

AMDD Workbook

Using the UN Process Indicators of Emergency Obstetric Services

Questions and Answers

Contributors:

Anne Paxton
Senior Program Officer
Monitoring and Evaluation, AMDD

Deborah Maine
Program Director, AMDD

Nadia Hijab
Consultant, AMDD

AMDD

Averting Maternal Death
& Disability Program



Columbia University
MAILMAN SCHOOL
OF PUBLIC HEALTH

The Averting Maternal Death & Disability (AMDD) Program has produced this Workbook as a resource for planners and managers working to increase women's access to emergency obstetric services.

UN Guidelines available at: <http://www.unicef.org/reseval/pdfs/finalgui.pdf>

This publication is supported by the Bill & Melinda Gates Foundation.

May 2003

• AMDD • Heilbrunn Department of Population & Family Health • Mailman School of Public Health
Columbia University • 60 Haven Ave., B-3 • New York, NY 10032 •
<http://www.amdd.hs.columbia.edu/>

Preface

The most important work we can do together to reduce death and disability in women due to complications in pregnancy and childbirth is to provide them with services that can save their lives and health. The workbook you are about to read contains information we hope will be of assistance as you document the efforts you are making to provide women with quality emergency obstetric services that are accessible to them wherever they live.

The *Guidelines for Monitoring the Availability and Use of Obstetric Services*, issued by UNICEF, WHO and UNFPA in 1997, clearly describe why the information the UN Process Indicators contain is important, and how to collect and interpret the data. Nonetheless, questions are asked by people using the UN Process Indicators, many of whom have no prior experience using clinical data from hospital registers or in monitoring projects. This AMDD Workbook addresses some frequently asked questions, in an attempt to make the collection and interpretation of these data as accessible as possible to clinicians and facility managers in hospitals and health clinics, as well as to public health program managers. We hope you will be able to use the UN Process Indicators to monitor trends over time in your emergency obstetric facilities, and make the important decisions which must be made based upon what your data are telling you. The overall pattern of the data, and the decisions these data lead you to, are what is most important, not the precision of any one indicator.

This workbook is produced on behalf of the Averting Maternal Death and Disability Program (AMDD). This is a revised version based on feedback we received from users as to what is most useful and what could be made clearer. Please give any additional feedback you might have to Dr. Anne Paxton at ap428@columbia.edu. We would like to acknowledge the helpful review and comments of the following colleagues: Patricia Bailey, Barbara Kwast, Samantha Lobis, Dileep Makalavar, Sourou Gbangbade, and Kavita Bali.

This workbook is a companion piece to the *Guidelines for Monitoring the Availability and Use of Obstetric Services*, originally developed by Columbia and UNICEF staff in 1991, with input from WHO. AMDD wishes to acknowledge the significant and on-going collaboration with UNICEF in the design and implementation of the UN Process Indicators.

Frequently Asked Questions

1. Why were the UN Process Indicators developed?
2. What are the 6 UN Process Indicators?
3. How do we define the major direct obstetric complications?
4. What are Signal Functions, how are they measured, and why do we use them?
5. What if a facility performs almost all of the Signal Functions?
6. Which registers should we use to gather data?
7. How should we record complications in the facility registers?
8. How are data abstracted from the registers?
9. How are the UN Process Indicators calculated?
10. How do we deal with indirect causes of maternal death?
11. How do we collect data on complications of abortion?
12. How should referrals be handled?
13. What if women come from outside the catchment area?
14. Why use a series of indicators?
15. How are the UN Process Indicators useful at the facility level?
16. How is the case-fatality rate interpreted?
17. What other tools are available for analyzing quality of services?

1. WHY WERE THE UN PROCESS INDICATORS DEVELOPED?

The majority of maternal deaths are due to direct obstetric causes such as postpartum hemorrhage, sepsis and complications of abortion. Indirect obstetric complications – illnesses that are aggravated by the pregnancy such as anemia, malaria, tuberculosis, HIV/AIDS and various chronic conditions – are increasing in parts of the world and accounting for an increasing proportion of maternal deaths.

There is now an international consensus that making pregnancy and delivery safer includes ensuring that women who experience obstetric complications receive the medical care they need on time. Emergency services are needed to handle potentially life-threatening, direct obstetric complications that affect an estimated 15% of women during pregnancy, at delivery, or in the postpartum period¹. Accordingly, more governments are putting emergency obstetric care at the center of their maternal health programs, recognizing its importance to preventing death and disability in women.

Naturally, planners and program managers want to know that their efforts to improve the quality and coverage of emergency obstetric services are making a difference for women who experience life-threatening complications. Tools to do so were developed by Columbia University and UNICEF in 1991, in the form of *Guidelines for Monitoring the Availability and Use of Obstetric Services*. These *Guidelines* were issued by UNICEF, WHO and UNFPA in 1997.

The *Guidelines* introduced a set of six process indicators to monitor obstetric services. Process indicators measure activities that lead up to the desired goal – in this case, the goal is reduction of maternal deaths. Examples of process indicators in other fields include percent of children immunized and percent of couples using modern family planning methods. The UN Process Indicators are based on the understanding that, to prevent maternal deaths, certain types of obstetric services must be available and used. The UN Process Indicators will tell you whether these services are available to women in sufficient quantity, and whether women who most need them – those who experience a life-threatening obstetric emergency – are, in fact, using them. And the UN Process Indicators will tell you a little about the quality of care, although other tools are needed to investigate quality in more depth. The indicators can be used both for needs assessments carried out for the purpose of program design, as well as for quantitatively monitoring progress in program implementation. Together, the six indicators give an indication as to whether women's lives are being saved as a result of the programs put in place².

¹ Research has demonstrated that even in developed countries, about 15% of pregnant women will experience complications. See the *Guidelines* for more information.

² Until the UN Process Indicators were developed, maternal mortality rates and ratios were the only way a country could tell if its women were dying in unacceptably high numbers from pregnancy-related complications. While the rates and ratios provide a snapshot of the severity of the problem, they are not as useful for the purposes of program design and monitoring. Accurate mortality surveys are labor- and time-intensive, expensive, and do not highlight the issues that health managers need to design and

2. WHAT ARE THE 6 UN PROCESS INDICATORS?

The six UN Process Indicators are:

1. Amount of emergency obstetric care (EmOC)³ services available
2. Geographical distribution of EmOC facilities
3. Proportion of all births in EmOC facilities
4. Met need for EmOC services
5. Cesarean sections as a percentage of all births in the population
6. Case fatality rate.

Each indicator has standards for acceptable levels – against which actual data can be compared. The UN Process Indicators and recommended levels are set out in Table 1, which is adapted from the *Guidelines*.

Table 1: The Six UN Process Indicators and Recommended Levels

UN Process Indicator	Definition	Recommended level
1. Amount of EmOC services available	Number of facilities that provide EmOC	Minimum: 1 Comprehensive EmOC facility for every 500,000 people Minimum: 4 Basic EmOC facilities per 500,000 people
2. Geographical distribution of EmOC facilities	Facilities providing EmOC well-distributed at sub-national level ⁴	Minimum: 100% of sub-national areas have the minimum acceptable numbers of basic and comprehensive EmOC facilities
3. Proportion of all births in EmOC facilities	Proportion of all births in the population that take place in EmOC facilities	Minimum: 15%
4. Met need for EmOC services	Proportion of women with obstetric complications treated in EmOC facilities	At least 100% [Estimated as 15% of expected births. See Q9.]
5. Cesarean sections as a percentage of all births	Cesarean deliveries as a proportion of all births in the population	Minimum 5% Maximum 15%
6. Case fatality rate	Proportion of women with obstetric complications admitted to a facility who die	Maximum 1%

monitor programs. Indeed, it is recommended that such surveys only be conducted every 10 years to show meaningful difference, whereas managers need to be able to track results over a period of months.

³ Note that in the *Guidelines*, instead of “EmOC,” the term “EOC” or essential obstetric care is used.

⁴ The geographical distribution is most clearly seen by plotting the EmOC facilities on a map.

Indicators 1 and 2 deal with coverage or availability, answering the question: Do enough EmOC services exist to serve the population?

Indicator 3 deals with utilization, answering the question: Are the EmOC services being used by pregnant women?

Indicators 4 and 5 also deal with utilization, but focuses on the question of complications: Are the EmOC services being used by women who really need them, i.e. women experiencing obstetric complications?

And Indicator 6 tells us something about the quality of service, by answering the question of whether the facilities are saving women's lives.

If a public health planner or facility manager knows that enough coverage of the population exists, women who experience obstetric complications are reaching the services that can save them from death and disability, and the facilities are functioning well enough to save lives, then he or she can be confident that many maternal deaths in the country are being averted.

3. HOW DO WE DEFINE THE MAJOR DIRECT OBSTETRIC COMPLICATIONS?

The WHO definition of 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.”

There are seven direct obstetric causes of maternal death, all of which can be successfully treated without loss of life in the great majority of cases with adequate obstetric services. The *Guidelines* define these direct complications as: hemorrhage (antepartum or postpartum), prolonged/obstructed labor, postpartum sepsis, complications of abortion, pre-eclampsia/eclampsia, ectopic pregnancy, and ruptured uterus, and they account for about 85% of direct obstetric deaths. These complications occur suddenly, often without warning. Unless they are treated promptly, they become emergencies⁵.

Many countries will have national definitions for obstetric complications. The country's national standards can be harmonized with international definitions. Definitions for each of the direct obstetric complications have been developed by FIGO (the International Federation of Gynecology and Obstetrics) for the “Save the Mothers Projects.” Definitions can also be found in the WHO/UNFPA/UNICEF/World Bank manual

⁵ See also *Safe Motherhood Programs: Options and Issues*, which reviews much of the relevant literature; as well as *Reducing Maternal Deaths: Selecting Priorities, Tracking Progress*, UNFPA and Columbia University, produced by the UN Staff college at Turin, 2002.

Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors (WHO/RHR/00.7, 2000).

Table 2 presents the major, direct obstetric complication in the left-hand column, and definitions derived from WHO and the FIGO Save the Mothers Project in the right-hand column.

Table 2: Direct Obstetric Complications and Working Definitions

Direct Obstetric Complication	Definitions derived from WHO ⁶ and International Federation of Gynecology and Obstetrics Save the Mothers Projects
<p>Hemorrhage</p> <p style="text-align: right;">Antepartum</p> <p style="text-align: right;">Postpartum</p>	<p>Any bleeding before labor and during labor: placenta previa, abruptio placenta.</p> <ul style="list-style-type: none"> • Bleeding that requires treatment (provision of intravenous fluids and/or blood transfusion); • Retained placenta; • Severe bleeding from lacerations (vaginal or cervical)
<p>Prolonged / Obstructed labour</p>	<p>This is dystocia (abnormal labor) and will include:</p> <ul style="list-style-type: none"> • prolonged, established, first stage of labor (>12 hours) • prolonged second stage of labor (>1 hour) • CPD (cephalo-pelvic disproportion), transverse lie, brow/face presentation. <p>If a women with a previous caesarian section has had a failed trial of scar⁷, and again she requires a C-section, then the complication is CPD. If a woman has a C-section for fetal distress, she is registered as a C-section case, but has no maternal complication.</p>

⁶ WHO/UNFPA/UNICEF/World Bank. *Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Integrated Management for Pregnancy and Childbirth (MCPC)*. World Health Organization, Geneva, Switzerland, 2000, WHO/RHR/00.7

⁷ From prior cesarean section.

Direct Obstetric Complication	Definitions derived from WHO and International Federation of Gynecology and Obstetrics Save the Mothers Projects
Postpartum sepsis	A woman has a fever (temperature 38 degrees Centigrade or more) occurring more than 24 hours after delivery (with at least two readings because labor alone can cause some fever). Other signs and symptoms that can be present: lower abdominal pain, purulent, offensive vaginal discharge (lochia), tender uterus. (Rule out malaria)
Complications of abortion	<ul style="list-style-type: none"> • Hemorrhage due to abortion, which requires resuscitation with IV fluids and/or blood transfusion. • Sepsis due to abortion (this includes perforation and pelvic abscess) <p><u>Note:</u> abortion may be spontaneous or induced.</p>
Severe Pre-eclampsia Eclampsia	<p>Diastolic blood pressure >110 mmHG and proteinuria >3+ after 20 weeks gestation. Various signs and symptoms: headache, hyperflexia, blurred vision, oliguria, epigastric pain, pulmonary oedema.</p> <p>Convulsions. Diastolic blood pressure 90mmHG or more after 20 weeks gestation. Proteinuria 2+ or more. Various signs and symptoms: coma and other signs and symptoms of severe pre-eclampsia.</p>
Ectopic Pregnancy	Internal bleeding from a pregnancy outside the uterus. Lower abdominal pain and shock possible from internal bleeding. History of pregnancy.
Ruptured Uterus	Uterine rupture with a history of prolonged/obstructed labor when uterine contractions suddenly stopped. Painful abdomen. Patient may be in shock from internal and/or vaginal bleeding.

For practical purposes, you can think of a complication as an event of sufficient severity that staff must respond with a life-saving procedure or referral to another facility. To continue with the example of hemorrhage, if you needed to resuscitate the woman with intravenous fluids or a blood transfusion and/or perform a manual removal of placenta in order to save a woman's life, clearly that was an obstetric complication (and you should record it as such in your register.) If a woman arrives at the hospital with a high fever following an abortion and you treat with antibiotics, such a case should be considered a complication of abortion. Your procedure probably saved her from serious illness or death.

If staff in a facility cannot recognize a condition that requires an emergency action, quality of care will be undermined. There are several excellent clinical guidelines

available that discuss signs and symptoms of various maternal conditions and the appropriate actions to take. Two such texts are:

WHO/UNFPA/UNICEF/World Bank. *Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Integrated Management for Pregnancy and Childbirth (MCPC)*. World Health Organization, Geneva, Switzerland, 2000. WHO/RHR/00.7

Enkin et al. *A Guide to Effective Care in Pregnancy and Childbirth*. Oxford University Press. 2000.

Some questions have come to our attention regarding specific obstetric experiences and whether they are considered direct obstetric complications as per these UN Process Indicators. For example, if labor is augmented with oxytocin and ends in a normal delivery, it is ONLY considered a complication if the oxytocin was given because the labor was prolonged or obstructed as per the definition above. The concern is that some doctors augment labor even when it is not yet a prolonged labor. This is why use of a partograph is so important to determine whether or not a woman is progressing in labor. An episiotomy, by itself, does not qualify as an assisted delivery.

Another question concerns vaginal or cervical tears that are sutured immediately without much bleeding. These tears, if they do not result in loss of blood so that they fall into the category of postpartum hemorrhage, are not considered direct obstetric complications. It is very important for each team using the UN Process Indicators to state explicitly what complications they are including and how they are defining them, especially as these nuances emerge in practice.

Some project managers and clinicians may be confident in their definition of a given obstetric complication, but be concerned that the complication may not be accurately measured, and thereby recorded, in a facility. Estimating blood loss to determine whether a woman is experiencing a hemorrhage may be difficult under any conditions, let alone in an emergency. We acknowledge this dilemma, but encourage everyone involved in collecting data for monitoring progress in provision of EmOC services to always keep in mind the purpose of our work, which is to treat women appropriately in order to save their lives.

If these obstetric complications are the main direct obstetric cause of maternal death, you may ask, is there a list of key life-saving procedures? The answer is yes, and they are called "Signal Functions".

4. WHAT ARE SIGNAL FUNCTIONS, HOW ARE THEY MEASURED, AND WHY DO WE USE THEM?

The *Guidelines* define a set of activities, called "Signal Functions" that should be available in a facility for emergency care of women with pregnancy-related complications. However, it is not an exhaustive list of the important emergency obstetric activities. These Signal Functions must be performed by a facility for it to be recognized as an Emergency Obstetric Care (EmOC) facility.

There are eight Signal Functions, of which six can be performed at the level of a good health center. A facility performing all six is known as a Basic EmOC facility. Two additional functions are often available only at a hospital; a facility performing all eight functions qualifies as a Comprehensive EmOC facility. The Basic EmOC Signal Functions are:

- administer parenteral (intravenous or by injection) antibiotics,
- administer parenteral oxytocic drugs,
- administer parenteral anticonvulsants,
- perform manual removal of placenta,
- perform removal of retained products, and
- perform assisted vaginal delivery (vacuum extraction, forceps delivery.)⁸

The functions performed at a Basic EmOC facility can save many women's lives. Even when the patient needs to be referred from a Basic EmOC facility to a Comprehensive one, the functions performed at the Basic EmOC facility may stabilize the woman so that she does not die on the way or arrive in a near-fatal condition at the Comprehensive EmOC facility.

One of the signal functions – "perform removal of retained products" – requires a bit of explanation. This signal function is aimed at provision of emergency care for an incomplete abortion (spontaneous or induced) because retained products of conception lead to life-threatening complications of abortion – sepsis and/or to hemorrhage. (Retained placental fragments is a post-birth complication that requires different management and refers more to the signal function "perform manual removal of placenta.") The manual *Managing Complications in Pregnancy and Childbirth (MCPC)* suggests that when bleeding is light to moderate in an incomplete abortion, "fingers or ring (or sponge) forceps may be used to remove products of conception protruding through the cervix." However, in an incomplete abortion with heavy bleeding, the recommended procedure is vacuum aspiration to remove retained products of

⁸ An episiotomy, by itself, does not qualify as an assisted delivery. In addition, augmentation of delivery with oxytocin, by itself, does not qualify as an assisted delivery.

conception (either manually, referred to as MVA⁹, or electrically, referred to as EVA.) In many countries, we have found, vacuum aspiration is not taught or used frequently, and necessary equipment may not be available. Curettage may then be used, but is a less desirable technique due to the greater risk of complication.

The Comprehensive EmOC functions are all six Basic Signal Functions plus:

- perform surgery (Cesarean section)
- perform blood transfusion.

It should be noted that to perform surgery, anesthesia is required.

During a needs assessment, and periodically over time, facilities are reviewed for the performance of these Signal Functions. Designation of a facility as an emergency obstetric care facility (Basic or Comprehensive) depends on these functions not only being available, but actually being performed at least once in a three month period. The *UN Guidelines* state very clearly that it is not the theoretical performance of these Signal Functions that matter but actual performance. The performance of the Signal Functions can be determined through a review of records, through observation, or through interview of staff.

Many things can impede the performance of these Signal Functions – interruption in supplies, equipment disrepair, staff absenteeism due to transfer, holiday, trainings or meetings, etc. It is important to note that patient volume will also have an impact on EmOC status of a facility. If so few women seek care at the facility that performance of the Signal Functions has not been necessary, the facility can not be considered an EmOC facility. Clearly, both technical and managerial factors play a part in a facility performing emergency obstetric services on a routine basis.

In a needs assessment, it may be found that one or more Signal Functions have not been performed in facilities in the last three months. A program planner who undertakes an assessment of the functioning of facilities should look for patterns that might point to underlying policy issues that affect service delivery. For example, there might be policies limiting the ability of facilities to perform blood transfusion, or that place limits on what procedures nurses and midwives can perform. These policy issues could be addressed through advocacy that compares practices with other countries. Likewise, there may be managerial issues pertaining to drug supply, maintenance of equipment, or staffing that could be identified through analysis of patterns of Signal Functions in facilities.

In some situations a facility that provides all EmOC Signal Functions at one point in time may not be performing these same functions six months or a year later. There are many possible reasons for a facility to “lose” its EmOC status. A key member of the

⁹ For more information on manual vacuum aspiration (MVA), please contact Ipas: 300 Market St., Suite 200, Chapel Hill, NC 27516, USA, tel: 919-967-7052, fax: 919-929-7687, email: customerservice@ipas.org.

EmOC team (anesthesiologist, Oby/Gyn) may be away for an extended leave or may be transferred without an immediate replacement, and thus, no cesarean deliveries are performed. A crucial piece of equipment may be damaged, or the operating theatre may be closed for renovations. During routine supervision, project managers and external supervisors can check that a facility is still performing the Signal Functions, and if not, bring the identified management or policy problems to the attention of facility management and/or government counterparts.

The periodicity of review of the Signal Functions performed at facilities will vary from place to place, depending on resources and the opinion of decision-makers on the utility of this activity. AMDD recommends that facilities be reassessed yearly, where possible. If an annual review of Signal Functions can be performed at all potential EmOC facilities in an area, it may be discovered that EmOC services are available in more facilities than were expected. Success in improving services in some facilities may inspire replication in neighboring facilities.

In Table 3 below the seven direct obstetric complications that make up a “complicated case” as per the *Guidelines* are matched with one or several Signal Functions that might need to be performed to save the woman's life. Please! Do not look at this table as a clinical management guide. We have matched the complications with the Signal Functions only as a way to help you think about how you will record complications for the UN Process Indicators.

Table 3: Obstetric Complications Matched to the Signal Functions

Major Obstetric Complications	Signal Functions
Hemorrhage	<p><i>Antepartum:</i></p> <ul style="list-style-type: none"> • perform blood transfusion • perform surgery (cesarean section for placenta previa, abruptio placenta)
	<p><i>Postpartum:</i></p> <ul style="list-style-type: none"> • administer parenteral oxytocic drugs • perform blood transfusion • perform manual removal of placenta • perform removal of retained products
Prolonged / obstructed labor	<ul style="list-style-type: none"> • perform assisted vaginal delivery • perform surgery (cesarean section) • administer parenteral oxytocic drugs
Postpartum sepsis	<ul style="list-style-type: none"> • administer parenteral (intravenous or by injection) antibiotics • perform removal of retained products • perform surgery for pelvic abscess

Major Obstetric Complications	Signal Functions
Complications of abortion	<p>For hemorrhage:</p> <ul style="list-style-type: none"> • perform blood transfusion • perform removal of retained products <p>For sepsis:</p> <ul style="list-style-type: none"> • administer parenteral antibiotics • perform removal of retained products
Pre-eclampsia / eclampsia	<ul style="list-style-type: none"> • administer parenteral anticonvulsants • perform surgery (cesarean section)
Ectopic pregnancy	<ul style="list-style-type: none"> • perform surgery • perform blood transfusion
Ruptured uterus	<ul style="list-style-type: none"> • perform surgery • perform blood transfusion • administer parenteral antibiotics

5. WHAT IF A FACILITY PERFORMS ALMOST ALL OF THE SIGNAL FUNCTIONS?

In many countries, particularly in Latin America, assisted vaginal delivery is rarely performed as a matter of policy. Women who might benefit from this intervention are delivered by C-section. Techniques of assisted vaginal delivery – eg. vacuum extraction or forceps delivery – are no longer taught in many schools of medicine, nursing and midwifery in these countries. So, if it is found that all Signal Functions are performed in a facility except assisted vaginal delivery, can the facility be considered an EmOC facility?

We answer this question with a qualified yes. If a strict interpretation of the definition of an EmOC facility were used, some countries would not have a single facility qualify, and this would misrepresent the real situation of emergency care for women. Therefore, if a facility performs all the Signal Functions to qualify as a basic emergency obstetric facility except this one, we might call it “Basic EmOC minus one” (with a footnote saying which one is missing). Similarly, for a facility that performs all the functions of a comprehensive emergency obstetric facility except assisted vaginal delivery, we might call it “Comprehensive EmOC minus one”.

There are many advantages of assisted vaginal delivery over C-section. An experienced midwife or nurse can perform an assisted, vaginal delivery in a basic emergency obstetric facility. Anesthesia is not required as with a C-section, and the potential risks (due to bleeding, infection, complications from the anesthesia) to the woman are fewer. By pointing out that an important Signal Function is missing by labeling a facility "EmOC minus one", we are highlighting that an important service, recommended in the *Guidelines*, is not available to women, and that policy on that subject needs to be revisited.

6. WHICH REGISTERS SHOULD BE USED TO GATHER DATA?

The data for the UN Process Indicators are not collected in a research setting, but rather from facility registers and records, filled in by staff during both routine care and emergencies.

To calculate the UN Process Indicators, the data need to be collected routinely in facilities. Virtually all health facilities record some kind of routine data in the form of registers and patient records. The quality of these data varies greatly, as do the types and numbers of registers and records used.

The facility data required to formulate the UN Process Indicators include:

- number of deliveries in the facility,
- number of complicated cases,
- number of cesarean sections, and
- number of maternal deaths.

Data on deliveries, C-sections and maternal deaths are commonly collected in health facilities, although usually not in the same register. Data on births are easily found on an admissions register, a labor and delivery register, or a maternity ward register. The operating theater register is usually the most complete record of data on C-sections. Data on maternal deaths may be found on a maternity / obstetric register, a discharge register (if used by the facility) or, perhaps, a separate register for all deaths in the facility.

Gathering data on complications is less straightforward. Facility registers generally do not have a place to record obstetric complications, in which case a column for this information must be added. Hospital and project managers should resist the urge to create a new, separate register devoted to obstetric complications or other data for the UN Process Indicators. It is more useful to the facility to improve and revitalize existing registers than to create more administrative work for busy clinicians. Women with complications may be treated in the labor or maternity ward (for example, women with prolonged labor) while women with postpartum sepsis may be seen and treated in a gynecology, general or female ward. Complications from abortions or ectopic pregnancies may also be recorded in a female or general ward. Complications can sometimes be located in operating theatre registers, for example, cases of ruptured uterus or ectopic pregnancy, or cases of hemorrhage requiring blood transfusions.

We recommend that you carry out an analysis of the flow of obstetric patients through a facility that shows where and how data are recorded, especially on obstetric complications and maternal deaths, before choosing which registers to use for collecting data for the UN Process Indicators. The most complete and accurate registers should be used before those that might contain only some of this information.

When performing the needs assessment for the first time, it may be necessary to look at other sources of information. Patient records such as the "bed head ticket" (the patient chart placed at the foot of a hospital bed) or individual patient files can be useful especially for complications. These same records may also be useful to validate the data in the registers while checking for completeness and accuracy. Patient records are too cumbersome to be used for routine data recording, however, and should not be used as a substitute for patient registers.

7. HOW SHOULD WE RECORD COMPLICATIONS IN THE FACILITY REGISTERS?

When recording obstetric complications at your facility, here are some things to keep in mind:

- Make sure that there is a place in the appropriate register to record complications (including registers in female or gynecology wards where women with complications of abortions, ectopic pregnancies, or puerperal sepsis may be seen).
- When calculating Met Need, only one obstetric complication per woman should be counted. Data on "obstetric complications treated" more accurately should be called data on "women who experienced at least one major obstetric complication."
- Make sure that the registers are being filled out consistently and completely, and have them routinely reviewed by a supervisor. To ensure consistency, it may be useful to post a list of the seven major obstetric complications with their definitions in the area where the registers are filled-in or in the register itself. This is important because if women with complications are being treated at your facility, but the information is not put in the registers, "met need" will appear lower than it actually is (and the "case fatality rate" will appear higher than it actually is, as discussed later).

Remember: obstetric complications are unpredictable and can occur in the facility unexpectedly. For example, postpartum hemorrhage can occur without warning and is not the fault of the attendant. The complication should be registered in both the case notes and the register. Encourage staff not to underreport due to feelings of guilt or misplaced culpability. Remind them that a high number of complications treated shows that women are coming to the facility and receiving care.

8. HOW ARE DATA ABSTRACTED FROM THE REGISTERS?

Many facilities have a system in place to compile their obstetric data on a monthly, quarterly or semi-annual basis. Reports may be used internally, or may be required by health authorities or donor agencies. In the projects conducted by AMDD's partners, a semi-annual reporting form is used, compiling data each six months on deliveries in the

facilities, major obstetric complications treated, C-sections performed, and maternal deaths.

When reviewing the registers that will be used to complete the summary form, a number of data collection problems may be identified, especially when a new process is being undertaken in a facility, such as filling in data on obstetric complications for the first time. In an AMDD-sponsored tool developed with EngenderHealth entitled “Emergency Obstetric Care: Toolbook for Improving the Quality of Services” there is an entire chapter devoted to conducting a review of registers and records with an eye to improving the quality and completeness of data collection. (To access this document and for information on how to order copies, please go to the AMDD website – <http://www.amdd.hs.columbia.edu>.)

One concern in compiling data from a number of registers, such as data on obstetric complications, is that women will be identified as a complication on more than one register. It is important that staff at each facility understands the flow of obstetric patients and why the data are being collected so that large numbers of cases of obstetric complications are neither missed nor double-counted.

However, the critical issue is that facility staff and local health officials using these data to monitor availability and utilization of emergency obstetric care. Therefore, the need to improve the accuracy of the data should be weighed against the extra (and unrealistic) burden that this would place on staff. One way to resolve this issue is to do a short study to determine whether double counting, for example, is a serious problem. If such a study showed that double counting resulted in a 10% inflation in the number of complicated cases, then either that might be considered an acceptable level of error, or it could be used as a “correction factor” – in other words, the number of major complications might be reduced by 10%. Consistency is critical so that (after the initial period of improving data collecting systems) changes in facility data are due to changes in services rather than fluctuations in data collection methods. However, realistically speaking, we recognize that improvements in the data collection system are likely to have an initial effect on the data.

9. HOW ARE THE UN PROCESS INDICATORS CALCULATED?

Indicators 1 and 2: Coverage of EmOC services

Both Indicators 1 and 2 deal with the question of population coverage by EmOC services. **Indicator 1** deals with the amount of EmOC services available to the population. The minimum acceptable EmOC coverage is one comprehensive EmOC facility, and four basic EmOC facilities, per 500,000 people. To determine the population size in a given area (i.e. national, regional, district, catchment area, etc.), the most recent census should be used. If the census is more than ten years old, a population projection may be used for the relevant year and adjusted accordingly.

The number of EmOC facilities is calculated through direct observation, interview with staff or review of facility records. All six of the Signal Functions must have been performed in the three prior months in order for a facility to qualify as a Basic EmOC facility. For comprehensive EmOC facilities, those six Signal Functions, plus obstetric surgery and blood transfusion, must have been performed over those three months

Example:

A health project manager intends to determine EmOC status in 25 facilities in a region. During supervision visits in these facilities, she determines that there is one comprehensive EmOC facility, and 3 basic EmOC facilities. In an additional four facilities, four out of the six Signal Functions are performed, and she makes a note of this fact.

The population in the region, using the most recent census, is 745,730. The *Guidelines* use 500,000 population as the denominator in order to set the ratio of facilities to the population. She begins by dividing 745,730 by 500,000.

$$\frac{\text{Region's population: 745,730}}{\text{Denominator: 500,000}} = 1.49$$

She gets the number 1.49, or roughly 1.5. The *Guidelines* state that the minimum acceptable level is 1 Comprehensive EmOC facility per 500,000 population. So she needs 1.5 times as many Comprehensive EmOC facilities as she has (1 multiplied by 1.5). She notes that, with only one Comprehensive EmOC facility, there might be considerable unmet demand for services, and, in fact, she has observed that this facility is quite crowded.

The *Guidelines* also state that there should be a minimum of 4 Basic EmOC facilities per 500,000 population. She multiplies the minimum acceptable level of 4 by 1.5 for her region, and determines that 6 basic EmOC facilities are required for adequate coverage. But, this region only has 3 basic EmOC facilities, so it needs at least another three.

Reviewing her notes, she remembers that there are four facilities that perform most, but not quite all, of the Signal Functions. These can be upgraded without too much additional cost – providing the women in the region with the coverage they need in emergency services.

Indicator 2 deals with the geographical distribution of EmOC facilities. To see if the facilities are well distributed, simply look at the geographic distribution of your EmOC facilities on a map, and the distribution of the population. You may have met the minimum acceptable level of 1 Comprehensive and 4 Basic EmOC facilities per 500,000 population. But when you look at the facilities on a map, you may find that they are all

clustered near the main city or along a main road, and are not accessible to a large proportion of women, most of whom live in the countryside.

Time is an important element in saving the lives of women needing emergency treatment. Sudden complications during pregnancy and childbirth are the main causes of maternal mortality and morbidity. Postpartum hemorrhage, if untreated, can lead to death within a few hours. For most other complications, the estimated average interval from onset to death ranges from 12 hours to several days. Table 4, below, shows the average time interval from onset of a complication to death.

Table 4: The Average Estimated Interval from Onset of to Death

Complication	Hours	Days
Hemorrhage		
Postpartum	2	
Antepartum	12	
Eclampsia		2
Obstructed labor		3
Infection		6

If emergency obstetric facilities are all clustered near the main city, then women experiencing obstetric complications in outlying areas will not be able to get to a facility in time. Some health planners, having found out that their EmOC facilities were unevenly distributed, were inspired to upgrade facilities to EmOC status in more remote areas.

Indicators 3, 4 and 5: Utilization of EmOC services

Indicators 3, 4 and 5 all measure different aspects of the utilization of services.

- Indicator 3: Proportion of all births in EmOC facilities. This indicator shows how many women are giving birth in EmOC facilities (numerator) as a proportion of the number of expected births in the population (denominator)¹⁰.
- Indicator 4: Met need for EmOC. This indicator is calculated by dividing the number of women with complications treated in a facility or facilities in a region (numerator), by the number of complications you would expect to occur in the population, estimated as 15% of expected births (denominator)¹¹.

¹⁰ When you want to calculate a proportion or a percentage, you divide one number (the numerator) by another (the denominator). $\frac{\text{numerator}}{\text{denominator}}$

¹¹ Although this indicator is phrased in terms of “women treated” in an EmOC facility, the question of whether a woman actually received treatment, or adequate treatment, would need to be addressed using clinical audits or some other in-depth method. (See section 17.) More accurately, these are women who

- Indicator 5: Cesarean sections as a percentage of all births in the population. This indicator on cesarean sections shows you what proportion of women giving birth in the population gave birth by C-section in emergency obstetric care facilities. The number of C-sections (numerator) is divided by expected births in the population (denominator).

If any of these three indicators is below the minimum acceptable level, then you can conclude that women in need of emergency services are not using the services available. (Indicator 5 also has a maximum acceptable level, acknowledging that C-sections can be over used). We will show how this calculation is done for each Indicator below.

You can estimate the annual number of expected births by multiplying the population by the crude birth rate. You can get the population size for the area from the census or the government statistics office. The crude birth rate is usually available from health authorities. For example, your census shows that the population in your district is 500,000. You find out that the birth rate is 40 (or 40 per 1000 which is the same as 0.04). The annual number of births you would expect in your district:

$$500,000 \times 0.04 = 20,000 \text{ annual number of births}$$

The information required for the numerators for UN Process Indicators 3 through 5 is obtained from facility records and registers:

- Number of births in EmOC facilities (Indicator 3)
- Number of women with complications treated in EmOC facilities (Indicator 4)
- Number of Cesarean sections performed (Indicator 5)

Calculating Indicator 3: Proportion of all births in EmOC facilities

Example:

A health planner for a provincial health ministry wishes to determine what proportion of all births is taking place in EmOC facilities. He starts by looking up the census figures, which show that there is a population of 105,820 people in his province. He then checks at the National Institute for Statistics that estimates the crude birth rate for the country is 40 births per 1000 population. Nothing is available for his province, so he uses the estimated national birth rate. He calculates that the estimated annual number of births in the province is 105,820 multiplied by 0.04 (40 divided by 1000) or 4232. The health planner then collects monthly data summaries from all 10 EmOC facilities in the province, from which he develops an annual summary. He finds that there were 402 total deliveries in EmOC facilities in that year. He has ensured that the 402 deliveries include all C-sections and assisted deliveries (not just “normal” deliveries).

experience major obstetric complications who are registered in an EmOC facility – either admitted with the complication or who develop one while they are in hospital.

He then divides the numerator - the actual number of deliveries in EmOC facilities (402 deliveries) – by the denominator – the number of births expected in the region (4232 births), and multiplies this by 100 to get the percentage.

$$\frac{\text{Numerator: deliveries in EmOC facilities } \mathbf{402}}{\text{Denominator: births estimated for the province } \mathbf{4232}} = 0.095 \times 100 = 9.5\%$$

Approximately 10% of women give birth in emergency obstetric facilities whereas the minimum required level is 15%. Most women are giving birth somewhere else, perhaps at home or in facilities that do not provide emergency services. It is very likely, given these data, that women with obstetric complications are not receiving the care they require.

Important to remember:

- The numerator is the total number of **deliveries** (including all C-sections and assisted vaginal deliveries).
- The numerator is the total number of **deliveries** in the facility and not the number of **births**. This is an important distinction because the number of births may be higher than the number of deliveries depending on the number of multiple births.
- But, the denominator is the expected number of **births**.

Calculating Indicator 4: Met Need

This is a very important indicator. If data on complications are gathered correctly, program managers have an excellent indicator of utilization that is oriented directly to saving women's lives. Met Need describes the proportion of women with complications who receive emergency treatment out of the total number of pregnant women that you would expect to have complications (15% of pregnant women). If a program increasingly provides life saving services, and service data are well collected, then Met Need should increase, meaning that an increasing proportion of women who need emergency obstetric services are getting them.

The numerator for Met Need is the actual number of women with the major obstetric complications receiving EmOC services. The collection of data on complications is often a new activity at EmOC facilities (see Question 3 for the definitions of complications).

The denominator for Met Need is an estimate of the number of women in an area who would be expected to have complications. How do we know how many women will

develop complications? The WHO estimates that in a population of pregnant women at least 15% would be expected to experience serious obstetric complications¹². Thus, the denominator is calculated by multiplying this 15% by the estimated annual number of births.

Example:

A project manager recently upgraded EmOC services in the six facilities in a district. Reviewing the data for the past year from all the facilities, he sees that a total of 460 women with major obstetric complications were treated in the facilities over the year. This is his numerator.

He calculates the expected number of complications in the population as follows. First, he multiplies the number of people in his district (439,800 people) by the birth rate for the region, 36 per 1000. There is no birth rate for his district, but he expects it is roughly the same as the regional rate. The expected number of deliveries in the district is $439,800 \times 0.036$ or 15,833. He knows that he can expect 15% of these women to have a complication of pregnancy, so he multiplies 15,833 by 0.15 and gets 2375 expected complications. This is his denominator.

He then calculates Met Need by dividing the actual number of women with complications treated at the facilities by the expected number of women with complications, or $460/2375$.

$$\frac{\text{Numerator: complications treated at facilities } \mathbf{460}}{\text{Denominator: expected number of complications } \mathbf{2375}} = \mathbf{0.19 \times 100 = 19\%}$$

Denominator: expected number of complications **2375**

He multiplies 0.19 by 100 to get the percentage: the proportion of women who needed EmOC and received treatment is 19%. In other words, Met Need is only 19%, whereas it should be at least 100%. At first he finds this a bit discouraging, as he would like all women with complications to be treated. However, when he reviews the situation prior to the project, he realizes that only about 5% of women with complications were being treated before the project started, so in fact, there has been a marked improvement. He encourages his staff to continue their efforts.

Important to remember:

- *National / Regional / District Levels* (tracking progress of all facilities in area): The numerator includes all women with direct obstetric complications treated at the facility.
- *Facility Level* (tracking progress of a single facility): Facility managers should count all women with complications who are stabilized at the facility even if they need to be referred to another facility to receive additional treatment such as a C-section or blood transfusion.
- When counting women with complications, it is the *woman* who is counted, even if she has multiple complications.

Calculating Indicator 5: C-sections as a percentage of all births

The C-section rate allows for a comparison of the proportion of women giving birth by C-section in a population to a range of rates considered appropriate on a population level (between 5% and 15% of all births)¹³. The numerator, the number of women with C-sections, often comes directly from operating theater registers. The denominator is the expected number of births in the population. (It is important to note that the denominator is **NOT** the number of births in a facility. Some referral facilities may need to perform more than 15% of births by C-section due to the high volume of complicated cases they receive.)

Example:

To continue the example above, the project manager observes that 140 women received C-sections in the district over the past year. He knows from the calculations he did for Met Need that the expected annual number of births in the district is 15,833. So he divides the number of C-sections actually performed by the number of all births in the population, and multiplies this by 100 to get the percentage of C-sections being performed.

$$\frac{\text{Numerator: C-sections in district } \mathbf{140}}{\text{Denominator: Annual number of births } \mathbf{15,833}} = 0.0088 \times 100 = 0.88\%$$

Denominator: Annual number of births **15,833**

He finds that 0.88% of women in the district received a C-section. Because the *Guidelines* establish a minimum of 5% (and a maximum of 15%), he knows that the rate in his district is far below the minimum rate of C-sections he would like to see taking place in his district. He takes steps to investigate this further with district hospital managers. He wants to remove barriers to this crucial service while not encouraging unnecessary surgery.

Important to remember:

- Must count all C-sections (emergency and elective).

¹³ The *Guidelines* uses the 5-15% range as the proportion of complications requiring C-Sections amongst a group of women giving birth. Below 5% would indicate women are dying or suffering disability because they are not receiving treatment; above 15% may indicate that women are receiving C-sections for reasons other than those strictly required by their medical condition or fetal indications.

Indicator 6: Case Fatality Rate

The last process indicator, the case fatality rate, gives a rough indication of the quality of care women are receiving in a facility. The numerator for the case fatality rate is the number of direct obstetric deaths in EmOC facilities and the denominator is the number of complicated cases seen in EmOC facilities. The *Guidelines* recommend that the maximum acceptable level for the case fatality rate is 1%.

Case fatality rates are best calculated and interpreted at the facility level. (For more information on interpretation of case fatality rates, see Question 16).

Example:

The medical director in a district hospital reviews the yearly data and observes that there were 6 maternal deaths out of 735 women with direct obstetric complications. On closer inspection, she realizes that one of the deaths was due to malaria, which is not a direct obstetric cause of death (see Question 10). So she calculates the case fatality rate for the facility as $5/735 \times 100$, or 0.68%.

$$\frac{\text{Numerator: direct obstetric deaths } 5}{\text{Denominator: complicated cases at facilities } 735} = 0.0069 \times 100 = 0.68\%$$

She is pleased to see that fewer than 1% of women with complications in the hospital have died, especially given that the hospital treats many women with emergencies. She plans to bring this news to the attention of the staff, but will continue undertaking periodic clinical audits to further improve the quality of care in the hospital. (See Question 17 on other tools available for analyzing quality of care.)

Some facilities find it useful to calculate cause-specific CFRs in order to better understand what complications are particularly life-threatening in their settings. This may assist the management and clinicians in improving the quality of care, or may point to the need to inform the community of signs and symptoms of specific life-threatening complications that need to be brought to the facilities in a timely manner.

Important to remember:

- The numerator consists only of maternal deaths due to direct obstetric complications
- The denominator consists only of women with direct obstetric complications
- Interpret this indicator with care... (See Question 16)

Note on denominators

Some EmOC decision-makers (project managers, provincial health authorities, technical advisors) find it useful to adjust the population in a given area on an annual basis to reflect the increase or decrease in population due to births, deaths and or migration. This population figure serves as the denominator for the calculation of four out of the six UN Process Indicators (indicators 1, 3, 4, and 5). If programs are interested in making this adjustment, have the resources to do this, and have sufficient confidence in the local annual estimate of population, this may be done. However, in a relatively short period of time (three to five years) this is not required. The small change in the denominator resulting from the adjusted population estimate is unlikely to change the estimates of Process Indicators # 1, 3, 4 and 5 substantially, and is especially not likely to change their meaning or public health importance. A balance should be sought between the additional work and level of complication that adjusting the population entails, and the desire to have the most accurate quantification of the change in emergency obstetric care service availability and utilization over time. If an adjustment in the population estimate is made, it should be clearly stated how this was done.

Note on "non-EmOC" facilities

The six Process Indicators are calculated using data from facilities that qualify as EmOC facilities, using the definitions outlined in Q2. Occasionally, in the context of a project, the Process Indicators are calculated on facilities that are going to be upgraded to EmOC status during the life of the project. However, this is an exception. It is important that it is understood that these indicators monitor progress in the availability and utilization of EmOC services, not all maternity services.

Some project managers will want to know the "bigger picture" of all maternity services in an area. They may wish to know how many births are taking place in all maternity facilities, not just those that qualify as EmOC. They may also wish to know whether some obstetric complications are being treated in these non-EmOC facilities. These managers may wish to gather data from non-EmOC facilities and show this alongside the data on EmOC facilities.

As an example of this, see below two tables (Tables 5 & 6) showing data from a national needs assessment in Senegal undertaken in 2001 by the Government of Senegal and UNFPA, and published in the International Journal of Obstetrics and Gynecology (2002; 76: 299-305).

Table 5: Proportion of Births in EmOC Facilities

Facility Type	Number of Deliveries	Expected Number of Births	Proportion	Recommended
38 EmOC	43,770	452,352	9.7%	>15%
All facilities surveyed	129,475	452,352	28.6%	

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

Table 6: Met Need for EmOC

Facilities	Number of Women with Complications Treated	Expected Number of Complications in Population	Met Need	Recommended
38 EmOC	7,789	67,853	11.5%	100%
All facilities interviewed	13,144	67,853	19.4%	

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

Remember: As with any data collection effort, it is important to state clearly how you collected the data.

10. HOW DO WE DEAL WITH INDIRECT CAUSES OF MATERNAL DEATH?

Indirect obstetric causes of maternal death are those illnesses that are aggravated by the pregnancy. Indirect causes of maternal death of particular importance include malaria, tuberculosis, HIV/AIDS and other infectious diseases, and chronic conditions such as anemia, diabetes, or heart disease. The UN Process Indicators gather data on direct obstetric complications, for example, to study “Met Need” for direct obstetric complications treated. Therefore, only data on direct obstetric causes of maternal death – those that can generally be avoided through improved emergency obstetric services – are gathered.

However, in some countries, indirect causes of maternal deaths are a very important component of overall maternal mortality. This is especially true in places where HIV/AIDS or malaria is highly prevalent. In these situations, it might be useful for public health planners to gather information on indirect causes of maternal mortality in order to design appropriate preventive programs.

If indirect causes of maternal death are gathered, they should not be used when calculating UN Process Indicators such as “Met Need,” or “Case fatality,” but should be reported separately. The worksheets in the *UN Guidelines* provide space to record data on other maternal deaths. If specific indirect causes are monitored, this should be clear to those looking at the data reports.

11 . HOW DO WE COLLECT DATA ON COMPLICATIONS OF ABORTIONS?

There are several very important issues surrounding the collection of data on complications of abortion. First of all, abortions (and ectopic pregnancies) by definition occur in the early or mid stages of pregnancy, unlike complications of delivery or the postpartum period. Data on these complications will be missed unless efforts are made to collect data from the register placed at the ward where these women will be seen and treated (such as a Female Ward or Gynecology). Clearly, collecting data from a birth registry or from the admissions register of the labor and delivery ward will not be adequate for capturing information on these events. As mentioned above, a column on obstetric complications may need to be added to the appropriate register, and facility staff alerted to the importance of collecting data on complications of abortion and on ectopic pregnancies.

Secondly, not all abortions should be included as major obstetric complications. Only those abortions (whether spontaneous or induced) that result in a problem that could be life-threatening. Most serious complications seen post-abortion will be sepsis or bleeding. Some projects collect information (incorrectly) on all induced abortions and all incomplete abortions, as obstetric complications. Project managers should review with staff the definition for complications of abortions to avoid over-reporting.

In some projects, staff may wish to consider segregating abortion-related complications from other obstetric complications when calculating “Met Need.” The data for the numerator, all women with complications treated in the facilities, come from facility registers. The denominator is an estimate of the number of women expected to have major complications in the region. If there are many abortion-related complications (and especially if non-complicated abortions are included) the indicator for “Met Need” will be inflated, and it will be difficult to interpret change over time in service utilization. Two “Met Need” proportions can be calculated, one with all obstetric complications, including those from abortions, and one with all obstetric complications except abortions. This

will show you whether an unrealistically large proportion of all major complications is due to abortion (e.g. >50%).

12. HOW SHOULD REFERRALS BE HANDLED?

In calculating the UN Process Indicators “Proportion of all births in EmOC facilities,” “Met Need,” and “Cesarean Sections as a percent of all births,” data are collected in the EmOC facility where the event (the birth, the complication treated or the C-section) takes place. This can be challenging when gathering data to calculate Met Need, since some women with complications will be seen in one facility but referred to another facility for the treatment. Here are some guidelines for handling data on referrals:

- if a woman is seen in a facility and referred with NO TREATMENT given in the process of referral, she should not be included in that facility's data on complications treated.
- if, on the other hand, a woman is seen at a facility and stabilized or partially treated before being referred, her data should be included in that facility's data on complications treated. If she then goes on to a referral facility and is treated, she will also be counted in the calculation of that facility's Met Need.

We understand that some women will be included twice, then, in the calculation of Met Need – at the facility where she was stabilized or partially treated, and at the facility where she was fully treated. This may be an unavoidable problem because linking women's records from the lower level facility to the referral facility is too complicated to do on a routine basis. Also, not including the women's information in the basic EmOC facility where she received life-saving interventions before being referred undervalues that facility's role in the process of preventing maternal deaths.

If a project manager suspects that women referred out of a facility are not receiving care, or – worse yet – are dying en route to a referral facility, this should be addressed as a special activity. The records of women referred out of a facility over a one-month period, for example, can be linked to records of women seen and treated at the referral site, to determine whether women are able to access the referral care. Public health strategies can be developed to address problems of women not reaching care upon referral.

13. WHAT IF WOMEN COME FROM OUTSIDE THE CATCHMENT AREA?

As mentioned above, three of the UN Process Indicators – proportion of all births in EmOC facilities, the met need for EmOC, and cesarean sections as a percent of all births – require estimates of the number of expected births in the area to perform the calculations. Facilities that provide excellent EmOC services will most likely draw

women with complications from a wider geographical area than the nominal catchment (or service) area of the facility or group of facilities in a geographical area. This is a positive outcome of upgrading facilities as it shows that more women are being treated who need help, and that word of improved services is reaching an ever-wider set of communities.

If you think that women are coming from outside your catchment (or service) area, but would like to be certain, you can do a quick review of your admissions records. Review the records from one or two recent months. Look at the addresses of the women and tabulate those coming from inside the catchment area compared to those coming from outlying areas. If you are interested in data for an entire health area, you will have to do this in all the EmOC facilities in that area of interest. You can then calculate the percent of women being served from outside your area. This exercise can be done by a member of the staff who is familiar with the names and locations of the towns and villages in the area. A map that outlines the official catchment area for the facility or the area of interest can be helpful.

Some managers using UN Process Indicators express concern that having women come from outside their facility's catchment area (e.g., from outside their district) will make their calculations incorrect. Let's say you estimate, based on a small study, 20% of the women delivering in your facility come from outside the area. You can do one calculation of the Indicator "births in EmOC facilities" using all the births (and mention in a note that you think some are from outside the catchment area) and another calculation using only 80% of the births in your numerator. The same two, separate calculations can be done with the UN Process Indicators Met Need and C-sections.

Since the UN Process Indicators are not familiar to many users, issues such as this can sometimes be confusing. One way to clarify issues is to go back and restate what question you are trying to answer. For example, if your hospital is the only functioning hospital in the area, then does it really matter where women are coming from? By improving services you are helping to save the lives of women who would have no other place to get help.

14. WHY USE A SERIES OF INDICATORS?

One major advantage a series of UN Process Indicators has over a single indicator such as a maternal mortality rate or ratio is that you can explain more of the picture of maternity emergency care, and what changes over time in response to the provision of services. For example, if you determine from your coverage indicators that services are available to women, but the proportion of births in facilities, met need and the C-section rates are all low, you know there is some unidentified barrier to women using the services. You may wish to hold focus groups with women in the community to determine what these barriers are.

If your C-section rate is high in relation to the proportion of births in EmOC facilities and Met Need, you may want to make sure that all the C-sections are justified for the health and safety of the mother and infant. The best scenario for increasing success in providing women with life-saving services is for coverage, proportion of EmOC deliveries and Met Need to increase, for C-sections to increase to between 5% and 15%, and for case-fatality rates to decline.

15. HOW ARE THE UN PROCESS INDICATORS USEFUL AT THE FACILITY LEVEL?

The facility collecting obstetric services data is in a good position to see progress towards improved quality and utilization of its services by systematically reviewing the data trends. After making an effort to renovate facilities and train personnel, you expect utilization to increase. The data that would show an increase in utilization most directly is the number of births taking place in the facility. If you graph the number of births per month over a period of time, you expect to see a steady increase.

What you most want to see is an increase in women with obstetric complications using the emergency obstetric services you are providing. For this, you would want to graph the number of women with complications treated, and the number of C-sections. If you do not see an increase in obstetric complications treated, you will want to undertake a review, such as a quality improvement study discussed below (Question 17) to determine whether there are barriers to services that could be removed through a change of facility policy or procedure. In addition, you may wish to undertake a community focus group to see how the community perceives the facility.

If the C-section rate in your facility is quite high (such as 20% or higher) this might suggest that unnecessary procedures are being done, and can be reviewed through supervision, observation or clinical audit. Likewise, if your C-section rate is rising steadily for many months but then for a period of one or two months dips, you can ask yourself the reason. Perhaps the anesthetist was on leave or equipment broke down. A review of the data supplemented by good supervision can identify problems that management can address.

Finally, a close look at the facility's case fatality rate, combined with an analysis of the time of death in relation to time of arrival, can be a helpful tool if performed in a manner that is sensitive to the impact that a maternal death has on the facility staff. (See Questions 16 and 17 for more information.)

Graphing the absolute number of births, C-sections, complications and maternal deaths in your facility may provide you with vital information you need to make decisions on improving services for women. However, staff at some facilities want to calculate UN Process Indicators using their data, but know they are only one of many facilities in the area, and do not know what denominator to use in the calculations. Here are some considerations:

1. You can calculate the indicators based on the population of the catchment area.
2. You can calculate your facility's contribution towards the Met Need of women in your area for emergency obstetric care (keeping in mind that additional need is met in the neighboring facilities.)
3. Or, you could meet with the directors of the other facilities and look at all your facilities' service statistics for a year and calculate the UN Process Indicators together. Remember, however, that most facilities have records of the annual number of births and C-sections, but not necessarily complications.

16. HOW IS THE CASE-FATALITY RATE INTERPRETED?

The case fatality rate is a statistic that must be interpreted with care. You want your facility to be handling cases of complications – many of them severe – and with that service provision comes the risk of death of women. If you are not receiving women with complications at your facility, your case fatality will be low, but you also will not be serving the community. It can be very demoralizing for staff to treat women who arrive at the hospital in such a weakened state through blood loss, obstructed labor or infection that they die shortly upon arrival. If women are dying after they have been in the hospital for some time, either because the emergency response is too slow or there are management problems (such as problems of equipment, supply or staff not adhering to treatment protocols), a high case fatality rate is a call to action.

It is also important to note that if very few emergency obstetric complications are treated in a facility, it is best not to calculate a case fatality rate; the interpretation will not have the same meaning as in a higher volume facility.

17. WHAT OTHER TOOLS ARE AVAILABLE FOR ANALYZING QUALITY OF SERVICES?

Obstetric service data are most useful for monitoring availability and utilization of services, but their use is limited when monitoring the quality of care. Only one of the UN Process Indicators, the case fatality rate, directly addresses quality of care, although the C-section rate indirectly touches on quality of care. Other tools should be used routinely or as needed to understand the issues surrounding quality of care in a facility, and for continual improvement. Two tools available to project teams are 1) *Improving Emergency Obstetric Care Through Criterion-Based Audit* and 2) *Emergency Obstetric Care: Leadership Manual for Improving the Quality of Services* with its accompanying Toolbook. (To access these documents and for information on how to order copies, please go to the AMDD website - <http://www.amdd.hs.columbia.edu>.)

Criterion-based clinical audits can be an excellent way to review procedures for handling emergencies, compared against objective standards. Criterion-based clinical audits can be used on all or selected obstetric complications, on management issues such as infection prevention, or on issues related to human rights in the facility setting such as transparency of the facility fee structure. This approach makes the exercise less threatening. Staff can discuss how best to improve their emergency response, and management can identify barriers to effective service.

Improving Emergency Obstetric Care Through Criterion-Based Audit is a chartbook on how to conduct a criterion-based audit developed by a group of AMDD technical advisers and is available for project teams. The audit manual gives facility and project managers information on where to go to find the best practices in obstetrics and gynecology, and distinguishes “case reviews” from criterion-based audit.

A new publication by WHO entitled *Beyond the Numbers; Reviewing maternal deaths and complications to make pregnancy safer* describes a number of methodologies for reviewing maternal deaths and complications in order to make pregnancy safer. Among the methodologies described are verbal autopsies, maternal death case reviews, confidential enquiries into maternal death, surveys of severe morbidity and clinical audits. (To access this document and for information on how to order copies, please go to the WHO website - <http://www.who.int/reproductive-health>.)

The *Leadership Manual for Improving the Quality of Services* (known as the QI process) provides detailed information on how to conduct a quality improvement study and provides the tools to undertake this. The QI manual is written for facility providers and managers and outlines a participatory process involving teams composed of facility staff directly and indirectly involved in emergency obstetric care. The teams can use the questionnaires in the *Toolbook* to systematically review the quality of the care provided in the facility, to identify problems to address, and a plan of action to improve the facility functioning. Ideally, the QI process is on going, with new plans being developed and implemented over time, and successes celebrated.

In addition to undertaking clinical audits and quality improvement exercises, facilities may benefit from conducting periodic internal reviews such as case reviews of maternal deaths, “near misses” or cases of women who survived very serious complications, or other complications in the facility. These reviews could be undertaken weekly or monthly, or could be reviewed during the course of an external supportive supervisory visit. It is most important that these reviews are conducted in a way that does not accuse or blame the facility staff.

REFERENCES:

AMDD. *Improving Emergency Obstetric Care Through Criterion-Based Audit*. Columbia University, New York, NY. 2002.

AMDD Working Group on Indicators. Program note: Using UN process indicators in emergency obstetric services: Pakistan, Peru and Vietnam. *International Journal of Gynecology & Obstetrics* 2002; in press.

AMDD Working Group on Indicators. Program note: Using UN process indicators in emergency obstetric services: Bhutan, Cameroon and Rajasthan. *International Journal of Gynecology & Obstetrics* 2002; 77(3): 277-284.

Bailey PE, A Paxton. Program note: Using UN process indicators to assess needs in emergency obstetric services (Mozambique, Nepal and Senegal). *International Journal of Gynecology & Obstetrics* 2002; 76: 299-305.

EngenderHealth, AMDD. *Emergency Obstetric Care: Leadership Manual for Improving the Quality of Services*. Working Draft, January 2002.

EngenderHealth, AMDD. *Emergency Obstetric Care: Toolbook for Improving the Quality of Services*. Working Draft, January 2002.

Enkin M, Keirse M, Neilson J, Crowther C, Duley L, Hodnett E, Hofmeyr J. *A Guide to Effective Care in Pregnancy and Childbirth 3rd edition*. Oxford, Oxford University Press. 2000.

Goodburn EA, Hussein J, Lema V, Damisoni H, Graham W. "Monitoring obstetric services: putting the UN guidelines into practice in Malawi. I: developing the system." *International Journal of Gynecology & Obstetrics*. 2001; 74:105-117.

Hussein J, Goodburn EA, Damisoni H, Lema V, Graham W. "Monitoring obstetric services: putting the 'UN Guidelines' into practice in Malawi: 3 years on." *International Journal of Gynecology & Obstetrics*. 2001; 75:63-73.

Maine D. *Safe Motherhood Program: Options and Issues*. Center for Population and Family Health, School of Public Health, Columbia University, New York, NY, 1991.

Pathak LR, Kwast BE, Malla DS, Pradhan AS, Rajlawat R, Campbell BB. "Process indicators for safe motherhood programmes: their application and implications as derived from hospital data in Nepal." *Tropical Medicine and International Health*. 2000; 5(12):882-90.

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

UNFPA, AMDD. *Distance learning courses on population issues, Course 6: reducing maternal deaths: selecting priorities, tracking progress.* UNFPA, New York, NY 2002.

Wardlaw T, Maine D. "Process indicators for maternal mortality programmes." In: *Safe Motherhood initiatives: critical issues.* Oxford: Blackwell Science. 1999.

WHO. "Beyond the Numbers. Reviewing maternal deaths and complications to make pregnancy safer. WHO, Geneva. 2002.

WHO/UNFPA/UNICEF/World Bank. *Managing Complications in Pregnancy and Childbirth: A Guide for Midwives and Doctors. Integrated Management for Pregnancy and Childbirth (MCPC).* World Health Organization, Geneva, Switzerland, 2000, WHO/RHR/00.7