregnancy and childbirth (see for example, the *Mother Baby Package*, and *Managing Complications in Pregnancy and Childbirth*). This package of services is often referred to as the essential obstetric care (EOC) package.

Now, when it comes to the specific problem of maternal deaths and of dealing with the complications that occur during pregnancy and childbirth, it is useful to know what functions are absolutely necessary to save women's lives. A short list of crucial functions has in fact been drawn up, and is known as the list of "signal functions" (see Guidelines).

The list of signal functions includes the following eight functions:

- administer parenteral antibiotics
- administer parenteral oxytocic drugs
- administer parenteral anticonvulsants for pre-eclampsia and eclampsia
- perform manual removal of placenta
- perform removal of retained products
- perform assisted vaginal delivery
- perform surgery
- perform blood transfusions.

You will remember from Section 2.1 that the major medical causes of death which practitioners have to deal with are: haemorrhage, complications of unsafe abortion, eclampsia, infection, and obstructed labour.

The signal functions address these medical causes. These eight functions are covered by the term Emergency Obstetric Care (EmOC). Although some conditions can be treated before they become true emergencies, for example with prolonged labour a caesarean section can be done before the woman is seriously ill, we use the term “emergency” to convey the importance of prompt medical treatment.

Of course, 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. The full list is better covered by the term EOC. However, we can feel fairly sure that, if the EmOC functions are performed well at a health facility, then this facility is likely to be saving the lives of the women who go there for care.

In some cases, the term EOC is used interchangeably with EmOC. This doesn’t matter, so long as the terms are clearly defined before use, so that you are sure what functions are covered. As you will see in Module 2, having a list of signal functions has made it possible to design indicators to assess progress towards reducing maternal deaths.

During the rest of this module - and indeed during the rest of this course - I will focus on the centrality of EmOC to reducing maternal deaths. We can show this centrality in two ways: first, by looking at what happens in communities where EmOC is not available or not used, and, second by looking at communities where EmOC is available. I will give you examples of each situation in the next few pages.

5.2 Central Role of EmOC in Reducing Maternal Deaths

The aim of this Module is “Understand the central role of EmOC in reducing maternal deaths”. You may be wondering if this is something that is really as easy to tell as all that. Is it the same as saying that cutting out fatty foods reduces weight, or that regular brushing reduces cavities?

There are two reasons why I am able to be quite certain about EmOC’s centrality in reducing maternal deaths. The first reason is the nature of the quest. I am not talking about general health care, nutrition and hygiene, where a number of interventions can be considered. I am talking specifically about saving the lives of women who develop obstetric complications like hypertension

or haemorrhage, which account for the majority of maternal deaths. In other words, I am talking about emergencies.

And the second reason is that experience over the past century has shown EmOC to be central in reducing maternal deaths. I will set out below some case studies that show how the availability or lack of EmOC makes the difference between life and death.

5.2.1 Lack of EmOC

I am going to give you two case studies to show how lack of EmOC resulted in continued high rates of maternal mortality. The first is from the United States, and the second is from Gambia.

In the United States, State of Indiana, there is a religious sect called the Faith Assembly of God. Members of the sect are well fed, educated, and relatively wealthy. However, their religious beliefs prevent them from using modern medical services, even in cases of emergency. A medical team studied maternal deaths for this population group of some 2,000 between 1975 and 1982 (Kaunitz et al, 1984).

The researchers found that, during this period, there were six maternal deaths amongst the residents. Haemorrhage accounted for four, and infection for two of the deaths. You might think that six deaths was not a very dramatic number. But the point is that it was very out of line from what you expect in the United States. The deaths in the Faith Assembly community worked out at 872 per 100,000 live births whereas the ratio in the United States as a whole was 12.

The researchers noted that the maternal mortality ratio for the Faith Assembly is comparable with those “in developing countries where obstetric care is unavailable.... These findings suggest that when women, even in the United States, avoid obstetric care, they greatly increase the risks” of maternal deaths.

You will remember that the maternal mortality ratio in India that I gave you in Section 2 was 570. So, in fact, the maternal mortality ratio in the Faith Assembly community was higher than in the Indian sub-continent, even though they lived in the United States! As the authors suggest, the main difference is access to modern medical care.

The second case study comes from the Gambia. In the Gambia, a team of medical researchers studied the outcome of pregnancy amongst 672 women between 1982 and 1983 (see Greenwood et al, 1987)

At this time, there was only a government dispensary, staffed by a dispenser and a midwife; one private medical practitioner; and a number of small pharmacies. Two prenatal clinics were held every two weeks about 20 kilometres away, while house to

house ante-natal care was provided in the study area. But anyone who needed treatment had to travel to the capital, Banjul, by ferry, a journey of some 200 kilometres.

There were 15 reported deaths between 1982 and 1983, one in Banjul hospital, two on the way to Banjul hospital, and the remainder at home. This works out to a maternal mortality ratio of 2,390 per 100,000 live births for the two communities, nearly four times as high that of India.

The most important causes were postpartum haemorrhage, (33%), followed by infections, and sudden collapse at or shortly before delivery. This reinforces the message in Section 2 about the fact that a handful of medical causes are responsible for the majority of maternal deaths.

Looking at data for a 25 year period from 1951 to 1975 in other parts of the Gambia, the researchers reported that “there has been little or no improvement in the outcome of pregnancy in the rural areas of the Gambia during the past few years. The maternal death rate in the Farafenni area is about 200 times higher than that recorded in industrialized countries”.

The team had tried to identify factors that would have shown which women were at risk. Other than well-known factors - such as women over the age of 40 or women with multiple pregnancies - these efforts were without success. “Very few women had any signs of pre-eclampsia or other recognized risk factors”.

Eleven of the women had attended an antenatal clinic at least once during their pregnancy, but this did not predict or prevent the obstetric complication that led to their death. This reconfirms the discussion in Section 3, that there is no way to predict or prevent the vast majority of complications that lead to death.

Indeed, the team of researchers noted that “because of lack of transport and the absence of resuscitation facilities at the nearest dispensary it is unlikely that these deaths could have prevented”. The nearest place with blood transfusion or obstetric services was in the capital. The team urged that major health centres be upgraded to include blood transfusion facilities and the services of an obstetrician.

SAQ 18

The women in the Faith Assembly case study did not attend an antenatal clinic, whereas many of the women in the Gambia example did. What was the maternal mortality ratio in each case? In 70 words or less, what can you learn from this finding?

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SAQ 19

What conclusion did the researchers have in common in both the Faith Assembly and the Gambia cases?

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5.2.2 Availability of EmOC

In this section, I will examine the experience in Matlab, Bangladesh (study summarized from Ronsmans et al). Matlab is a rural area located about 60 kilometres from Dhaka, the capital. People rely mostly on country boats or on walking for transport. It has a population of 200,000. The living standards throughout Matlab are similar, as are the cultural factors and the levels of literacy, which were low at the time of the study.

Now, the story of Matlab is especially interesting because it is possible to compare what happened in different parts of the area over an 18-year period. Indeed, Matlab is unique because, since 1966, there has been house-to-house demographic surveillance. This means that it has the most complete birth and death records in the developing world.

For the purposes of this study, and as can be seen on the stylized drawing in Figure 5, I will be dividing Matlab into four distinct areas depending on the type of health services each area received. In 1977, a range of maternal and child health (MCH) services were introduced in two parts of Matlab, and I will call both of these MCH Areas.

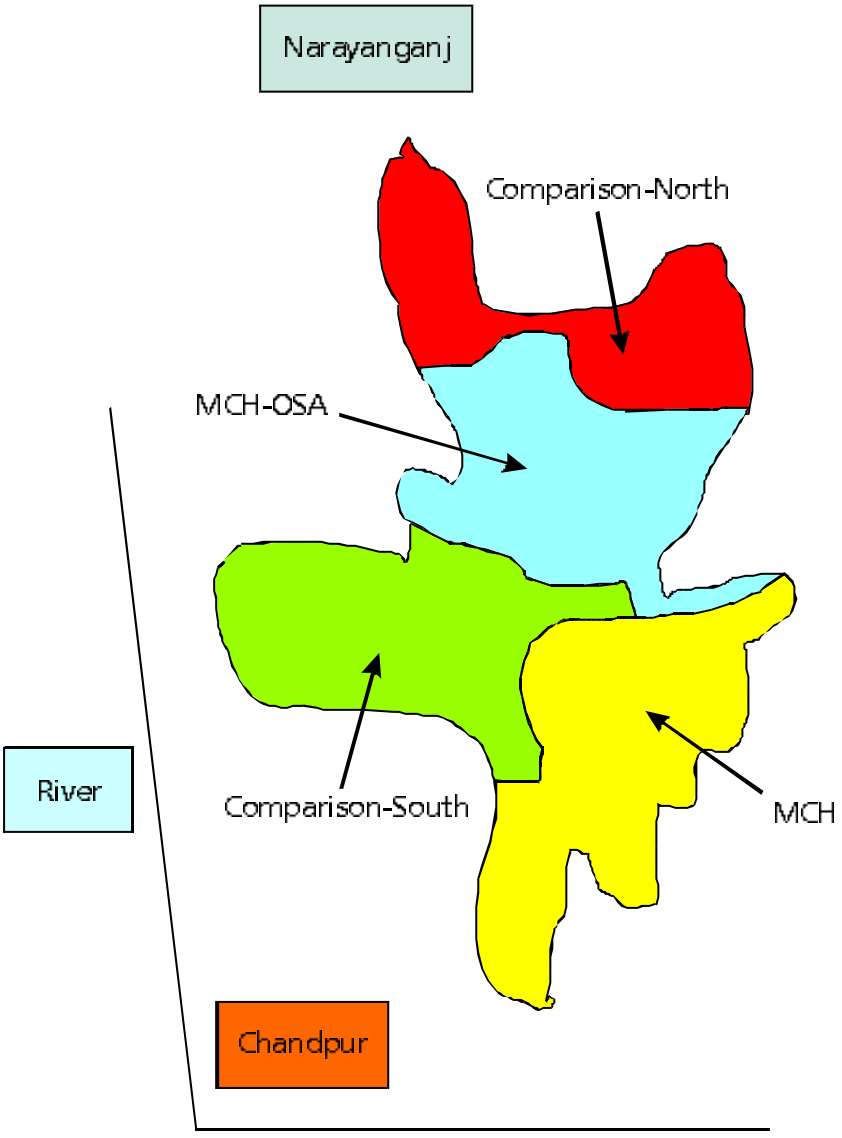


Figure 5 - Matlab

The MCH services did not include treatment of obstetric complications. Women who needed these services had to find their way to a city - either Chandpur in the South or Narayanganj in the North.

Meanwhile, in order to compare what happened in areas that received services with areas that did not, the researchers also examined maternal deaths in two other areas, which they called Comparison-North and Comparison-South.

Then, in 1987, an extensive project to reduce maternal deaths was added in one of the two MCH areas, which I will call the MCH-Obstetric Services Area - or MCH-OSA for short. The other MCH area continued to receive maternal and child health and family planning services.

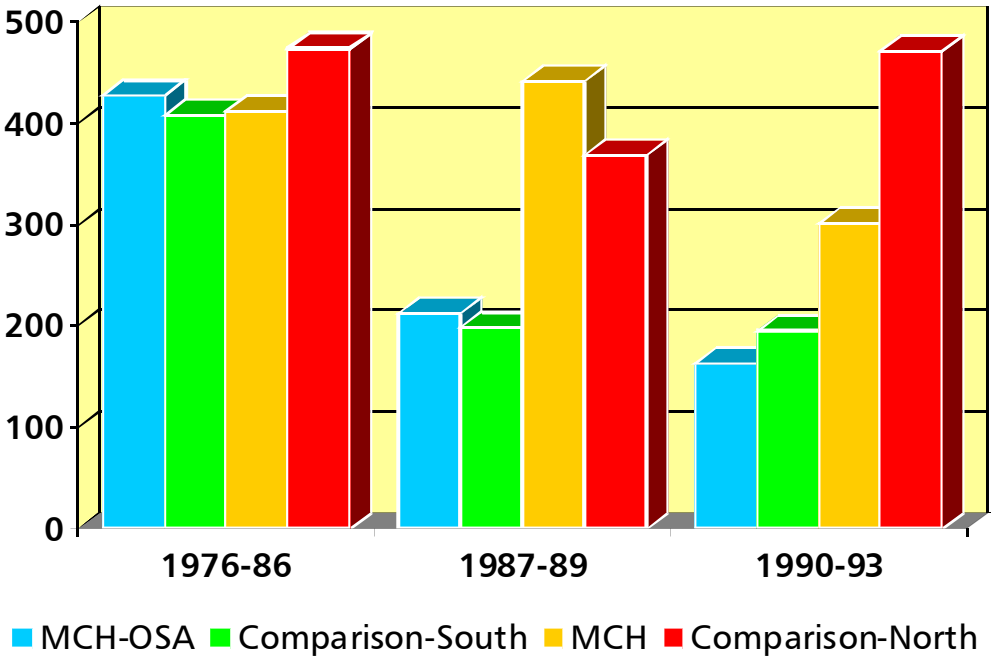
In the MCH-OSA, there were a number of innovations. Four trained midwives were posted in two rural health centres. They had 24-hour access by speedboat to a new maternity care clinic in the town of Matlab. The services at this clinic did not include surgery, so women who needed surgery still had to be transported to the government hospital in Chandpur; transport by ambulance was available 24 hours a day. The hospital in Chandpur provided a full range of obstetric emergency services, including surgery.

For your information, Comparison-North was about four hours from the city of Narayanganj, while Comparison-South was two hours from the city of Chandpur. As for MCH, it was also about two hours from Chandpur, while MCH-OSA was about three hours away from Chandpur.

In the 11 years before the Obstetric Services Project (the period 1976-1986), there was no decline in maternal mortality in any of the four areas of Matlab. (See Figure 6). After 3 years (1987-1989), maternal mortality had declined by 50% in the MCH-Obstetric Services Area, but there was no decline in the MCH Area. There was also, surprisingly, the same magnitude decline in the southern part of the comparison area, Comparison-South, where demographic surveillance was carried out but no special services were added. There was no decline in maternal mortality in Comparison-North.

Starting in 1990, two of the four midwives in the Obstetric Services Area were moved to health rural centers in the MCH area, and each midwife was joined by a paramedic who had 18 months training in midwifery. During 1990-1993, there were slight (but not statistically significant) declines in maternal mortality in the MCH area and in MCH-OSA, and no decline in either of the comparison areas.

Figure 6
Changing patterns of maternal mortality in Matlab



Many questions are provoked by these data. Most especially, you may ask why maternal mortality would have declined in the Comparison-South area, where there were no special services at all?

At first sight, these data do seem confusing. However, when looked at from the point of view of access to EmOC, a clear pattern emerges. The decline in 1987-1989 in MCH-OSA appears to be due to the availability of midwives and transportation to EmOC round the clock. In 1990, activities in this area were diluted somewhat when two of the four midwives were moved to the MCH area. Decline in maternal mortality seemed to continue at a reduced rate, though this was not statistically significant.

As for the two Comparison areas, there was no overall decline in Comparison-North, where the nearest hospital, in Narayanganj, was at least four hours away by travel. By contrast, the people in Comparison-South had relatively easy access to Chandpur. This was not just because they were closer, but also because there was a high, wide embankment along the river in that area, which served as a dry road to the city. Furthermore, it is believed (though not documented) that some physicians may have set up private clinics near Chandpur, which further increased access to treatment for obstetric complications.

Thus, in the areas where women had good access to EmOC - the MCH-OSA and the Comparison-South area - maternal mortality declined by half in only 3 years. In areas where access was more difficult, maternal mortality did not decline significantly over 18 years.

Meanwhile, you may have a few questions in your mind about what the Matlab case study reveals regarding the relationship of family planning and maternal mortality. I should note that, of course, family planning services are essential to the overall reproductive health of women and men.

But if our aim is to reduce maternal deaths, family planning programmes can only do so much. Family planning can reduce the number of maternal deaths in a population (the maternal mortality rate) because fewer women will become pregnant.

However, family planning cannot reduce the risk of death once a woman is pregnant (the maternal mortality ratio). Studies in Matlab confirmed this by showing that, in the period before 1987, when family planning was available but emergency obstetric care was not, the maternal mortality ratio was unchanged.

And now, some SAQs before moving on to the last few sections in this module.

SAQ 20

How many hours did women have to travel to reach EmOC in each of the four parts of Matlab? Which women had the longest to travel?

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SAQ 21

What would you say is the most important factor to saving women's lives in the case of Matlab? How can you tell?

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SAQ 22

How does the case study of Matlab show that EmOC is central to reducing maternal death, in comparison to the case studies of the Gambia and the Faith Assembly in the United States? Do not write more than 150 words.

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SAQ 23

Based on what you have studied to date, give three reasons for the continued high incidence of maternal mortality in developing countries.

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5.3 Time and Resources for EmOC

Now, one question you may have had in mind as you were working through this material, is how much time is needed to save a woman's life? Once she develops a complication, isn't it too late to do anything? Another question could be: how much does it cost to provide EmOC? And, do developing countries have these resources?

These are valid questions. There is no point investing effort in making EmOC available if it can't make a difference, or if countries simply do not have the resources to do so.

5.3.1 Time for EmOC

I have previously mentioned the importance of getting women who develop obstetric complications to EmOC "in time". For most complications, "in time" is a matter of hours or days, not minutes. It is true that a serious haemorrhage can kill a woman in less than an hour, However, in many cases women arrive at hospitals alive after bleeding for much longer.

As for the major complications such as eclampsia, infection, and obstructed labour - which account for nearly 30% of all maternal deaths - there are usually several days between the time the condition becomes obvious and death. Estimates of the time between onset of the complication and death for common obstetric complications are presented in 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

As you can see from Table 3, the only complication where EmOC is crucial within two hours of the onset is postpartum haemorrhage. The other complications generally take between approximately 12 hours to 6 days to lead to death. Therefore, if women can reach EmOC within those time frames, their chances of survival are greatly improved.

SAQ 24

I have constructed a table below, using the time frames given in Table 3, and the case study on Matlab. I would like you to fill in the boxes to show the obstetric complications for which you think there is time to treat the women of Matlab. Answer yes or no. If you have to answer "maybe", please give an explanation.

Complication	MCH-OSA	MCH	Comparison-North	Comparison-South
Haemorrhage Postpartum Antepartum				
Eclampsia				
Obstructed labour				
Infection				

5.3.2 Resources for EmOC

In the next few paragraphs, I want to look briefly at the question of resources for EmOC. You will remember that in Section 3.1 I discussed the issue of training TBAs and other members of the community on ways to recognize obstetric complications. In those sections, I briefly mentioned factors such as bad roads, the family's inability to afford the cost of supplies, and some cultural factors.

I am going to return to these issues in the final Module for this Course, Module 3, which will deal with policies and programmes to reduce maternal death. In this Section, I want you to assume that women with complications have managed to reach a health facility. The two questions I would like to consider are: once they reach the facility, what care should they find? And, can my country afford to provide such care?

I introduced the list of signal health facility functions in Section 5.1. Not all eight functions need to be available in all health facilities. In fact, as in the case of Matlab, it is generally enough for health centres to offer most of these functions, leaving blood transfusions and Caesarean Sections to the hospital, while ensuring that women will get there.

It is estimated that health centres working in tandem with well-staffed and equipped hospitals could save 60% of total

deaths in rural areas, and 67% of total deaths in urban areas (Maine, 1991). This answers my first question as to the kind of care a woman should find if she develops obstetric complications.

As for the second question "Can a developing country afford to make EmOC available?", the answer is yes. Even the poorest developing country spends millions of dollars on the population's health care. Enhancing health facilities can cost about as much as a programme to train TBAs, but is much more effective in saving women's lives. In most cases, you would not be building new hospitals but improving the functioning of those facilities that do exist. In fact, TBA programmes are not cheap because they involve training hundreds of women, whereas in the same area only a few facilities may need to be fixed up.

In addition, people themselves use their own funds to cover the costs of their health care when they need to. It is estimated that 97% of their health care costs are covered by families themselves in developing countries.

Moreover, there are several examples where communities have mobilized to fill gaps in public health services, paying for supplies, salaries, and transport (see Prevention of Maternal Mortality Network: Abstracts).

Therefore, by setting the right priorities for resource allocation, and through a creative combination of public and private initiatives, a developing country can reduce maternal deaths.

5.4 Summary of Section 5

In this Section, I have dealt with the central role of EmOC in reducing maternal deaths. I have defined the difference between the terms essential obstetric care and emergency obstetric care.

I have given you two case studies that show how lack of EmOC results in sustained maternal mortality - the case of Faith Assembly women who chose not to use EmOC, and the case of women in Gambia who did not have access to EmOC.

I have described a situation where different communities had different access to EmOC in Matlab in Bangladesh. I discussed how this study shows the importance of the availability of and access to EmOC in order to save women's lives.

I also discussed the question of time, and showed that it is possible to save women's lives if they can have access to care. With the exception of post-partum haemorrhage, obstetric complications take between 12 hours and 6 days to lead to death. I briefly touched on the question of resources, to which I will return in Module 3 of this course.

Section 6: Summary of Module 1

You have now completed Module 1 of the course. In this short section, I will summarise the most important lessons you should have learned from studying it. These should be the main thoughts you take with you in your study of the remainder of the course.

The following are the major points which emerge from the material you and I have covered so far:

- Maternal death is a leading cause of death among women in developing countries. The discrepancy between developing and developed countries is far greater when it comes to maternal morality than other causes of death for women.
- All pregnant women are at risk of life-threatening obstetric complications. There is no such thing as a “no risk” woman.
- Five obstetric complications are responsible for the majority of maternal deaths: haemorrhage, infection, hypertension, obstructed labour, and complications of unsafe abortion.
- The means to prevent deaths from these complications have been available for decades, and do not require very sophisticated or expensive technology.
- Research shows that efforts to predict and prevent obstetric complications are not successful. But if EmOC is available, and women can access it in time to treat the complications, then their lives can be saved. This is the case in developed countries today, where maternal mortality has been reduced. It is the case in areas like Matlab, where maternal mortality is declining rapidly where EmOC is available.

Tackling the reasons for maternal deaths means ensuring that policies and programmes target the central issues relating to EmOc: Is it available? Can women access it and do they make use of it? Is the quality of service sufficient to save women’s lives?

In the rest of this course, we will look at indicators to assess progress on reducing maternal deaths (Module 2), as well as ways to ensure that maternal deaths are targeted through national policies and programmes (Module 3).

SAQ Answers

SAQ 1

A maternal death is caused by a complication arising from or aggravated by a woman's pregnancy, which can occur while she is pregnant, during delivery, or up to 42 days after the pregnancy ends.

SAQ 2

The estimated maternal mortality ratio is 170 for Egypt, 100 for Colombia, and 850 for Bangladesh.

SAQ 3

The maternal mortality ratio gives the number of maternal deaths per 100,000 live births, while the rate tells us the number of maternal deaths per 100,000 women of reproductive age per year.

SAQ 4

If you described the magnitude of the problem of maternal deaths in developing countries by giving any three of the following answers, then you were correct:

- *99% of all maternal deaths take place in developing countries;*
- *one in every five deaths among women in their childbearing years is related to pregnancy in Bangladesh, Egypt, India, and Indonesia, as opposed to one out of every 200 deaths in the United States;*
- *maternal deaths account for over a quarter of deaths among women in developing countries, but less than 1% of deaths among women in developed countries;*
- *a woman's lifetime risk in Asia is 1 in 65, whereas this is 1 in 3,200 in Western Europe;*
- *the maternal mortality ratio in Colombia is 100 per 100,000 live births, whereas it is 12 in the United States;*
- *the maternal mortality rate is 101 per 100,000 women of reproductive age in Bangladesh, whereas it is 3 in the United States.*

SAQ 5

The five main major medical causes of maternal deaths in developing countries are, in order of importance: haemorrhage, induced abortion, hypertension, obstructed labour, and infection.

SAQ 6

True or False?

a. *False. In fact, the most important medical cause of maternal deaths in developing countries is haemorrhage (21%).*

b. *False. Existing medical conditions account for 25% of maternal deaths.*

c. *True: 75% of deaths from maternal causes are due to complications of pregnancy, delivery, or the postpartum period*

SAQ 7

The most important medical cause of maternal death is haemorrhage. It accounts for nearly a fifth of all maternal deaths.

SAQ 8

Among other things, prenatal visits can: identify minor bleeding, showing which women may be at risk of haemorrhage before or during delivery; reveal signs of hypertension; and show mal-positioning of the foetus. Prenatal visits to do not prevent these complications, but they may enable treatment to be provided before these complications become life-threatening.

SAQ 9

In the case study given, 10% of women with bad obstetric history suffered from obstructed labour; 71% of women without a bad obstetric history suffered from obstructed labour.

SAQ 10

Screening cannot predict postpartum haemorrhage, or a large proportion of eclampsia cases. It cannot predict complications from unsafe abortion, or infection or obstructed labour. These five medical causes account for two-thirds of all maternal deaths in the developing world.

SAQ 11

By definition, TBAs are not nurse-midwives or obstetricians, and therefore do not have the skills necessary to provide lifesaving services needed in case of obstetric complications. Training can help to stop negative practices that some TBAs currently undertake, such as pressing down on the abdomen to hasten delivery or cutting a slit in the vagina. However, women experiencing obstetric complications need treatment at functioning facilities with qualified staff, equipment and supplies. TBAs can, like other members of a community, learn to recognize the signs of obstetric complications, and help women reach adequate facilities on time.

SAQ 12

If my aim is to reduce maternal death, my highest priority would be enhancing health facilities by upgrading skills, supplies, equipment, and facility management so as to treat obstetric complications when they occur. I would not invest in screening programmes at any time, because there is no reliable way to predict or prevent obstetric complications. As for TBAs, I would include them in a general information campaign for the community, after the local facilities are functioning.

SAQ 13

A community-based initiative would not be sufficient to reduce maternal death if there are no facilities with the equipment, trained staff, and supplies to deal with emergencies, or if such facilities exist but are badly managed. Let us imagine that community members decide to use a health facility because of an active community information programme, and then discover that it is poorly staffed and equipped. Word will quickly spread and discourage others from doing using this facility.

SAQ 14

If you answered any three of the following, you were correct:

- *non-availability of transport;*
- *impassable roads;*
- *the cost of services;*
- *lack of information about danger signals;*
- *cultural factors.*

SAQ 15

Different information and community campaigns are needed depending on the state of health facilities available to the community. If adequate facilities are available, such campaigns can focus on getting the community to use the facilities appropriately. If adequate facilities are not available, then such campaigns can help the community organize to demand such facilities, or to contribute to providing these facilities.

SAQ 16

Infant mortality is most affected by the general socio-economic environment. Maternal mortality is most affected by the standard of obstetric care, including such factors as the skills of the

practitioner, and the availability of obstetric treatment such as blood transfusions and antibiotics.

SAQ 17

The maternal mortality ratio in the Netherlands in 1960 was between 37 and 39; it had been 240 in 1920.

SAQ 18

The maternal mortality ratio for the Faith Assembly women was 872 per 100,000 live births. For the women in the Gambian study, it was 2,300 per 100,000 live births. What this tells us is that antenatal visits do not prevent maternal deaths, even though they may be helpful in other respects, for example nutrition and hygiene.

SAQ 19

Both teams highlighted the need for the availability of emergency obstetric care to save lives.

SAQ 20

Women in Comparison-South and MCH had the shortest distance to travel to reach EmOC - less than two hours. Women in MCH-OSA had about three hours to travel, but also had improved access to transport. Women in Comparison-North had furthest to travel - more than four hours.

SAQ 21

Access to EmOC was the most important factor in Matlab. In those areas where women had easier access, maternal mortality declined by half in just three years. In those areas where access was more difficult, maternal mortality did not decline significantly over 18 years.

SAQ 22

EmOC is central because it is the only way we can save women's lives if they are facing life-threatening obstetric complications. We know this because:

- *If EmOC is available and women can access it, then many of their lives can be saved. This clearly applied to many of the women in three parts of Matlab - Comparison-South, MCH and MCH-OSA.*
- *If EmOC is "available" but it is difficult to access, then women will continue to die. This is the case in the Matlab area of Comparison-North.*
- *If EmOC is available and women refuse to use it, they will continue to die. This is the case of the Faith Assembly women in the United States.*
- *If EmOC is not available, women will continue to die. This is the case in the Gambia communities.*

SAQ 23

If you gave any three of these reasons you were correct:

- *Many programmes that are thought to help reduce maternal death do not in fact do so. Such programmes may promote general community health, but do not provide the services women need to deal with obstetric complications when they occur.*
- *EmOC services are not sufficiently available to women who develop obstetric complications.*
- *Many women have difficulty accessing EmOC services because these are usually located in towns or the capital city.*
- *There is insufficient information in the community about the quality of EmOC services, when these are available to women.*

SAQ 24

Complication	MCH-OSA	MCH	Comparison-North	Comparison-South
Haemorrhage				
Postpartum	Maybe	Yes	No	Yes
Antepartum	Yes	Yes	Yes	Yes
Eclampsia	Yes	Yes	Yes	Yes
Obstructed labour	Yes	Yes	Yes	Yes
Infection	Yes	Yes	Yes	Yes

There should be only one "maybe" in your answers: the women of MCH-OSA need to travel for three hours to reach the EmOC service of blood transfusion in the town of Chandhpur, so they face this obstacle even though a 24-hour ambulance service exists. The women in Comparison-North, who need to travel over four hours, will not be able to make it to blood transfusion services on time. There is, in principle, enough time to save all other women in Matlab from all other emergency obstetric complications.

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

Much of the material in this module has been drawn from:

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

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 York1996.

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