

What Works:

A Policy and Program Guide
to the Evidence on Family Planning,
Safe Motherhood, and
STI/HIV/AIDS Interventions

Module 1

Safe Motherhood

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POLICY Project

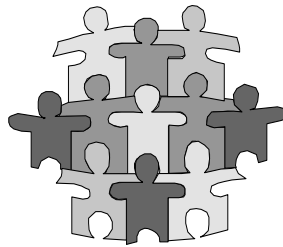


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POLICY Project

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List of Abbreviations

ANC	Antenatal Care
ACNM	American College of Nurse Midwives
AIDS	Acquired Immune Deficiency Syndrome
ANM	Auxiliary Nurse Midwife
CemOC	Comprehensive Emergency Obstetric Care
CI	Confidence Interval
CHW	Community Health Worker
CIDA	Canadian International Development Agency
CLADEM	Latin American and Caribbean Committee for the Defense of Women's Rights
CNM	Certified Nurse Midwife
CRLP	Center for Reproductive Law and Policy
DDE	Dichlorodiphenyl Dichloroethene
DDT	Dichlorodiphenyl-trichloroethane
DHS	Demographic and Health Surveys
ELISA	Enzyme Linked Immunosorbent Assay
EmOC	Emergency Obstetric Care
EOC	Essential Obstetric Care
FCV	Family Care Volunteer
FHI	Family Health International
GDP	Gross Domestic Product
FNIB	Family Size Nonimpregnated Bed Net
GD	Gestational Diabetes
GHC	Global Health Council
GIS	Geographic Information Systems
HIV	Human Immunodeficiency Virus
HIV-1	Human Immunodeficiency Virus (Subtype, non-B)
IARC	International Agency for Research on Cancer
IC (strip test)	Immunochromatographic Strip Tests
ICPD	International Conference on Population and Development
IDVC	Integrated Disease Vector Control
IEC	Information, Education and Communication
IOC	Iodized Oil Capsule
IOM	Institute of Medicine
ITN	Insecticide Treated Nets
IV	Intravenous
LBW	Low Birth Weight
MCH	Maternal and Child Health
MMR	Maternal Mortality Ratio
MOH	Ministry of Health
MTCT	Mother-to-Child-Transmission of HIV/AIDS
NGO	Nongovernmental Organization
NIB	Nonimpregnated Bed Net
OGTT	Oral Glucose Tolerance Test
PATH	Program for Appropriate Technology in Health

PCBs	Polychlorinated-biphenyls
PIB	Permethrin-Impregnated Bed Net
PMM	Prevention of Maternal Mortality
PPH	Post-Partum Hemorrhage
RAMOS	Reproductive Age Mortality Survey
SIDS	Sudden Infant Death Syndrome
SP	Sulphadosine-Pyrimethamine
STD	Sexually Transmitted Disease
STI	Sexually Transmitted Infection
TBA	Traditional Birth Attendant
TB	Tuberculosis
UBTH	University of Benin Teaching Hospital
UNFPA	United Nations Fund for Population Activities
UNHCR	United Nations High Commission on Refugees
UNICEF	United Nations Children's Education Fund
USAID	United States Agency for International Development
VVF	Vesico-Vaginal Fistula
WHO	World Health Organization

Introduction to the Series of Modules in the Guide

When designing reproductive health and STI/HIV/AIDS programs, policymakers and program planners are faced with a wide array of interventions. The current push for “best practices” is an attempt to sift through the evidence on programs and interventions to cull those that are most effective. With scarce resources for reproductive health and growing demand for services, program priorities must be based on effective interventions. Most scientific and biomedical research on reproductive health interventions has been written for scientists; little has been written specifically for policymakers. This guide is intended for policymakers and program planners who are designing reproductive health and STI/HIV/AIDS interventions and who are deciding among priority interventions. Organizations that provide assistance to programs worldwide may also benefit from this guide.

The modules in this guide, *What Works: A Policy and Program Guide to the Evidence on Family Planning, Safe Motherhood, and STI/HIV/AIDS Interventions*, provides a list of reproductive health interventions and the supporting research that documents the effectiveness of these interventions. This guide will be useful to those developing guidelines for best practices.

The modules in this guide provide information complementary to the biomedical information from clinical studies in the WHO Reproductive Health Library, based on the Cochrane Collaboration.¹

¹ The Cochrane Collaboration, an international resource for evidence-based medicine in all specialties, is a continuously updated review of randomized controlled trials (PANOS, 2001). Information on the Cochrane Collaboration and the related WHO Reproductive Health Library is

While the Cochrane Collaboration reviews provide meta-analysis of randomized clinical trials, there are many health problems in developing countries that are not amenable to investigation using this methodology. This guide also adds to the ongoing work on best practices in reproductive health, such as UNAIDS’ work on HIV/AIDS.

This guide summarizes research published in peer-reviewed publications with clear and transparent data on the effectiveness of various reproductive health interventions, program and policy initiatives that can be implemented to improve family planning/reproductive health and reduce STI/HIV/AIDS in developing countries, rather than dosage levels of particular medications. Biomedical information is included in so far as it is relevant to programmatic considerations.

Furthermore, the modules in this guide categorizes these interventions by those that are effective, those that may be on the cutting edge but for which sufficient evidence has not yet been gathered, and common interventions that are not effective. This guide includes policy and program issues regarding the components of reproductive health and HIV/AIDS. Most evidence in the guide comes from developing countries; however, where that was not available, evidence from developed countries is included.

The authors have not, as is done in the Cochrane Collaboration, reanalyzed the data on interventions, rated the grades of evidence, or presented an analysis of the implications of the data. For some

available at www.cochrane.org or www.update-software.com.

interventions, many large-scale studies including some randomized controlled trials are listed; for other interventions, supporting research is available from only one study using a small sample size. With review articles, the original studies are cited as reported in the review. An attempt has been made to use the original studies and primary sources; but where the original could not be located, the authors relied on review articles. Evidence from review articles is clearly noted (e.g., x cited in y).

Gray (1997) lists the five strengths of evidence in research:

Type	Strength of evidence
I	Strong evidence from at least one systematic review of multiple well-designed, randomized controlled trials.
II	Strong evidence from at least one properly designed, randomized controlled trial of appropriate size.
III	Evidence from well-designed trials without randomization, single group pre-post, cohort, time series, or matched case-control studies.
IV	Evidence from well-designed, non-experimental studies from more than one centre or research group.
V	Opinions of respected authorities, based on clinical evidence, descriptive studies or reports of expert committees.

The evidence cited in this guide primarily falls in strength levels IV and V; however, some evidence that falls in strength levels I, II, and III is included. The evidence presented in the guide represents the best available research on family planning, safe motherhood, STI/HIV/AIDS and related reproductive health interventions the authors have been able to gather at the time of each module was published.

This guide also does not address the issues of cost, equity, or sustainability. The authors hope that others will provide policymakers with guidance on these issues based on the effective evidence-based interventions presented here. For example, Wendy Graham at the University of Aberdeen, is leading an effort to provide evidence of cost-effective intervention packages for maternal health. John Stover of the Futures Group is leading efforts in this regard on HIV/AIDS. The USAID-funded Advance Africa Project is also compiling a set of best practices in family planning and STI/HIV/AIDS that will include more detail of some of the interventions included in the modules of this guide. See www.advanceafrica.org/bestpractices.

The guide's three main modules include:

- Safe Motherhood
- STI/HIV/AIDS, including mother-to-child transmission (MTCT)(underway)
- Reducing Unintended Pregnancy (underway)

Other modules may include adolescent reproductive health, female genital cutting, gender-based violence, integration, infertility, reproductive health cancers, and the health of older women.

Each module is organized as follows:

- Introduction summarizing critical issues.
- Effective interventions, presented in table format, with the interventions in the left hand column and relevant research that supports the intervention or particular policy direction in the right hand column. The interventions are listed in the table of contents of each module.
- Policy and program issues (such as access to care and quality of care).
- Common interventions that are ineffective or potentially harmful.

- Promising interventions for which more evidence is needed.
- References (citations for each study and web sites, where possible).
- Most recent clinical manuals.
- An annotated index of interventions.

Regular updates will be posted to the online document. In addition, a CD-ROM version of the guide will be made available. The module is available at:
www.policyproject.com.

Executive Summary of Safe Motherhood

This module of the guide, *What Works: A Policy and Program Guide to the Evidence on Family Planning, Safe Motherhood, and STI/HIV/AIDS Interventions*, reviews the research that supports interventions in safe motherhood.

Reducing maternal mortality is an attainable goal for countries around the world. “It is not for lack of knowledge or tools appropriate to developing country settings that poor women in poor countries still die of pregnancy related causes” (Gelband et al., 2001:48).

Policies and programs to reduce maternal mortality can work. Countries that have put political and financial resources behind safe motherhood programs have made progress in reducing maternal mortality.

Most women get pregnant and give birth incident-free. However, for the women who do experience a problem, some level of medical intervention is needed. For the main causes of maternal mortality—severe bleeding (hemorrhage) infection, unsafe abortion, eclampsia, obstructed labor, and other direct causes such as ectopic pregnancy and embolism—women need access to emergency obstetric care (EmOC). Coupled with assuring skilled attendance at birth, increasing access to EmOC for women in developing countries will go a long way toward reducing maternal mortality.

Increasing access to skilled attendance, including both having a skilled attendant at all births and access to EmOC, requires improving a number of aspects of the health system. Community support is also essential to ensure that women who need it have access to medical care that can save their lives.

A number of other interventions can also help reduce maternal mortality.

- The most important life-saving intervention for pregnant women is access to functioning EmOC facilities. Having a skilled attendant at birth (and basic hygiene) is part of a functioning EmOC facility. A skilled birth attendant who attends a birth outside of an EmOC facility can recognize the danger signs that require quick transport to an EmOC facility. Thus, referral and transport to the EmOC facility are also essential interventions to save mothers’ lives. Countries that have increased skilled birth attendance have seen impressive gains in reducing maternal mortality.
- When informed of the danger signs of labor, delivery, and the postpartum period, the woman, her husband or sexual partner, her family, traditional birth attendants, and her community can facilitate timely access to EmOC.
- However, hospital births alone are not enough to save mothers’ lives; high maternal mortality rates have occurred in hospitals where the quality of care is poor. Iatrogenic medicine in some settings remains a genuine concern.
- Considerable human and financial resources have gone to antenatal care (ANC). However, given that two-thirds of maternal mortality occurs during the postpartum period, much more attention is needed for postpartum care.
- Four ANC visits that focus on evidence-based interventions can have the same

pregnancy-related outcomes as ANC protocols involving more visits.

- Support for breastfeeding should be an integral component of postnatal care. HIV-positive women should be informed of the benefits and risks of breastfeeding.
- High-quality family planning and reproductive health services can ensure that every pregnancy is wanted.
- Maternal nutritional status is important for the health and quality of life of women and for the health of their newborn infants. Adequate nutrition for girls can increase height and pelvic size, decreasing the likelihood of requiring cesarean sections during birth in the future. Approaches are needed to target gender inequalities that deprive girls of adequate nutrition because nutritional interventions are most effective until age three.
- Education, particularly for girls, is associated with a number of healthy outcomes, including reducing unwanted

pregnancies (and thus reduced maternal mortality) and better care for children.

- Smoking cessation programs starting in adolescence can reduce smoking among women once they reach reproductive age, thus improving some birth outcomes.
- Training clinic staff and creating adolescent-friendly sexual and reproductive health services can increase the numbers of adolescents who receive ANC.

The most critical research topics in safe motherhood are operations research on increasing geographic coverage for EmOC, installing and maintaining infection prevention in EmOC facilities, and ensuring safe blood supplies. Other operations research is on improving the quality of care in maternal health, particularly motivating essential obstetric care (EOC) providers in the hospital setting.

Reducing unintended pregnancy and HIV/AIDS and MTCT will be addressed in separate modules.

Introduction to Safe Motherhood

Safe motherhood goes beyond individual women, but it also has a “communal and public health goal. The survival and well-being of mothers and children is central to family and community life and social flourishing” (Cook and Dickens, 2002).

A maternal death is defined by WHO as “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” (WHO, 1977, cited in Maine, 1991). Maternal mortality and morbidity² are major public health problems in developing countries, where between one-quarter and one-third of the deaths of women in their reproductive years can be attributed to pregnancy-related causes. For every woman who dies from pregnancy-related causes, it is estimated that 16–17 women will suffer complications that seriously affect their health, often permanently (Koblinsky et al., 1993; Walsh et al., 1993; Howard, 1987, cited in Roth and Mbizvo, 2001). “Maternal mortality is the leading cause of premature death and disability among women of reproductive age in developing countries” (WHO and UNICEF, 1996, cited in Yamin and Maine, 1999). This module will not include the burgeoning field of neonatal health, which while important, is beyond its scope.

² While the focus of this module is to reduce maternal mortality, interventions to reduce maternal morbidity are also included. However, “a standardized definition for maternal morbidity” does not currently exist (Dumont et al., 2002: 72; translation by Jill Gay).

The Safe Motherhood Initiative, launched in 1987, highlighted the need to reduce the large number of preventable deaths from childbearing. The goal of the Safe Motherhood Initiative is ambitious: to reduce maternal mortality and morbidity as well as to ensure that *every* woman has access to a full range of high quality, affordable sexual and reproductive health services, especially treatment of obstetric emergencies. Maternal mortality has specific biomedical causes that are clearly understood and that respond to appropriate treatment. Among women who die of pregnancy-related causes, 25 percent of women die during pregnancy, 16 percent die during delivery, and 61 percent die after delivery, with most of these deaths occurring within one week of delivery (Li et al., 1996).

Causes of Maternal Death Worldwide

Causes	%
Severe bleeding/ hemorrhage	25
Infection/sepsis	15
Unsafe abortion	13
Eclampsia/hypertension	12
Obstructed labor	8
Other direct causes*	8
Indirect causes**	20
Total	100

Source: WHO, 1997.

*Other direct causes include ectopic pregnancy, embolism, and anesthesia-related complications.

**Indirect causes include anemia, malaria, tuberculosis, and heart disease.

Given the clear understanding of the causes of maternal mortality, significant progress has been made in designing interventions to make pregnancy and childbirth safer (Starrs, 1998). Because most maternal deaths occur at labor and delivery or within the first week following birth, EmOC is the most

important action that can be taken to reduce maternal mortality (Maine, 1999). “A large body of research and program experiences demonstrates that pregnancy and childbirth need not put most women at significant risk” (Ransom and Yinger, 2002), provided that women have access to EmOC.

However, as long as women can be quickly transported to an EmOC facility, a woman can give birth safely in a variety of settings that have access to basic hygiene. Skilled attendance at the home or health facility can lower maternal mortality (Koblinsky et al., 1999), provided women have access to EmOC when needed. The quality of care within the EmOC facility is critical; maternal mortality can remain high when EmOC is not functioning poorly.

Health care programs can be improved to reduce maternal morbidity and mortality. Policies that promote women’s access to education, nutrition, and economic resources, which may not have an immediate impact on maternal mortality, contribute to safe motherhood in future generations. Women’s economic autonomy, their legal rights, their access to education, and their overall status affect their access to maternal health care (Atkinson and Farias, 1995; Nachbar, 1997; Vissandjee et al., 1997; WHO, 1995, and Kutzin, 1993, cited in Roth and Mbizvo, 2001; Celik and Hotchkiss, 2000).

Safe motherhood has been recognized as a human right by numerous countries around the globe through a number of conferences and international conventions (Cook, 1997, cited in AbouZahr, 2001). Yet, “in 2002, the women who lose their lives as a result of pregnancy and childbirth in poor countries, essentially remain invisible to the governments and agencies that need to see” (Graham, 2002: 702).

Note on the Evidence Used in the Safe Motherhood Module *(Please also refer to the general introduction of the guide concerning the evidence cited)*

Although more than 600,000 maternal deaths occur per year, maternal mortality is a rare event statistically within any given population. Therefore, it is difficult to measure the effectiveness of any given intervention by a reduction of the maternal mortality ratio. “The continuing controversy surrounding the [causes of the] decline in maternal mortality in Matlab illustrates the difficulties of effective evaluation of Safe Motherhood programmes. These programmes rely, at the very least, on the functioning of the entire health care system, and on effective referral and communication strategies to promote specific behaviors. One indicator will not be sufficient to elucidate the complex nature of such programmes....” (Ronsmans et al., 1997: 1814).

The gold standard for measuring the impact of an evaluation is a controlled randomized trial, in which interventions are randomly allocated to communities. “Whilst a large number of specific midwifery and obstetric practices have been evaluated using this gold-standard design (i.e., randomized controlled trials), few have been conducted in developing countries and none has used maternal death as the primary outcome” (Graham et al., 2001). Experts agree that conducting randomized controlled trials for safe motherhood would be costly and complex, given that “[s]afe motherhood involves the entire health sector, from community level care to admission in hospitals offering essential obstetric care, and providing scientific proof of programme effectiveness through randomized controlled trials may be unfeasible or prohibitively expensive” (Ronsmans et al., 2001). In addition, “large studies are hugely expensive and require

resources...that could, in our opinion, be much better spent on programs to save lives” (Maine and Rosenfield, 2001: 101).

Most obstetric records systems in developing countries do not elicit information about obstetric complications. Therefore, process indicators (i.e., skilled attendance at birth) have often been used as a proxy in an attempt to assess the intervention’s effectiveness in reducing maternal mortality. For example, to measure the Millennium Goal of reducing maternal mortality, the indicator being used is skilled attendance at birth only, rather than skilled attendance at birth and access to EmOC. To reduce maternal mortality, skilled attendance cannot operate effectively in the absence of EmOC; thus, indicators for both should be measured.

Most process indicators can be built into the health information system, as the governments of Morocco and Malawi have done, meaning that programs can be monitored without expensive population surveys (Goodburn et al., 2001). “Another benefit of process indicators is that they can show change relatively quickly – in a year or two. In contrast, experts recommend that maternal mortality ratios not be measured more than every 10 years, which is not very helpful in monitoring projects” (Maine and Rosenfield, 2001: 101). (See Appendix 1: Process Indicators for Monitoring and Evaluating Emergency Obstetric Care.)

Evidence for reducing maternal mortality is often based on historical data and associative rather than causal relationships. “Our understanding of the contribution of Safe Motherhood programmes to the transformation of maternal mortality has so far relied mostly on evidence from historical or quasi-experimental studies” (Ronsmans et al., 1997: 1813). In this guide, the most recent evidence is cited; however, where older studies are still valid, they are included.

Some new research initiatives are underway, including a new effort by Dr. Wendy Graham at the University of Aberdeen, to track maternal mortality and morbidity and determine the most effective and cost-effective strategies in real world populations with real resource constraints for specific country settings. For more information on this activity, see www.abdn.ac.uk/dugaldbairdcentre/impact.

Another effort in gathering data is collaboration between Columbia University’s Averting Maternal Death and Disability Program and Family Health International, funded by the Bill and Melinda Gates Foundation, to improve access, use, and quality of EmOC in 40 countries in Africa, Asia, and Latin America, with monitoring and evaluation using United Nations process indicators (see, for example, Goodburn et al., 2001). The program works with a variety of partners, including UNFPA, UNICEF, CARE, Save the Children, and the Regional Prevention of Maternal Mortality Network. For more information on this activity, please refer to www.amdd.hs.columbia.edu.

Another effort is the Reproductive Health for Refugees (RHR) Consortium, a collaboration with the Averting Maternal Death and Disability Program at the Mailman School of Public Health of Columbia University to address the critical EmOC needs of refugee and displaced women in 11 project sites in Bosnia, Kenya, Liberia, Pakistan, Sierra Leone, Southern Sudan, Tanzania, Thailand, and Uganda. For more information on this activity, please refer to www.rhrc.org.

Note on the Organization of the Safe Motherhood Module

Most literature on safe motherhood discusses interventions in the same

sequence as pregnancy; that is, pregnancy, during pregnancy, during labor and delivery, and postpartum. Because the single most effective intervention and the strongest evidence for effective actions pertain to labor and delivery, this module is organized as follows:

- Labor and delivery
- Postnatal care
- Care during pregnancy (ANC; health promotion for mothers, partners, and communities; and nutrition)
- Pre-pregnancy

Maternal health interventions need to be delivered as packages of care, or as

strategies, rather than as single interventions (Graham, 2002; Maine, 1991: 23). While interventions are often embedded in complex and multi-faceted programs, in this module each intervention is listed separately with a summary of the corresponding supporting research. This is done for ease of reviewing the evidence that supports interventions related to each stage of pregnancy.

Finally, some issues related to safe motherhood are included in other modules of the guide (forthcoming at the time of publication of the Safe Motherhood Module). These issues include STIs/HIV/AIDS, MTCT; postabortion care, and gender-based violence.

I. Labor and Delivery

I. Labor and Delivery

Evidence-based interventions during labor and delivery can make the difference between life and death for women and their infants. It is critical that women with serious complications receive care from a skilled birth attendant in an emergency obstetric care (EmOC) facility in an environment with the facilities, drugs, and supplies needed to save women's lives. Labor and delivery pertain to the birthing process that includes complete cervix dilation, the baby moving down the cervix from the uterus to being born, and the placenta being delivered. Sixteen percent of maternal deaths take place during labor and delivery. While access to EmOC is crucial for some percentage of women, most women will be able to give birth safely in a range of settings outside a hospital. Current consensus among international experts is that EmOC should be linked with skilled attendance at birth. A key feature of countries that have lowered maternal mortality to a level of less than 100 per 100,000 is that the large majority of births in those countries are delivered by professional skilled birth attendants (Campbell, 2001).

The percentage of women who need EmOC varies, and it is impossible to predict which pregnant women will need EmOC during labor and delivery. "It has been proposed that 9-15% of pregnant women require medical care in pregnancy above the level of minimum care, although the empirical basis for this assumption is weak" (Maine et al., 1992; Koblinsky et al., 1995; WHO, 1994, cited in Campbell and Pittrof, 2000). In the National Birth Center study in the United States, 8 percent of mothers of infants had serious complications during pregnancy, 12 percent were transferred to higher level care during labor, and 4 percent after delivery (Rooks et al., 1992, cited in Campbell and Pittrof, 2000). In a study from seven urban

sites in West Africa, which defined complications by the treatment women received and where there was a paucity of EmOC, 3 to 9 percent of pregnant women experienced severe obstetric morbidities (Bouvier-Colle et al., 1998, cited in Campbell and Pittrof, 2000). Effective referral systems are essential: the goal of a referral system "is that patients are dealt with in the right place with effective treatment at the minimum of cost" (Murray et al., 2001: 353).

Cesarean section is a life-saving intervention when medically indicated and necessary, such as during obstructed labor. Deaths from obstructed labor are almost unknown in developed countries due to the use of Cesarean sections (Maine, 1999). As a surgical intervention, Cesarean sections carry risks and increased maternal morbidities. In many countries, high rates of Cesarean sections are unrelated to medical necessity, wasting resources and increasing maternal morbidities (Hodnett, 1998 cited, in Campbell and Pittrof, 2000). "Routine application of surgical interventions and new obstetrical technologies to normal, low-risk women without the prior assessment of their effects has led to significant iatrogenic morbidity. Examples of routine interventions leading to increased maternal morbidity include fetal monitoring and epidural analgesia, both of which are associated with an increase in operative delivery, and routine episiotomy, which results in an increased risk of perineal injury" (Thacker et al., 1995; Morton et al., 1994; Thorp et al., 1993; Carolli et al., 1999; Labrecque et al., 1997, cited in Fraser and Kramer, 2000).

Historical data refute the assumption that obstetric care for the broad range of complications can only be delivered in

health facilities: The Frontier Nursing Service in rural Kentucky in the U.S. had only nine maternal deaths from direct or obstetric causes among 12,000 deliveries between 1925 and 1965, “with mortality rates 10 times lower than those in surrounding affluent communities” (Loudon, 1992, cited in Rush, 2000: 215S).

“Sweden reduced maternal mortality from 580 to 230 deaths per 100,000 with only a moderate increase in facility based births from 1% to 3%” (Hogberg et al., 1986, cited in Ronsmans et al., 2002). However, access to EmOC is critical for those women who develop potentially life-threatening complications during labor and delivery.

I.A. Labor and Delivery: EmOC, Skilled Attendants, and Referral

Intervention	Supporting research
<p>I.A.1. EmOC</p> <p>➤ Geographic access to and appropriate use of EmOC, trained responsive personnel, essential equipment, supplies, and drugs are correlated with improved maternal and infant outcomes.</p>	<ul style="list-style-type: none"> • “The evidence that providing EOC will save more lives than stand-alone prenatal care or TBA training interventions is based on analyses of historical trends in maternal mortality in the developed world. Until the mid-1930s, MMRs in the United States and Western Europe were as high as they are in many developing countries today. High levels of maternal deaths had persisted coincident with nearly universal prenatal care, adequate nutrition, and a reasonable standard of living. It was not until surgical obstetrics, blood transfusions, and antibiotics became available that maternal deaths began to drop dramatically” (Morrissey and Rionda, 1999; Carroli et al., 2001; Loudon, 1992, cited in Maine and Rosenfield, 1999). • Countries with lower than expected maternal mortality, such as Egypt, Namibia, Peru, and Tunisia, may have achieved maternal mortality rates of below 250 per 100,000 “not by ensuring that all deliveries occur with skilled attendance but rather that those who need emergency care receive it” (Graham et al., 2001). • Honduras reduced the number of maternal deaths from 182 per 100,000 live births to 108 between 1990 and 1997 as measured using the RAMOS methodology. The maternal mortality rate declined by 50 percent in a very poor country from 0.26 to 0.13. During these seven years, seven first referral hospitals and 266 rural health centers were opened. All referral hospitals were staffed by at least one specialist in internal medicine, surgery, obstetrics and gynecology, and pediatrics. All referral hospitals became equipped with at least one operating room, a laboratory with the capacity to bank blood, and a pharmacy. Each district hospital was equipped with an ambulance in case EmOC was needed. Deliveries at first referral level hospitals doubled during the seven years. This was correlated with making EmOC available in rural and urban health centers and district hospitals. Numbers of health personnel and skilled attendants also increased (<i>see below</i>). Norms and manuals were published and health personnel were trained. Cesarean sections increased among rural women from 3.2 percent in 1990 to 3.9 percent in 1996, and declined among the urban populations from 12.6 percent in 1990 to 10.6 percent in 1996. Roads and communication were also improved (Danel, 1998).

I.A. Labor and Delivery: EmOC, Skilled Attendants, and Referral

Intervention	Supporting research
<p><i>I.A.1. EmOC, continued</i></p> <p>➤ Geographic access to and appropriate use of EmOC, trained responsive personnel, essential equipment, supplies, and drugs are correlated with improved maternal and infant outcomes, continued</p>	<ul style="list-style-type: none"> • In Ghana, incidence of maternal mortality was reduced through the intervention of the Kumasi Prevention of Maternal Mortality (PMM) team. Interventions carried out in 1993–1994 included technical improvements with additional staff and training; administrative improvements, including a revolving fund for drugs; improved record-keeping, and supervision; and material improvements, including creating a surgical suite and improving blood supply management. All types of obstetric services at the health center increased during the study period, no maternal deaths occurred, and the number of women treated for major complications increased from 19 in 1993 to 37 in 1995. The number of women referred to the tertiary facility for treatment was reduced from 42 percent in 1993 to 14 percent in 1995. Both the number and type of emergency procedures increased, with two trained midwives performing 32 percent of manual removals of retained placenta, 68 percent of vacuum extractions, and 98 percent of episiotomy repairs during 1993–1995. “The PMM project has shown that there is no need to wait for ages to establish sophisticated health institutions at an unaffordable cost before tackling obstetric problems” (Djan et al., 1997: S89). • A review of 121 maternal deaths in rural west Maharashtra, India, found that only 37.1 percent actually reached a hospital capable of dealing with obstetric emergencies prior to death. Having to go through two or more referrals prior to reaching the hospital increased the risk of dying twelvefold. Maternal deaths were identified through multiple-source surveillance in 400 villages with a total population of 686,000 prospectively enrolled in a population-control study that compared deaths with the survivors of similar pregnancy outcomes (Ganatra et al., 1998). • A network of private clinics with a voluntary, low-cost hospital provided effective EmOC in a remote rural area in India with only 15 percent of deliveries in hospitals. A study of obstetric care in rural India followed 2,905 pregnancies and found that 85 percent of 2,861 pregnant women delivered at home. A total of 14.4 percent of women delivering had obstetric complications. Of the women with obstetric problems, 78.9 percent of these women delivered their babies in a hospital. Hospital care fatality was 0.3 percent. The cesarean section rate for all deliveries was 2 percent. With only two maternal deaths, the study estimated a maternal mortality ratio of below 250 per 100,000 with UNICEF currently estimating maternal mortality ratio of 55 per 100,000 for India as a whole. Increasing community understanding of the signs of obstetric emergencies also contributed to good outcomes (<i>see section III, Care During Pregnancy</i>) (McCord et al., 2001). Review of 121 maternal deaths in rural west Maharashtra, India, found that only 37.1 percent actually reached a hospital capable of dealing with obstetric emergencies prior to death. Having to go through two or more referrals prior to reaching the hospital increased the risk of dying twelvefold. Maternal deaths were identified through multiple-source surveillance in 400 villages with a total population of 686,000 prospectively enrolled in a population-control study that compared deaths with the survivors of similar pregnancy outcomes (Ganatra et al., 1998).

I.A. Labor and Delivery: EmOC, Skilled Attendants, and Referral

Intervention	Supporting research
<p><i>I.A.1. EmOC, continued</i></p> <p>➤ Geographic access to and appropriate use of EmOC, trained responsive personnel, essential equipment, supplies, and drugs are correlated with improved maternal and infant outcomes, continued</p>	<ul style="list-style-type: none"> • The Freetown/Makeni PMM team was able to improve the availability of and quality of services by fixing up an existing, but unused, operating theater at the hospital in Makeni, so that the number of women with obstetric complications who came to the hospital annually increased from 31 to 98 between 1990 and 1995, thus lowering the likelihood that these women would die from obstetric complications (Maine, 1997). • In the Ahmadu Bello University Teaching Hospital, the Zaria team managed to reopen the unused operating theater in the maternity ward, train physicians, and institute an emergency drug system. Case fatality fell from 14 to 11 percent between 1990 and 1995. The decline in case fatalities in the Sokoto Hospital fell from 22 to 5 percent from 1990 to 1995 (Maine, 1997). • The maternal mortality ratio in Vietnam from 1994–1995 was 155 deaths per 100,000 live births, a low rate despite the fact that “it is one of the world’s poorest countries” (Hieu et al., 1999: 329). From 1984–1994, 56 percent of deliveries were in a health care facility. Using the RAMOS methodology, the study found that while the proportion of home deliveries for the country as a whole was 43 percent or less, 65 percent of women who died as a result of childbirth delivered at home “and most of the deaths directly attributable to maternity could have been avoided if the births had taken place at medical facilities.” Access to skilled attendants also increased (<i>see below</i>) (Hieu et al., 1999). • Egypt reduced its maternal mortality ratio by more than 50 percent in eight years from 174 in 1992 to 84 per 100,000 live births in 2000. Even in rural areas, 99 percent of women live within 30 kilometers of at least one government hospital. More than 170 maternity centers were upgraded in underserved areas to provide essential obstetric care (EOC) and to refer pregnant women with complications. Births by skilled attendants also increased (<i>see below</i>). This study was based on information collected from 149 health bureaus in all 27 governorates in Egypt, identifying all deaths in women of reproductive age and those considered to be maternal deaths. All maternal deaths were investigated by interviewing the families of the deceased women and any health provider involved in their care. In each governorate, a local advisory group comprising the Undersecretary of Health, Director of MCH, an obstetrician, and a pediatrician reviewed the cases of all women who had died and assigned medical causes and avoidable factors for all maternal deaths (Ministry of Health and Population, Egypt, 2001).

I.A. Labor and Delivery: EmOC, Skilled Attendants, and Referral

Intervention	Supporting research
<p><i>I.A.1. EmOC, continued</i></p> <p>➤ Geographic access to and appropriate use of EmOC, trained responsive personnel, essential equipment, supplies, and drugs are correlated with improved maternal and infant outcomes, continued</p>	<ul style="list-style-type: none"> Two hundred eleven women who had delivered in the previous year were interviewed in Rakai District, Uganda. The study found that 39 percent of mothers who were within five kilometers of a maternity center delivered at home compared with 66 percent of those who lived more than five kilometers from a maternity center. Of mothers who were within one-hour walking distance of a maternity center, 26 percent delivered at home compared with 56 percent of those who were within more than one-hour walking distance. Of mothers who were within five kilometers of a health unit that could perform cesarean sections, 26 percent delivered at home compared with 65 percent who were more than five kilometers from a health unit that could perform cesarean sections (Nuwaha and Amooti-Kaguna, 1999). A prospective study of 19,545 pregnant women in West Africa through pregnancy and for 60 days postpartum found that 69.1 percent of all maternal deaths either gave birth without access to EOC or they gave birth without any help from a birth attendant (Ouedraogo and Bouvier-Colle, 2002: 84). The maternal mortality ratio dropped by more than half in China as the proportion of deliveries conducted in hospitals more than doubled in most provinces covered by the World Bank assisted Comprehensive Maternal and Child Health Project (Tinker et al., 2000).

I.A. Labor and Delivery: EmOC, Skilled Attendants, and Referral

Intervention	Supporting research
<p><i>I.A.2. Skilled Attendance at Birth to Reduce Maternal Mortality</i></p> <p>➤ “Providing skilled attendants able to prevent, detect, and manage the major obstetric complications, together with the equipment, drugs, and other supplies essential for their effective management, is the single most important factor in preventing maternal deaths” (WHO et al., 1999).</p>	<ul style="list-style-type: none"> • Sri Lanka reduced maternal mortality from 555 per 100,000 live births in 1950–1955 to 30 per 100,000 in 1999. During the 1950s, most births in Sri Lanka took place in the home with the assistance of untrained birth attendants. By the end of the 1980s, more than 85 percent of all births were attended by skilled birth attendants (Gunaserera and Wijesinghe, 1996; Gunaserera et al., 1996, cited in Koblinsky et al., 1999). • In the 1950s, most Malaysian women delivered at home assisted by untrained traditional birth attendants (TBAs), with maternal mortality ratios of 320. By 1996, 98 percent of women delivered with a skilled attendant, and the maternal mortality ratio dropped to 43 out of 100,000 live births. Rural midwives have 18 months of clinical midwifery training and are supervised by public health nurses with five years of training in nursing, clinical midwifery, and public health. Access to a strong referral network also served to lower the maternal mortality ratio (Koblinsky et al., 1999; World Bank, 1999). • Egypt reduced its maternal mortality ratio by more than 50 percent in eight years, from 174 in 1992 to 84 per 100,000 live births in 2000. The proportion of births attended by a doctor or nurse increased from 35 percent in 1986 to 63 percent in 1998. Access to EmOC also increased (<i>see above</i>). The study was based on information collected from 149 health bureaus in all 27 governorates in Egypt, identifying all deaths in women of reproductive age and those considered to be maternal deaths. All maternal deaths were investigated by interviewing the families of the deceased women and any health provider involved in their care. In each governorate, a local advisory group comprising the Undersecretary of Health, Director of MCH, an obstetrician, and a pediatrician reviewed the cases of all women who had died and assigned medical causes and avoidable factors for all maternal deaths (Ministry of Health and Population, Egypt, 2001).

I.A. Labor and Delivery: EmOC, Skilled Attendants, and Referral

Intervention	Supporting research
<p><i>I.A.2. Skilled Attendance at Birth to Reduce Maternal Mortality, continued</i></p> <p>➤ “Providing skilled attendants able to prevent, detect, and manage the major obstetric complications, together with the equipment, drugs, and other supplies essential for their effective management, is the single most important factor in preventing maternal deaths” (WHO et al., 1999), <i>continued</i></p>	<ul style="list-style-type: none"> • In Thailand, the introduction of 18,314 certified trained midwives was correlated with the reduction of maternal mortality levels from more than 400 in the 1960s, prior to the introduction of midwives, to 98 in 1980 (Wibulpolprasert, 2000, cited in Van Lerberghe and De Brouwere, 2001). • Sweden’s maternal mortality declined from 567 to 227 per 100,000 live births between 1861 and 1894. The interventions credited with this decline were (1) midwifery assisted home births, which increased from 30 to 70 percent; and (2) use of aseptic techniques in both hospital and midwife assisted home births. The percentage of women birthing in a hospital increased only from 1 to 3 percent during this period (Hogberg et al., 1986, cited in Koblinsky et al., 2000). “The key factor enhancing the decline in mortality appears to have been the sharp rise in professional attendance at home births from 40% to 78%” (Hogberg et al., 1986, cited in Ronsmans et al., 2002). • “In Indonesia, a dramatic increase in skilled attendance at home birth, without a concomitant rise in health facility births, has confirmed the success of home-based midwifery programmes while highlighting the need for strengthening the referral chain to higher levels of care.” In 1996, skilled attendants attended 37 percent of all births; by 1999, this had increased to 59 percent. Data collection was based on community random surveys, censuses of village midwives, and routine data collected from delivery ward registers in hospitals (Ronsmans et al., 2001, cited in Ronsmans et al., 2002). • A study of 64 countries from Asia, Africa, Latin America, North America, Europe, and Australia, using maternal mortality estimates from RAMOS, Demographic and Health Surveys (DHS), and vital registration systems of developed countries, found that a 10-point increase in the proportion of women assisted at childbirth by skilled birth attendants is associated with a predicted maternal mortality ratio reduction of 70 per 100,000 live births. At the sample mean of \$1,507 for low-income countries (those with incomes per capita below \$3,000), for instance, a country with 20 percent of women receiving trained assistance at birth will have an expected maternal mortality ratio of 551. If 80 percent of women receive skilled birth attendance at delivery, the predicted ratio for maternal mortality is lowered to 333 (Shiffman, 2000).

I.A. Labor and Delivery: EmOC, Skilled Attendants, and Referral

Intervention	Supporting research
<p><i>I.A.2. Skilled Attendance at Birth to Reduce Maternal Mortality, continued</i></p> <p>➤ “Providing skilled attendants able to prevent, detect, and manage the major obstetric complications, together with the equipment, drugs, and other supplies essential for their effective management, is the single most important factor in preventing maternal deaths” (WHO et al., 1999), <i>continued</i></p>	<ul style="list-style-type: none"> • Data from the Indonesia Family Life Study investigated the impact of the expansion in and access to midwifery services on health and pregnancy outcomes. Between 1990 and 1998, Indonesia trained 50,000 midwives, who were placed in poor communities relatively distant from health centers. The presence of a village midwife is associated with increased birthweight as a marker for pregnancy outcome. Midwives typically were recruited from three-year nursing academies and received one additional year of midwifery training. Between 1986 and 1996, the number of midwives per 10,000 of the population increased more than tenfold, from 0.2 to 2.6 (Frankenberg and Thomas, 2001). • A case control study comprising 261 maternal death cases reported during the last five years and 9,135 controls of women who survived a pregnancy during the last five years of 16 rural districts in Pakistan, along with verbal autopsies in case of a maternal death, found that well-staffed peripheral health facilities lowered maternal mortality even when access to EOC was poor. Literacy rates for women were below 11 percent. More than 78 percent of women received no prenatal care. Women were at lowest risk if they lived in districts having well-staffed peripheral health facilities and better access to EOC. Peripheral health facilities do not have facilities for cesarean sections or blood transfusions. The high-risk women living in the districts having one doctor per peripheral health facility were at greater risk of maternal mortality than those living in the districts having three doctors per peripheral health facility (Midhet et al., 1998). • A review of 121 maternal deaths in rural west Maharashtra, India, found a protective effect from having a trained attendant at delivery and an auxiliary nurse midwife (ANM) available in the village, who could guide and prompt action when a complication developed, and encourage an institutional delivery. Effective referral was also important (<i>see above</i>). Maternal deaths were identified through multiple-source surveillance in 400 villages with a total population of 686,000 prospectively enrolled in a population-based case control study that compared deaths with the survivors of similar pregnancy outcomes (Ganatra et al., 1998). • The maternal mortality ratio in Vietnam from 1994–1995 was 155 deaths per 100,000 live births, a low rate despite the fact that “it is one of the world’s poorest countries” (Hieu et al., 1999: 329). During that period, a doctor, nurse, or midwife attended 73 percent of births. Access to EmOC also increased (<i>see above</i>) (Hieu et al., 1999).

I.A. Labor and Delivery: EmOC, Skilled Attendants, and Referral

Intervention	Supporting research
<p><i>I.A.2. Skilled Attendance at Birth to reduce maternal mortality, continued</i></p> <p>➤ Ensuring adequate blood supplies that have been screened for HIV can avert maternal deaths.</p> <p><i>Refer to Appendix 3, “Maintaining a Blood Supply that Reduces the Risk of Transmission of HIV,” and see forthcoming module on STDs, HIV, and AIDS for more information on screening blood for HIV.</i></p>	<ul style="list-style-type: none"> • A maternal mortality study in Egypt in 2000 found that “shortage of blood was the most frequent avoidable health facility factor, contributing to 16% of maternal deaths and playing an especially important role in deaths from hemorrhage, ruptured uterus and complications of cesareans. Lack of blood was associated with 13 deaths per 100,000 live births.” The study was based on information collected from 149 health bureaus in all 27 governorates in Egypt, identifying all deaths in women of reproductive age and those considered to be maternal deaths. All maternal deaths were investigated by interviewing the families of the deceased women and any health provider involved in their care. In each governorate, a local advisory group comprising the Undersecretary of Health, Director of MCH, an obstetrician, and a pediatrician reviewed the cases of all women who had died and assigned medical causes and avoidable factors for all maternal deaths (Ministry of Health and Population, Egypt, 2001). • A demographic study carried out in a rural area of Gambia from 1993–1998 found that five of the 18 maternal deaths in the Farafenni area involved women who died while waiting for a blood transfusion in an obstetric referral care health facility, because of a shortage of blood for transfusion (Walraven et al., 2000). • A campaign to stimulate blood donor recruitment contributed to an impressive reduction in maternal mortality in Kigoma Hospital, Tanzania (Mbaruku and Bergstrom, 1995, cited in Walraven et al., 2000).

I.A. Labor and Delivery: EmOC, Skilled Attendants, and Referral

Intervention	Supporting research
<p><i>I.A.3. Referral System Linking Skilled Attendants at Birth With EmOC</i></p> <p>➤ Linking skilled attendants at birth with EmOC through a referral system with adequate transport can reduce maternal mortality.</p> <p><i>See Appendix 4, “Requirements of an Effective Referral System” (Murray et al., 2001).</i></p>	<ul style="list-style-type: none"> • Midwives in Matlab, Bangladesh, were supported by a referral chain, including a boatman and helper to accompany patients night or day to the central clinic and a maternity clinic with trained physicians for treatment for referral to a district hospital. Two hundred thirty-nine cards filled out by midwives and 300 clinic admissions were analyzed. The number of direct obstetric deaths in the intervention area declined from 20 in the three years prior to implementation of the program to six the three years after implementation. In the control area, 20 direct obstetric deaths occurred in the three years before the program and 20 in the three years after it began. Midwives referred four in 10 women with pre-eclampsia and five in 10 women with prolonged labor (Maine et al., 1996). Increasing the number of government-trained community midwives, together with the creation of the enabling environment of a referral chain and access to a health center able to provide basic EOC, reduced the number of maternal deaths in the intervention area but not in the control area (Maine et al., 1996, and Faveau et al., 1991, cited in Graham et al., 2001). However, a more recent study showed no significant differences between the intervention area and the comparison area (Ronsmans et al., 1997: 1814). • Decentralization and effective referral systems put into place in Zambia reduced the numbers of women giving birth at the main teaching hospital in the capital Lusaka from 24,000 in 1982 to 10,528 in 1998, relieving overcrowding (Murray et al., 2001). • Honduras reduced the number of maternal deaths from 182 per 100,000 live births to 108 between 1990 and 1997 as measured using the RAMOS methodology. The maternal mortality rate declined by 50 percent in a very poor country. During these seven years, seven first referral hospitals and 266 rural health centers were opened. All referral hospitals were staffed by at least one specialist in internal medicine, surgery, obstetrics and gynecology and pediatrics. All referral hospitals became equipped with at least one operating room, a laboratory with the capacity to bank blood and a pharmacy. Each district hospital was equipped with an ambulance in case EmOC was needed. Deliveries at first referral level hospitals doubled during the seven years. This was correlated with making EOC available in rural and urban health centers and district hospitals. Numbers of health personnel increased. Norms and manuals were published and health personnel were trained. Cesarean sections increased among rural women from 3.2 percent in 1990 to 3.9 percent in 1996 and declined among the urban populations from 12.6 percent in 1990 to 10.6 percent in 1996. Roads and communication were also improved (Danel, 1998).

I.B. Labor and Delivery: **Transport**

Intervention	Supporting research
➤ Successful transportation systems linked to EmOC have decreased the number of maternal deaths.	<ul style="list-style-type: none"> • An intervention in Sierra Leone involving placing an emergency vehicle at the local hospital and a radio communication system in eight primary health units resulted in an increase in the number of women with serious obstetrical complications from 0.9 to 2.6 per month and a decrease in case fatality from 20 to 10 percent (Macintyre and Hotchkiss, 1999). • An intervention in Uganda of the tricycle-radio program, funded by UNFPA, enabled TBAs and midwives to arrange for pregnant women to be transported to the hospital. Transportation was available 24 hours a day. Maternal deaths were more than halved in the first year of the project (Amooti-Kaguna and Nuwaha, 2000). • After introducing a system of radio communication and ambulances, emergency referral rates increased from 1 to 3 percent of expected live births, and the cesarean section rate increased from 0.1 to 1 percent in rural areas of Mali (De Brouwere, 1997, and Maiga et al., 1999, cited in Jahn and De Brouwere, 2001). • Nonavailability of transport contributed to 28 percent of the rural maternal deaths in a study of 105 maternal deaths in Zimbabwe. TBAs' delay in referring cases was the result of nonavailability of any method of emergency transport or communication (Fawcus et al., 1996).
➤ Transportation networks for maternal health can be arranged.	<ul style="list-style-type: none"> • In Sokoto, the PMM network worked with the local transport workers' union to solve the problem of getting women with complications to medical facilities. During two years, 29 women were transported at a cost of less than \$6 for each woman (Maine, 1997). • A radio system was efficient and reliable in arranging transport in Bo, Sierra Leone (Maine, 1997). • Emergency loan funds to help people with medical and transportation costs for women with obstetric complications were established in six communities in Ghana. Participation of local religious leaders and the local union of transport workers who were men were sought. The number of women with obstetric complications seeking treatment increased (Opoku et al., 1997).

I.C. Labor and Delivery: Support During Labor

Intervention	Supporting research
<p>➤ Supportive care in labor can reduce the need for clinical interventions.</p>	<ul style="list-style-type: none"> • A Cochrane Collaboration review of 15 trials found that the continuous presence of a support person from caregivers (i.e., nurses, midwives, or lay people) “reduced the likelihood of medication of pain relief, operative vaginal delivery, cesarean delivery, and a 5-minute Apgar score less than 7” (Hodnett, 2000). • A randomized control trial of 109 primagravidas in uncomplicated labor in Botswana was randomly distributed into a control group who labored without family members present and an experimental group who had a female relative with them during labor. Significantly, more mothers in the experimental group had a spontaneous vaginal delivery (91% vs. 71%), less intrapartum analgesia (53% vs. 73%), less oxytocin (13% vs. 30%), fewer vacuum extractions (4% vs. 16%), and fewer cesarean sections (6% vs. 13%) than in the control group. The study authors conclude, “The presence of a female relative as a labor companion is a low-cost, preventative intervention that is consistent with the traditional cultural practices in Botswana” (Madi et al., 1999). • The effect of doulas on perinatal outcomes of a population of young, low-income, primiparous women in the United States indicated that those receiving doula support received less oxytocin to augment labor and had a lower incidence of forceps and cesarean deliveries (Mayberry and Gennearo, 2001). • A randomized clinical trial with 724 women in Mexico who were randomly assigned to be accompanied by a doula or to receive care found that exclusive breastfeeding one month after birth was 12 percent in the intervention group as compared to 7 percent in the control group. The duration of labor was on average almost one hour shorter than in the control group, which may have an impact on women’s well being, shortening the often painful labor experience and on costs for the health institution. More women in the intervention group perceived a high degree of control over the delivery experience. Blinded interviewers obtained data from clinical records and from encounters with women in the immediate postpartum period and at their homes 40 days after birth. Doulas gave the women continuous support during labor and delivery using encouraging words and acknowledging the effort by the mother, answering her questions; informing the woman about how her labor was progressing in easy to understand language; advising on relaxation techniques, breathing, and comfortable positions; and encouraging the women to hold her baby after birth and promoting early breastfeeding (Langer et al., 1998).

I.C. Labor and Delivery: Support During Labor

Intervention	Supporting research
<p>➤ Supportive care in labor can reduce the need for clinical interventions, <i>continued</i></p>	<ul style="list-style-type: none"> • Interviews with 16 women in a Mexico City hospital found that women accompanied by doulas had a more positive childbirth experience, including increased information concerning hospital procedures and the process of birthing (Campero et al., 1998). • A randomized controlled trial in England found that companionship was associated with lower use of analgesia. Of the 75 women with companions, 51 percent were breastfeeding exclusively as compared to 29 percent of the 75 in the control group. Companionship also had a striking effect on the way that the participants reported experiencing labor, with those with the support group reporting less pain and that they had coped well during labor (Hofmeyer et al., 1991).
<p>➤ Adequate explanations and encouragement increase women's sense of control over their labor.</p>	<ul style="list-style-type: none"> • Studies in developed and developing country settings found satisfaction with birth is achieved by a woman's sense of control and information during labor (Campero et al., 1998; Butani and Hodnett, 1980; Kitzinger, 1990, cited in Hulton et al., 2000) • A systematic review of 35 reports of 29 studies mostly in developed countries of factors influencing women's evaluations of their childbirth experiences, including randomized controlled trials, descriptive studies, and systematic reviews of interventions since 1965 found that "having an active say in decisions about one's care was found to be an important dimension of childbirth satisfaction" (Hodnett, 2002).

I.D. Labor and Delivery: Food During Labor

Intervention	Supporting research
➤ Adequate food and drink during labor is advised to improve fetal outcomes and maternal well-being.	<ul style="list-style-type: none">• A review of the literature found no compelling scientific rationale for routine lack of food and drink for women in labor. Intravenous fluids are not a reasonable substitute for oral fluids. Fetuses of fasted mothers show less overall activity than fetuses of fed mothers (Natale et al., 1978, cited in Ludka and Roberts, 1993). A study of 11,814 women in the United States who ate and drank at will had no excess mortality or morbidity, even with the women who ate solid food and required emergency cesarean sections (Rooks et al., 1989, cited in Ludka and Roberts, 1993).

I.E. Labor and Delivery: Position During Labor

Intervention	Supporting research
<p>➤ Allowing women to choose the position in which they want to deliver and increased mobility for women during labor leads to decreased use of analgesia and reduces time in labor.</p>	<ul style="list-style-type: none"> • Mobility has numerous advantages including increased contractions that help cervical dilation, greater maternal comfort, and decreased use of analgesia (Roberts et al., 1983; Lupe and Gross, 1986, cited in Khayat and Campbell, 2000).
<p>➤ An upright position during labor increases positive health outcomes for the mother.</p>	<ul style="list-style-type: none"> • A Cochrane Collaboration review of 18 trials found that the use of any upright or lateral position, compared with supine or lithotomy positions, was associated with reduced duration of second stage of labor by an average of five minutes; a reduction in assisted deliveries; a reduction in episiotomies; a smaller increase in second degree perineal tears; reduced reporting of severe pain during the second stage of labor; and fewer abnormal fetal heart rate patterns. However, there was an increased estimated risk of blood loss of more than 500 ml (Gupta and Nikodem, 2002). • A study in Britain of 1,512 women judged to be at low risk of post-partum hemorrhage (PPH) were randomly assigned to upright or supine posture and either active management of the third stage, consisting of prophylactic oxytocic within two minutes of the baby's birth; immediate cutting and clamping of the cord; delivery of the placenta by controlled cord or traction or maternal effort; or expectant management consisting of: no prophylactic oxytocic, no cord clamping until pulsation ceased and delivery of placenta by maternal effort. The rate of PPH was only 6.8 percent with active management as compared to 16.5 percent with expectant management. The study found no evidence that "upright posture leads to more PPH" (Rogers et al., 1998: 697). • A number of trials from both developed and developing country settings "suggest that an upright position or a lateral tilt during second stage labor has greater advantages than a supine position. Findings demonstrate that the upright position causes less discomfort and difficulty when bearing down, less labor pain, less perineal trauma and fewer wound infections. In one trial, a shorter second stage was observed in the upright position" (Stewart and Spiby, 1989; Liddell and Fisher, 1985; Crowley et al., 1991, and Bhardwaj et al., 1995, cited in Hulton et al., 2000).

I.F. Labor and Delivery: Treatment of Complications From Labor and Delivery

Intervention	Supporting research
<p>➤ Eclampsia is most effectively treated by magnesium sulphate with an appropriate enabled environment (Eclampsia Trial Collaborative Group, 1995, and Magee et al., 1999, cited in AbouZahr and Berer, 1999).</p> <p><i>Also refer to “Care During Pregnancy: Nutrition to Support Safe Motherhood”</i></p> <p>➤ One-half of the standard dose of magnesium sulphate can control convulsions effectively.</p>	<ul style="list-style-type: none"> • A retrospective analysis of 69 maternal deaths of 641 maternal deaths and 56,152 deliveries in India found that maternal mortality from eclampsia was reduced when magnesium sulphate was used as an anticonvulsant. From 1982–1989, lytic cocktail was used as an anticonvulsant, and from 1990–1998, magnesium sulphate was administered. Maternal mortality in eclampsia was significantly lower (4.1% compared to 13.8%) when magnesium sulphate was used. The incidence of maternal death in eclampsia was significantly higher from 1982–1989 compared to 1990–1998. However, patients need to reach the hospital before they are deeply comatosed on admission (Sawhney et al., 2000). • A study of 10,110 women with pre-eclampsia in 33 countries at 175 secondary and tertiary hospitals were randomized to magnesium sulphate or placebo and found that women allocated magnesium sulphate had a 58 percent lower risk of eclampsia. Maternal mortality was 45% lower among women allocated magnesium sulphate. There were no substantive harmful effects to mother or baby in the short term. There was a lowered risk of placental abruption in the magnesium sulphate group. More women experienced side effects with the intramuscular injection rather than the intravenous regimen. Safe monitoring was achieved using clinical assessment of tendon reflexes, respiratory rate and urine output. This trial included women only after admission to a hospital. The study authors recommended that duration of treatment should not exceed 24 hours (Magpie Trial Collaborative Group, 2002). • Since the introduction of low dose magnesium sulphate to treat eclamptic patients at Dhaka Medical College, mortality rates have fallen from 16 to 8 percent (Begum et al., 2000). • A prospective study of 65 patients in Bangladesh found that a loading dose of 10gm, followed by 2.5 gm given intramuscularly every four hours for 24 hours after the administration of the first dose found that only one patients developed recurrent convulsions (Begum et al., 2001).

I.F. Labor and Delivery: Treatment of Complications From Labor and Delivery

Intervention	Supporting research
<p>➤ In selected cases and with close supervision, conservative management can be attempted in cases of severe pre-eclampsia and eclampsia after 30 weeks of gestation to gain fetal maturity without increased risk to the mother.</p>	<ul style="list-style-type: none"> • A study of 51 patients in Dhaka Medical College and Hospital in Bangladesh enrolled 21 patients with severe pre-eclampsia and 30 patients with eclampsia, all of whom had fetus' under 36 weeks of gestation. At this hospital, 9,352 babies were born in 1999; of these, 4,478 were high-risk pregnancies. The neonatal unit has only with eight beds with one incubator and two phototherapy machines. The cost for care in the neonatal unit is about \$70 per day, which exceeds most patients' monthly income. No patients had antenatal checkups before admission, but all were fully conscious on admission. Average pregnancy prolongation was 13.27+8.26 days, with a range of 3–35 days. Of 51 patients, 12 reached 36 weeks of gestation and none of these infants required admission to a neonatal ICU. Only one patient (1.96%) developed a maternal complication of abruptio placentae. Relative risk of intrauterine death was 6.13 times higher for infants of gestational age of less than 30 weeks than for those of gestation age of more than 30 weeks. Conservative management consisted of informing patients of the risks and benefits, patient counseling, intravenous injections of magnesium sulfate, bed rest, oral phenobarbitone, oral methyldopa, and an antihypertensive, as required. If severe pre-eclampsia developed before 30 weeks of gestation, the result of conservative management was not satisfactory (Begum et al., 2002).
<p>➤ Ventouse delivery (vacuum extraction rather than forceps delivery) is the first choice for low-cavity operative vaginal delivery.</p>	<ul style="list-style-type: none"> • A Cochrane Collaboration review of 10 trials found that use of the vacuum extractor for assisted vaginal delivery was associated with significantly less maternal trauma, with less general and regional anesthesia, and fewer cesarean sections than forceps delivery (Johanson and Menon, 2000). • Evidence from randomized controlled trials suggests that ventouse is preferable to the use of forceps for low-cavity operative vaginal delivery. Ventouse is associated with reduced maternal trauma, without any increase in fetal trauma (Johanson, 1995, and Drife, 1996, cited in Hulton et al., 2000).

I.G. Labor and Delivery: Cesarean Sections

Intervention	Supporting research
<p>➤ Access to timely and necessary cesarean section is critical to reducing maternal mortality.</p>	<ul style="list-style-type: none"> Guidelines to ensure that cesarean sections performed are absolutely necessary can reduce the rate of cesarean sections, maternal mortality and morbidity, and perinatal mortality (Starrs, 1998). Rates of cesarean sections below 2 percent may indicate inadequate availability and access to obstetric care (Ronsmans, 2001; Enkin et al., 1995, cited in Hulton et al., 2000), while “setting an arbitrary minimum cesarean section rate of 5 percent may enhance an overinterventionist culture and cause more harm than good” (Ronsmans et al., 2002). All countries with cesarean delivery rates below 2 percent have levels of maternal mortality above 500 per 100,000 live births (AbouZahr and Wardlaw, 2001). The Netherlands, England, and Wales had maternal mortality ratios as low as 20 and 60 per 100,000 with cesarean section rates not exceeding 2 percent (De Brouwere and Van Lerberghe, 1998, cited in Ronsmans et al., 2002). In Guinea, implementation of a refugee-assistance program led to a fourfold increase in the cesarean section rate from .03 to 1.2 percent, reflecting clear progress towards meeting the need for obstetric care (Van Damme et al., 1998, cited in Ronsmans et al., 2002). A quasi-experimental study in Ecuador requiring a second opinion from a supervising obstetrician or resident for all cesarean sections (co-managed) found that at the intervention hospital the incidence of cesarean section was reduced by 4.5 percent from 26.6 to 22.1 percent. Data were collected on 1,584 cesarean candidates. Co-managed women with vaginal deliveries had fewer postpartum complications than those delivered by cesarean section. “Case co-management was a simple, acceptable intervention that substantially reduced unnecessary cesarean delivery, hospital days and costs of care, without detriment to maternal and neonatal outcome....” Those pregnant women were excluded where a cesarean section was considered mandatory (i.e., women with more than one cesarean section or a diagnosis of transverse lie, placenta previa, cord prolapse, or abruptio placenta with evidence of fetal distress). Case co-management permitted trial of labor for those with previous cesarean sections. Post-term cesarean section candidates were required to receive a second opinion before any action to induce labor or provoke birth. Providers were trained to correctly triage patients with fewer adverse prenatal conditions for vaginal delivery and to assist vaginal deliveries for breech presentation. The intervention reduced cesarean section rates largely by averting primary cesarean sections (89.5% of co-managed women delivering vaginally had no prior cesarean section), which ultimately will reduce the incidence of repeat cesarean delivery (Sloan et al., 2000).

I.G. Labor and Delivery: Cesarean Sections

Intervention	Supporting research
<p>➤ Access to timely and necessary cesarean section is critical to reducing maternal mortality, <i>continued</i>.</p>	<ul style="list-style-type: none"> • Revising guidelines for cesarean sections to consist of active management of labor in women with one previous cesarean section birth, selective vaginal breech delivery, and continuous intrapartum fetal monitoring in a teaching hospital in Jordan reduced the cesarean section rate from 15.5 to 8.7 percent and reduced perinatal mortality from 52 to 20.9 deaths per 1,000 live births. Attention was focused on correct initial diagnoses of labor, with regular assessment of early progress and stimulation with oxytocin when dilation of the cervix was slow and cephalopelvic disproportion was excluded. Policy called for a trial of labor for women who had previously given birth by cesarean section, with all women informed of risks and benefits, proving successful for 80 percent of cases without increasing the risk to mother or fetus. Fetal heart rate and uterine activity were continuously electronically monitored in patients with a prior cesarean section or who were at high risk. An anesthesiologist was available on a 24-hour basis (Ziadeh and Sunna, 1995). • In Zimbabwe, strict guidelines for the management of difficult labor, previous cesarean section, fetal distress, and breech presentation brought about a drop in the cesarean section rate from 16.8 to 8 percent over two years. The maternal mortality ratio fell from 202 to 57 per 100,000 and the perinatal mortality rate fell from 71.9 to 56.2 per 1,000 (De Muylder and Thiery, 1990, cited in Wong and Liljestrand, 1999). • Numerous studies have demonstrated that “using clinical guidelines, second opinions and hospital policies safely and effectively reduced cesarean rates” (Flamm et al., 1994; Porreco et al., 1996; Lagrew and Morgan, 1996, cited in Sloan et al., 2000). • A study of 221 consecutive cesarean sections at a large London teaching hospital demonstrated that maternal morbidity was common after a cesarean section. Anaesthetic problems, hemorrhage, wound problems, and infections were both frequent and often unrelated to the condition that mandated the cesarean section (Kelleher and Cardozo, 1994, cited in Hulton et al., 2000). • A study in the United States of more than 1,776 patients with a prior cesarean section who underwent a trial of labor, 74 percent delivered vaginally. There was no maternal or perinatal mortality related to uterine scar rupture. Thus, during the study, 1,314 major operations were avoided. Patients with a known classic or low vertical uterine incision, breech presentation, or twin gestation were excluded from the study. Electronic fetal monitoring was used in all patients. Success rate did not differ significantly among patients with one, two, or three prior cesarean sections (Flamm et al., 1988).

I.G. Labor and Delivery: Cesarean Sections

Intervention	Supporting research
➤ Use of prophylactic antibiotics at the time of cesarean sections decreases the incidence of post-operative infectious morbidity.	<ul style="list-style-type: none"> • A Cochrane Collaboration review of 66 trials found that administering prophylactic antibiotics to women undergoing an elective or nonelective cesarean section reduces the incidence of endometritis by two-thirds to three-quarters. Use of prophylactic antibiotics in women undergoing cesarean section also substantially reduces episodes of fever, wound infection, urinary tract infection, and serious infections (Smaill and Hofmeyr, 2000).
➤ Use of a partogram can decrease rates of cesarean sections.	<ul style="list-style-type: none"> • In a randomized trial, the cesarean section rate was lower when labor was managed using a partogram with a four-hour action line (Lavender et al., 1998, cited in Bergstrom, 2001).
➤ In some cases, symphysiotomy can be reasonably performed where cesarean sections are not available.	<ul style="list-style-type: none"> • In Mozambique and Botswana, 31 cases of symphysiotomy showed no permanent complications. In rural areas, where cesarean sections are not available within a few hours, symphysiotomy is a life saving operation in cases of moderate disproportion (Bergstrom et al., 1994).
➤ A subhypnotic dose of 1–2 mg/kg per hour of propofol effectively controls the nausea and vomiting associated with regional anesthesia during a cesarean section.	<ul style="list-style-type: none"> • A study that randomized 80 women in Japan found that a subhypnotic dose of 1–2mg/kg per hour of propofol effectively controls the nausea and vomiting associated with regional anesthesia during cesarean section (Fujii and Numazaki, 2002).

I.H. Labor and Delivery: Vesico-vaginal Fistula (VVF)

Intervention	Supporting research
<p>➤ VVF can be completely averted through a timely cesarean section when a woman has a prolonged labor.</p>	<ul style="list-style-type: none">• VVF is a completely preventable problem that has disappeared from industrialized countries (Kristof, 2002).• A study compared 50 patients suffering from VVF at Babbar Ruga Hospital in Nigeria with 50 women of childbearing age in Babbar Ruga Village. Inadequate nutrition is one predisposing factor for VVF. Lack of education put women at risk of VVF because they are less likely to use hospitals for maternal health care. Delaying marriage by encouraging post-primary education or, if married, delaying pregnancy by using family planning until a woman is age 20 is the primary means of preventing VVF. The social consequences for a woman who has VVF can include divorce and destitution. Women suffering from VVF are also less likely to have personal income to spend on their own health (Onolemhemen and Ekwempu, 1999).

I.I. Labor and Delivery: Immediate Postpartum Care, Prevention, and Treatment of Hemorrhage

Intervention	Supporting research
<p>➤ Counseling women on choosing an intervention-free third stage of labor as compared to the benefits of active management of the third stage of labor, which is associated with clinically significant reductions in blood loss, can result in lower rates of postpartum hemorrhage.</p>	<ul style="list-style-type: none"> • A study in Britain of 1,512 women judged to be at low risk of PPH were randomly assigned to either active management of the third stage, consisting of: prophylactic oxytocic within two minutes of the baby's birth, immediate cutting and clamping of the cord, and delivery of the placenta by controlled cord or traction or maternal effort; or to expectant management consisting of: no prophylactic oxytocic, no cord clamping until pulsation ceased and delivery of placenta by maternal effort. The rate of PPH was only 6.8 percent with active management as compared with 16.5 percent with expectant management. Of the women who had a PPH, 14 percent in the expectant management group had a blood transfusion as compared with 8 percent in the active management group. "Although women were about five times more likely to receive a blood transfusions if they were allocated expectant management, 48 women would need to receive active management to prevent one transfusion" (Rogers et al., 1998: 698). Active management also increases the risk of "unpleasant and occasionally dangerous side-effects, such as nausea, vomiting, and hypertension" (Rogers et al., 1998: 693). Expectant management reduced the incidence of nausea and vomiting (Rogers et al., 1998). • Active management of the third stage of labor is associated with statistically and clinically significant reductions in blood loss, including PPH and blood transfusion (Prendiville et al., 1999, cited in Fraser and Kramer, 2000). • In Berekum, Ghana, expectant management of the third stage of labor was practiced until 1996. Routine active management was introduced at the start of 1996. Retrospectively, all women who gave birth vaginally between 1992 and 1999 were included in the study, with 5,088 women in the expectant management group and 3,840 in the active management group. The study found that postpartum hemorrhage occurred among 13.7 percent of the active management group as compared with 17.4 percent in the expectant management group. Manual removal of the placenta occurred among 2.6 percent in the active management group as compared with 3.5 percent in the expectant management group. The findings "confirm that active third stage management is feasible and useful in preventing PPH in a rural hospital in a developing country" (Geelhoed et al., 2002). • A randomized trial of 849 expectant and 846 for active management found that the incidence of postpartum hemorrhage was 17.9 percent under physiological management as compared with 5 percent under active management. Active management consisted of prophylactic oxytocic, cord clamping before placental delivery, and cord traction (Prendiville et al., 1988).

I.I. Labor and Delivery: Immediate Postpartum Care, Prevention, and Treatment of Hemorrhage

Intervention	Supporting research
<p>➤ Counseling women on choosing an intervention-free third stage of labor as compared to the benefits of active management of the third stage of labor, which is associated with clinically significant reductions in blood loss, can result in lower rates of postpartum hemorrhage, <i>continued</i></p>	<ul style="list-style-type: none"> • A double blind randomized controlled trial in Sweden randomly allocated 513 to treatment with oxytocin and 487 to saline solution. Administration of intravenous oxytocin in the third stage of labor was associated with a 22 percent reduction in mean blood loss and a 43 percent reduction in frequencies of PPH. Only 8.8 percent of those receiving oxytocin had PPH as compared to 15.2 percent of those receiving the saline solution (Nordstrom et al., 1997). • Induction of labor by oxytocin or prostaglandin for prelabor rupture of membranes at or near term is associated with a lower risk of maternal infection and admission to intensive neonatal care (Tan and Hannah, 2000a,b, cited in Carroli et al., 2001). • A Cochrane Collaboration review of randomized and quasi-randomized trials of 18 studies of early use of oxytocin versus no early use of oxytocin for spontaneous rupture of membranes before labor at 34 weeks gestation or more, found that induction of labor by oxytocin was associated with a decreased risk of maternal infection and neonatal infection. Use of oxytocics also increased use of epidural analgesia and internal fetal heart rate monitoring (Tan and Hannah, 2002). • The use of oxytocin injection significantly reduces the risk of postpartum hemorrhage (Prendiville et al., 1996, cited in Bergstrom and Goodburn, 2001). • Injecting oxytocin intravenously or intramuscularly with safe injection guidelines and sterile injection equipment reduces the incidence of PPH by about 40percent (Elbourne et al., 1998, cited in Tsu and Free, 2002). • A systematic review of 35 reports of 29 studies mostly in developed countries of factors influencing women's evaluations of their childbirth experiences, including randomized controlled trials, descriptive studies, and systematic reviews of interventions since 1965 found an inverse relationship between medical interventions, in particular oxytocics and childbirth satisfaction (Hodnett, 2002).

I.I. Labor and Delivery: Immediate Postpartum Care, Prevention, and Treatment of Hemorrhage

Intervention	Supporting research
➤ Single-use injection device prefilled with 10IU of oxytocin improved dose accuracy and injection sterility.	<ul style="list-style-type: none"> A study in Indonesia using trained village midwives found that using small, low-cost, prefilled, single-use injection devices with 10IU of oxytocin improved dose accuracy and injection sterility (PATH, 2001, cited in Tsu and Free, 2002).
➤ Controlled cord traction technique lowers the incidence of PPH compared to minimal intervention when sonography can detect twins.	<ul style="list-style-type: none"> In a study, 1,648 women who delivered vaginally in a hospital in the United Arab Emirates were randomly allocated to a controlled traction group or to a minimum intervention group. The overall incidence of PPH was 5.8 percent in the controlled cord traction group as compared with 11 percent in the minimal intervention group. Significantly more patients (5.1%) in the minimal intervention group required additional uterotonic agents to control hemorrhage as compared with 2.3 percent in the controlled traction group. In the controlled cord traction group, women received oxytocin, 10 units intramuscularly, with delivery of the baby's anterior shoulder, after which the placenta was delivered actively by controlled cord traction. In the minimum intervention group, the placenta was delivered by maternal pushing. A drawback of controlled cord traction method is the concern about giving oxytocin intramuscularly before the delivery of the placenta to a woman with undiagnosed twin gestation. In this study, all patients had ultrasonographic exams so that this did not occur (Khan et al., 1997).

I.J. Labor and Delivery: Episiotomies

Intervention	Supporting research
➤ Selective use of episiotomy rather than routine episiotomy leads to a lower risk of morbidity.	<ul style="list-style-type: none">• A systematic review of six randomized controlled trials found that selective use of episiotomy shows a lower risk of clinically relevant morbidity, including posterior perineal trauma, a reduced need for suturing perineal trauma, and fewer healing complications at seven days. The only disadvantage found in the selective use of episiotomy is an increased risk of anterior perineal trauma. There was no difference in the incidence of major complications, such as severe vaginal or perineal trauma or in pain, dyspareunia (difficult or painful sexual intercourse), or urinary incontinence (Carroli and Belizan, 2000).• A study of 62 women found that episiotomy was significantly associated with the length of perineal laceration. Twenty-seven (44%) of the women had episiotomies performed; they had significantly larger perineal lacerations when compared with those who did not undergo the procedure (4.9 cm vs. 1.1 cm). All of the third and fourth degree lacerations occurred in women who had episiotomies. The study suggests that episiotomies performed during vaginal deliveries rather than protecting the perineal floor cause it more damage. A multivariate analysis that controlled for other factors revealed that only episiotomy was significantly associated with the length of the perineal laceration (Nager and Helliwell, 2001).

II. Postnatal Care

II. Postnatal Care

Postpartum care is clearly important since 61 to 72 percent of maternal deaths occur within the postpartum period. “If mothers received postpartum care as assiduously as they receive prenatal care, maternal mortality would decrease” (Li et al., 1996:7). Yet few studies have examined postpartum care. A study of 2,160 maternal deaths in China found that about 90 percent of the postpartum deaths could have been avoided (Zhang and Ding, 1994, cited in Li et al., 1996). A meta-analysis of population-based and community-based studies in developing countries providing a time distribution of maternal deaths found that of 1,636 maternal deaths, 45 percent of postpartum deaths occurred on the first day postpartum, 23 percent occurred from 2 to 7 days, 14 percent from 8 to 14 days, 8 percent from 15 to 21 days, 6 percent from 22 to 30 days, and 4 percent from 31 to 42 days. Thus, the first 24 hours postpartum is the period of highest risk for maternal deaths, the first week remains a period of high risk, and the risk remains significant until the second week after delivery (Li et al., 1996).

Of all maternal postpartum deaths in developing countries, 93 percent are caused by three obstetric events. Hemorrhage causes 50.2 percent of maternal postpartum deaths, infection causes 29.9 percent, and pregnancy-induced hypertension causes 12.9 percent. Prevention of postpartum

hemorrhage (PPH) through judicious use of oxytocin or other uterine stimulants, can prevent a proportion of PPH and sepsis by (1) vigilant attention to hygiene during delivery and regular reinforcement and attention to necessary supplies to improve compliance; (2) early detection through monitoring mothers with normal deliveries for at least 24 hours and those with complications at least 48 hours; (3) visits by skilled attendants to the mother’s home 24 hours postpartum with a second home visit 7 to 10 days postpartum to take the patients’ temperature and check for sepsis in addition to community education on postpartum danger signs can lower the numbers of maternal deaths postpartum (Li et al., 1996).

Support for breastfeeding should be an integral component of postnatal care. HIV-positive women should be informed of the benefits and risks of breastfeeding (*please refer to the forthcoming module on STI/HIV/AIDS*). Providing high-quality family planning services, regardless of HIV status, is also a critical component for postnatal care. A study of women within one year of their last birth, among 27 DHS country surveys in developing countries conducted between 1993 and 1996, found that about two-thirds of these women have an unmet need for family planning (Ross and Winfrey, 2001). (*Please refer to the forthcoming module on Reducing Unintended Pregnancy*).

II.A. Postnatal Care: Length of Postnatal Care

Intervention	Supporting research
<p>➤ Women should be monitored postnatally for at least 24 hours and preferably for one week following delivery.</p>	<ul style="list-style-type: none"> • Women, their families, and community members need to know the postpartum danger signs and their infants requiring medical attention. • Almost one-half of postpartum deaths take place within one day of delivery and about 70 percent occur within the first week (AbouZahr and Berer, 1999). Yet most women are discharged within a matter of hours postnatally and are not seen until they bring their babies back for a checkup and immunization at six weeks postpartum (Ransjo-Arvidson et al., 1998, cited in AbouZahr and Berer, 1999). • A study by the Egyptian Ministry of Health in 2000 found that of the women who die during childbirth, 27 percent deliver in private facilities and 23 percent of those delivering in public facilities subsequently die at home or postpartum, during transportation to their homes, “suggesting possible problems with referrals or premature discharge. Previous work has shown that the length of hospital stay for delivery is short” (Ministry of Health and Population, Egypt, 2001: 26). The study was based on information collected from 149 health bureaus in all 27 governorates in Egypt, identifying all deaths in women of reproductive age and those considered to be maternal deaths. All maternal deaths were investigated by interviewing the families of the deceased women and any health provider involved in their care. In each governorate, a local advisory group comprising the Undersecretary of Health, Director of MCH, an obstetrician, and a pediatrician reviewed the cases of all women who had died and assigned medical causes and avoidable factors for all maternal deaths (Ministry of Health and Population, Egypt, 2001).
<p>➤ Training midwives to conduct postpartum visits can increase skilled attendance postpartum.</p>	<ul style="list-style-type: none"> • Training midwives in three districts in Indonesia resulted in a change from 1996, in which only 36 percent of women reported the visit of a village midwife during the first 40 days postpartum to 72 percent in 1999. Among women seen by a trained village midwife, more than 60 percent received four visits postpartum, with 40 percent seen in the first 7 to 12 hours after delivery, a critical time for the prevention of maternal and neonatal health (Ronsmans et al., 2001).

II.B. Postnatal Care: Treating Hemorrhage

Intervention	Supporting research
➤ Training women postpartum in pelvic floor exercises can promote urinary continence.	<ul style="list-style-type: none">• A randomized controlled trial in Australia found that women randomized to receive training in pelvic floor exercises with strategies to improve adherence had a prevalence of incontinence of 31 percent (108 women) and in the usual care group 38.4 percent (125 women) (Chiarelli and Cockburn, 2002).

II.C. Postnatal Care: Breastfeeding

Intervention	Supporting research
<p>➤ Successful breastfeeding combined with adequate maternal nutrition, unless a woman is HIV-positive, is correlated with improved maternal health outcomes.</p> <p><i>Please also refer to section III.C.5. Breastfeeding Promotion.</i></p> <p><i>Also refer to forthcoming module on STI/HIV/AIDS, including HIV in pregnancy and mother-to-child transmission (MTCT)].</i></p>	<ul style="list-style-type: none">• Breastfeeding immediately postpartum speeds up uterine contractions in women and reduces iron-containing blood loss (Williams et al., 1985).

II.C. Postnatal Care: Breastfeeding

Intervention	Supporting research
<p>➤ Keeping babies with their mothers in the same room (“rooming in”) or the same bed from birth (Kangaroo Care Method) prevents infections and increases the success of breastfeeding, especially when it is combined with breastfeeding guidance.</p>	<ul style="list-style-type: none"> • The Kangaroo Care Method of skin-to-skin contact between the mother and newborn immediately after delivery has improved survival rates from 20 to 60 percent for infants in studies in Zimbabwe and Mozambique. Infants allocated to the Kangaroo Care method had better health outcomes than infants placed in a standard incubator setting. The Kangaroo Care babies grew faster. Their median weight and hospital discharge weight was higher, frequency of illness and median duration of hospital stay was less, there was a more rapid increase in weight, and survival rates were better (Bergman and Jurisoo, 1994, and Kambarami et al., 1998, cited in Black, 1999).
<p>➤ On demand breastfeeding is associated with fewer complications and longer duration of breastfeeding.</p>	<ul style="list-style-type: none"> • A Cochrane Collaboration review of three trials found that restricting breastfeeding to four-hour periods in the first few days after birth is associated with greater discontinuation of breastfeeding by four to six weeks postpartum, increased incidence of sore nipples, engorgement, and the need to give formula feeding (Renfrew et al., 2000). • Women whose babies receive routine supplements are five times more likely to give up breastfeeding in the first week and twice as likely to abandon breastfeeding in the second week, as women who are encouraged to feel that their own colostrum and milk are adequate without supplements (WHO, 1998).
<p>➤ Ongoing support from nurses for breastfeeding can result in increased duration of exclusive breastfeeding.</p>	<ul style="list-style-type: none"> • In a study in Mexico, nurses contacted 296 mothers during the first 24 hours after birth. Nurses were available by phone 24 hours a day. They conducted 11 home visits and phoned four times during the first year. As a result of this program, early cessation of breastfeeding was reduced from 39.4 to 11.1 percent. Improvements in continuation rates for breastfeeding were documented at 6 and 12 months (Albernaz et al., 1998). • A study in periurban Mexico City found that early and repeated contact with peer counselors was associated with a significant increase in breastfeeding exclusivity and duration. One hundred thirty women participated in the study. At three months postpartum, 67 percent of six-visit, 50 percent of three-visit, and 12 percent of control mothers exclusively practiced breastfeeding. Only 12 percent of the infants in the intervention group had diarrhea as compared with 26 percent in the control group (Morrow et al., 1999).

II.D. Postnatal Care: Postnatal Counseling for Intrauterine Death

Intervention	Supporting research
➤ In the event of a stillbirth, both parents benefit from providers allowing parents to choose time with their dead infant and tokens of remembrance.	<ul style="list-style-type: none"> • A study in Sweden of 11 fathers who were interviewed five to 27 months after the intrauterine death of their child during weeks 32 to 42 of pregnancy found that tokens of remembrance of the infant/fetus, such as hair, footprints, photos, and so forth, were meaningful to parents even if the parents declined them (Samuelsson et al., 2001). • A study reported that mothers in Sweden who possess tokens of memory of their stillborn child run a lower risk of developing anxiety-related symptoms three years after the stillbirth than those without such tokens. No negative effects of collecting tokens have been documented (Samuelsson et al., 2001). • A national study in Sweden found that only 1 percent of 300 women who had not seen their stillborn baby were still satisfied with their decision three years later. The women who had not seen their baby for as long as they wanted (because the ward staff interrupted or rushed the procedure) ran a higher risk than other women of developing anxiety-related symptoms (Samuelsson et al., 2001).
➤ In the event of a diagnosis of intrauterine death, women benefit from a lapse of no more than 24 hours until induction of labor.	<ul style="list-style-type: none"> • A study reported that the strongest predictor of anxiety-related symptoms in Swedish women three years after delivering a stillborn child was the passage of more than 24 hours between the diagnosis of intrauterine death and the induction of labor (Samuelsson et al., 2001).

II.E. Postnatal Care: Postnatal Contraception

Intervention	Supporting research
<p>➤ Postpartum provision of contraception is effective at increasing knowledge of contraception, desired contraceptive use, potentially increasing the use of ANC, and potentially decreasing maternal and infant mortality.</p> <p><i>Please refer to forthcoming module on Reducing Unintended Pregnancy.</i></p>	<ul style="list-style-type: none"> • A project in Sfax, Tunisia, provided a 40-day follow-up visit for mother and baby. Counseling was provided at this time on birth spacing as a means of recovery and good health for the mother and the mental and physical development of the infant. The postpartum program has achieved a high rate of return and timely promotion of the use of contraceptives. Of the 9,240 women who delivered in the Sfax Maternity in 1987, 83.2 percent returned to the center for the postpartum visit. Of the 7,686 women who returned, 55.6 percent accepted a family planning method during that visit, and all were informed about the family planning methods and services available closest to their homes (Coeyataux, 1989). • A study of the relationship between ANC and subsequent modern contraceptive use in Bolivia, Egypt, and Thailand found that previous use of modern contraception is a positive determinant of ANC, and the use of ANC has a strong influence on subsequent use of modern contraception (Zerai and Tsia, 2001). • Counseling to promote a three-year interval between births could avert maternal deaths. A study of 456, 889 women in Latin America found very short and very long birth intervals were associated with increased risk of adverse maternal outcomes. Women conceiving six months after a previous birth, or with an estimated birth interval of 14 months, had a 2.5 increased risk of maternal death, and 70 percent increased risk of third trimester bleeding and premature rupture of membrane compared with women with two and a half to three years between births (Conde-Agudelo and Belizan, 2000, cited in USAID, 2002). • Infants born less than two to three years apart are significantly more likely to die than newborns that arrive after 36 months (Zhu et al., 1999, cited in Tinker and Ransom, 2002).

III. Care During Pregnancy

III. Care During Pregnancy

Care during pregnancy comprises both antenatal care (ANC), in which pregnant women visit health providers for physical exams, tests, and counseling, and health promotion activities that can be carried out in the community and in health facilities. This section covers both types of care during pregnancy. In addition, nutrition interventions in support of safe motherhood are listed separately, although nutrition interventions can be part of ANC and health promotion.

While some aspects of ANC are important, “antenatal care cannot prevent the major complications of delivery for the vast majority of women destined to experience them—hemorrhage, sepsis, obstructed labor...But certain interventions during pregnancy can greatly improve the chances of avoiding poor maternal outcomes” (Gelband et al., 2001). A vital part of ANC is to increase awareness of danger signs in pregnancy, delivery, and postpartum and where to go in case of an obstetric emergency (Prual et al., 2002). Yet many women are not told (or are not told in a way that ensures they remember) the danger

signs in pregnancy. A study of maternal mortality in Egypt found that only 18 percent of women attending ANC were told about danger signs in pregnancy and only 14 percent were told where to go if they had a complication (Ministry of Health and Population, Egypt, 2001: 66).

Good, evidence-based ANC is important for healthy birth outcomes and reduced maternal morbidity. Throughout the world, the range of the content of ANC protocols varies widely. In industrialized countries, pregnant women are expected to have monthly antenatal visits, with weekly or greater frequency by the end of their pregnancies. In many parts of the world, however, women who most need ANC have little access to it (Gwatkin and Deveshwar-Bahl, 2002; Brown, 2002). Recent studies have shown that the number of antenatal visits can be reduced to four, provided that the appropriate services and care are given at each visit (Villar, Ba’aqeel, et al., 2001). The quality of ANC visits is much more important than the quantity of ANC visits. A recent WHO clinical trial that attempted to define the minimal acceptable standards for ANC is cited in Appendix 5.

III.A. Care During Pregnancy: ANC

Intervention	Supporting research
<p>III.A.1. Number of Visits</p> <p>➤ Providing four ANC visits in the following order: (1) by the end of 16 weeks; (2) between 24 and 28 weeks; (3) at 32 weeks; and (4) at 36 weeks results in no significant additional health risks compared to a greater number of ANC visits.</p> <p><i>Please refer to Appendix 5, “Basic Antenatal Care Checklist from the WHO Multicenter Trial of New Antenatal Care Model.”</i></p>	<ul style="list-style-type: none"> A WHO multicenter trial conducted in Argentina, Cuba, Saudi Arabia, and Thailand compared results between an urban women group, which received a median of five ANC visits, and a control group, which received a median of eight ANC visits. Both groups had similar rates of tetanus immunization, low birthweight, postpartum anemia, and urinary tract infection. Urinary tests, syphilis screening, hemoglobin measurement, and blood-group typing were done routinely in the control groups. The diagnosis methodologies for the intervention group are listed in attachment 1. Eclampsia and pre-eclampsia were slightly higher in the group with fewer ANC visits (1.69% vs. 1.38%). (See Appendix 5 for the protocol for the new ANC checklist.) More women in the group with fewer ANC visits received iron supplementation and were treated for syphilis. Costs for clinics, providers, and women were lower for those women with fewer ANC visits. Women in both groups expressed satisfaction with their care (Villar, Ba’aqeel, et al., 2001).
<p>➤ Even one antenatal visit late in pregnancy can confer health benefits.</p>	<ul style="list-style-type: none"> In rural Bangladesh, women who were visited in their homes by trained midwives for at least one antenatal visit were four times more likely to deliver with a midwife than women who had no antenatal visits. Midwives accompanied women to the maternity clinic when needed, where those needing a blood transfusion or cesarean section were transferred to an EmOC. High-quality ANC cannot be a substitute for adequate EOC. Yet even one visit late in pregnancy may confer benefits to the mother and her baby, not only because women with serious conditions such as hypertensive diseases in pregnancy can be diagnosed and kept under observation, but also because a dialogue can be initiated that may facilitate the use of skilled care when the need arises (Vanneste et al., 2000).

III.A. Care During Pregnancy: ANC

Intervention	Supporting research
<p>III.A.2. Evidence-Based Content of ANC: Immunizations</p> <p>➤ Immunizing pregnant women against tetanus is one of the simplest and most cost-effective means of reducing the neonatal mortality rate as well as reducing the incidence of maternal tetanus, which is responsible for at least 5 percent of maternal deaths in developing countries.</p>	<ul style="list-style-type: none"> • In Egypt, the reported number of neonatal tetanus cases dropped from 6,000 per year to fewer than 400 due to increases in routine tetanus toxoid coverage of pregnant women (UNICEF et al., 2000). • In Morocco, between 1987 and 1992, 75 percent of all women of childbearing age were immunized. Neonatal tetanus deaths, which accounted for 20 percent of all neonatal deaths in 1987, accounted for just 2 percent in 1992 (UNICEF et al., 2000). • In a study of 1,688 pregnant women in rural India, complete antenatal immunization with tetanus toxoid during pregnancy (two doses one month apart) was associated with an 88 percent reduction in the risk of neonatal tetanus among the newborn children (Gupta and Keyl, 1998). • In Bangladesh, with two doses of tetanus toxoid vaccinations to pregnant women, there was a reduction in deaths from day 4 to day 14 of life (the age at which most neonatal tetanus deaths occur) from 30 per 1,000 to less than 10 per 1,000. There was a substantial reduction in deaths from 30 per 1,000 to 10 per 1,000 among infants for the three years after the vaccination (Black et al., 1980, cited in Black, 1999).
<p>III.A.3. Addressing Diseases During Pregnancy: Preventing Malaria</p>	<p>Pregnancy aggravates other diseases, such as malaria, anemia, jaundice, tuberculosis (TB), or heart disease. Both anemia and malaria worsen during pregnancy, and malaria itself may cause anemia or aggravate an existing anemic condition (AbouZahr, 1998).</p> <p><i>Refer to Appendix 6, "Preventing, Detecting and Treating Malaria in the General Population."</i></p>

III.A. Care During Pregnancy: ANC

Intervention	Supporting research
<p>III.A.3. Addressing Diseases During Pregnancy: Treating Malaria</p> <p>➤ Administering drugs locally effective for malaria to pregnant women may reduce the incidence of low birth weight and anemia among low parity women.</p>	<ul style="list-style-type: none"> • Fifteen trials included in a Cochrane Collaboration review found that drugs given regularly and routinely for malaria were associated with fewer episodes of fever with the mother, fewer women with severe anemia antenatally, and higher average birthweight in infants (Garner and Gülmezoglu, 2002). • Pregnant women in Tanzania attending ANC services at an urban maternal and child health clinic were randomly exposed to either intermittent or continuous malaria chemoprophylaxis using chloriquine and proguanil. Three intervention strategies were evaluated using a cohort of 360 primigravidae and a similar number of multigravidae using different interventions. Overall hemoglobin concentrations were similar with the groups receiving intermittent or continuous malaria chemoprophylaxis, making intermittent chemoprophylaxis more cost effective (Mnyika et al., 2000).
<p>➤ Sulphadoxine-pyrimethamine is an effective prophylaxis for malaria among pregnant women, including those who are HIV-positive</p> <p><i>See forthcoming module on STIs, HIV, and AIDS.</i></p>	<ul style="list-style-type: none"> • A study in Kenya recruited 1,264 primigravid women with malaria who were randomly assigned sulphadoxine-pyrimethamine (SP) (Fansidar) or placebos. Treatment of severe anemia in pregnant women resulting from a high malaria parasite load with Fansidar alone has led to a 32 to 50 percent reduction in severe anemia in women, coupled with a 22 percent reduction in perinatal deaths and a 38 percent reduction in neonatal deaths. Of the women in the SP group, 5.3 percent had peripheral parasitaemia compared with 35.3 percent in the placebo group. Of those who received Fansidar, 14.5 percent had severe anemia and 23.7 percent who received the placebo had severe anemia. “Even women who were enrolled late and received only one dose of sulphadoxine-pyrimethamine benefited significantly from the intervention” (Shulman et al., 1999, cited in Black, 1999). ▪ A fever case management (CM) approach using SP was compared with two presumptive intermittent SP treatment regimens in pregnant women in Kenya. Women were systematically assigned to receive one of three regimens using a rotating assignment based on day-of-visit: (1) two doses SP, with treatment doses (1,500mg of sulfadoxine and 75mg of pyrimethamine) at enrollment and again early in the third trimester; (2) monthly SP, with treatment doses at enrollment and then monthly through 34 weeks of gestation; or (3) CM, with SP given only to women with a recent history of fever and parasitemia. Of the 343 women in the fever CM group, 27 percent had placental malaria compared with 12 percent who received monthly SP, and compared with 9 percent who received monthly SP. Of the HIV-positive women on the two-dose SP regimen, 7 percent had placental malaria compared with 25 percent of HIV-positive women on the same regimen. The rate of placental malaria in HIV-positive women was reduced to 7 percent for women on the monthly SP regimen. Less than 2 percent of women reported adverse drug reactions, with no statistically significant differences between HIV-positive and HIV-negative women (Parise et al., 1998).

III.A. Care During Pregnancy: ANC

Intervention	Supporting research
<p>III.A.3. Addressing Diseases During Pregnancy: Treating Malaria, continued</p> <p>➤ Artemisinin drugs can be superior to quinine in preventing death in severe or complicated malaria, especially for multidrug resistant malaria, but recurrence of malaria after treatment is frequent.</p> <p><i>Also refer to Appendix 6, “Preventing, Detecting and Treating Malaria in the General Population”</i></p>	<ul style="list-style-type: none"> • A study of 461 pregnant women in Thailand treated with artesunate found that artemisinin was effective for primary treatment, with a failure rate of 7.8 percent, which compared favorably to a cumulative failure rate of seven days of supervised quinine of 33 percent and a retreatment cumulative failure rate of 21.4 percent, and failure rates of 37 percent with quinine and 38 percent for mefloquine. Artemisinins were well tolerated by pregnant women, and adherence to treatment was consequently good (McGready et al., 2001).
<p>➤ Combining artemisinin with other agents, such as mefloquine or lumofantrine, while expensive, provide effective treatment for malaria and less likelihood of the disease recurring (Van Vugt et al., 1998, 1999).</p>	<ul style="list-style-type: none"> • A study in refugee camps in Thailand in an area of low malaria transmission, early diagnosis and treatment with combined artesunate and mefloquine reduced the incidence of P falciparum malaria and halted the progression of mefloquine resistance. From 1986–1999, 10,000 treatments were monitored in patients with uncomplicated P falciparum. Efficacy for mefloquine and SP was 98 percent initially in 1985, but cure rates fell to 71 percent by 1990. High-dose mefloquine alone was 90 percent effective initially, but efficacy declined to 60 percent by 1991. From 1994 on, a three-day regimen of mefloquine-artesunate combination had an efficacy of nearly 100 percent until the closure of the refugee camp closed in 1998. Among 6,490 pregnant women, incidence of P-falciparum malaria fell more than tenfold from 3.6 percent in 1986 to 0.21 percent in 1999. “Our data support the suggestion that antimalarial drugs should no longer be used alone but only in combination to protect them from the emergence of resistance” (Nosten et al., 2000).

III.A. Care During Pregnancy: ANC

Intervention	Supporting research
<p><i>III.A.3. Addressing Diseases During Pregnancy: Treating Parasitic Infections Other Than Malaria</i></p> <p>➤ Treating parasitic infections in pregnant women can improve maternal health, reduce maternal anemia and increase birthweight of infants.</p> <p><i>Please refer to section III.D. Care During pregnancy: Nutrition to Support Safe Motherhood.</i></p>	<ul style="list-style-type: none"> • The Mangochi trial in Malawi found that two doses of the Fansidar in the second and third trimesters is effective in clearing parasites and increasing the infants' birthweight (Steketee et al., 1996, cited in Black, 1999).

III.A. Care During Pregnancy: ANC

Intervention	Supporting research
<p><i>III.A.3. Addressing Diseases During Pregnancy: Treating TB</i></p> <p>➤ Preventing, detecting, diagnosing, and treating TB can reduce the numbers of maternal deaths among pregnant women, including those with HIV.</p> <p><i>Please refer the forthcoming module on STIs, HIV, and AIDS, including MTCT.</i></p>	<ul style="list-style-type: none"> • A retrospective study of the etiology of all maternal deaths at the University Teaching Hospital in Lusaka compared data between 1996–1997 and data from 1974–1989, and found an eight-fold increase in maternal mortality, with 58 percent of these cases due to non-obstetric causes and 25 percent due to TB. The diagnoses of AIDS were closely linked with that of TB (Ahmed et al., 1999). • A review of 50,518 deliveries and 101 maternal deaths in Durban, South Africa, found that of the 101 maternal deaths, 29.7 percent were HIV-1 infected. The overall mortality rate was 200 per 100,000. For HIV-1 infected women, the maternal mortality rate was 323.3 per 100,000; for HIV-negative mothers, the maternal mortality rate was 148.6 per 100,000 live births. The attributable fraction of overall deaths as a result of HIV-1 was 15.9 percent. Fourteen of the 15 mothers with TB were HIV-1 co-infected. The mortality rate for TB and HIV-1 co-infection was 121.7 per 1,000; for TB without HIV-1 co-infection, 38.5 per 1,000. Fifty-four percent of maternal deaths caused by TB were attributable to HIV-1 infection. TB emerged as the third leading disease associated with maternal mortality after sepsis and hypertensive disorders (Khan et al., 2001). • When HIV and TB occur together, mortality is compounded three- to seven-fold (Del Amo et al., 1999; Perneger et al., 1995, and Perriens et al., 1991, cited in Khan et al., 2001). TB among women in South Africa increased from 28 to 37 percent between 1991 and 1995; 44 percent of this increase was attributable to HIV infection (Wilkinson and Davies, 1997, cited in Khan et al., 2001). • In India, 6.3 to 10.3 percent of maternal deaths have been associated with TB (Juneja et al., 1994, and Ray, 1992, cited in Khan et al., 2001).

III.A. Care During Pregnancy: ANC

Intervention	Supporting research
<p><i>III.A.3. Addressing Diseases During Pregnancy: Preventing Eclampsia/ Cardiovascular Disease</i></p> <p>➤ Once identified, there is still no clearly defined treatment or effective intervention to prevent pre-eclampsia becoming eclampsia.</p>	<ul style="list-style-type: none"> • Treatment for pre-eclampsia remains induced labor; however, this may not be possible depending on the gestation of the pregnancy. The interim solution is rest with regular monitoring (Rosenberg and Twaddle, 1990, and MacGillivray, 1985, cited in McDonagh, 1996). • A study in rural Bangladesh found that a single blood pressure measurement and assessment of fundal height could detect a substantial number of women with hypertensive disease and twin pregnancies. The median gestational age at the first antenatal visit was seven months; 74.3 percent of first antenatal visits took place between the sixth and eight months of pregnancy. The majority (81.6%) of women seen antenatally were seen only once and 14.6 percent had two or more visits (Vanneste et al., 2000). • A study in Maputo, Mozambique, compared 133 consecutive eclamptic patients with 393 non-eclamptic referent women. Neither the women nor the antenatal staff was sufficiently informed about prodromal (early) symptoms. Furthermore, prodromal symptoms, even if presented by patients, were not adequately acted on. Only a fraction of those who were admitted with prodromal symptoms were referred for follow-up. For women with prodromal signs, it is utmost important to strengthen the competence of antenatal clinic staff to respond to clinical risk symptoms and intervene accordingly. However, a significant proportion of eclamptic convulsions occurs unexpectedly and cannot be foreseen (Bugalho et al., 2001).

III.A. Care During Pregnancy: ANC

Intervention	Supporting research
<p><i>III.A.3. Addressing Diseases During Pregnancy: Averting Exposure to Toxins</i></p> <p>➤ Averting exposure by women of reproductive age to high-level polychlorinated biphenyls (PCBs) may reduce the numbers of stillbirths.</p>	<ul style="list-style-type: none"> • In Taiwan in 1979, about 2,000 people were poisoned by cooking oil contaminated with PCBs. In 1993–1994, the authors interviewed 312 women aged 30–59 who survived. The authors identified 329 controls. Of the women exposed to PCBs, 16 percent reported abnormal menstrual bleeding compared with 8 percent in the control group; 4.2 percent versus 1.7 percent reported a stillbirth since 1979; and 10.2 percent reported that one of their offspring had died during childhood compared with 6.1 percent of the controls (Yu et al., 2000).
<p>➤ Averting exposure to DDT may decrease preterm births and women’s abilities to lactate. “DDT is reasonably anticipated to be a human carcinogen” (IARC, 1982).</p>	<ul style="list-style-type: none"> • DDT is still widely used against malaria transmitting mosquitoes in developing countries. Serum DDE was assessed in 2,613 mothers. DDE is a component of DDT that is quickly metabolized. The adjusted odds ratios for preterm births increased steadily with increased concentration of DDE. Maternal serum concentration of DDE was associated with increased odds of premature birth, and independently with increased odds of small for gestational age birth. If DDE causes premature birth, it is likely to cause increased infant mortality. In tropical countries where DDT is used for malaria control, blood concentrations of DDE can greatly exceed the range observed in this study (Longnecker et al., 2001). • “DDE may affect women’s ability to lactate.” A study in Mexico of 229 women followed every two months from childbirth until 18 months of age found that median duration of breastfeeding was 7.5 months in the group of women with the lowest amount of DDE measured in their breastmilk and that duration of breastfeeding was three months in the group of women with the highest amount of DDE in their breastmilk. Results “provide further evidence that DDE interferes with lactation” (Gladen and Rogan, 1995). • A study in the United States found that high maternal levels of DDE were associated with shortened duration of lactation (Rogan et al., 1987, cited in Gladen and Rogan, 1995).

III.A. Care During Pregnancy: ANC

Intervention	Supporting research
<p><i>III.A.3. Addressing Diseases During Pregnancy: Averting Exposure to Toxins</i></p> <p>➤ Decreasing exposure to pesticides may reduce the numbers of spontaneous abortions.</p>	<ul style="list-style-type: none"> A study in Canada found strong evidence that women’s exposure to pesticides in the three months prior to conception or in the month of conception significantly increased their risk of spontaneous abortion. Preconception exposure to the pesticides glyphosate, atrazine, carbaryl, and 2, 4-D increased relative risk of spontaneous abortion by 20–40 percent. Risks were even higher for women 35 or older exposed to pesticides and to pesticide mixtures. Older women exposed to both triazines and thiocarbamates before conception had a nearly eight-fold increase in the risk of spontaneous abortion over women exposed to triazines only (Arbuckle et al., 2001).
<p><i>III.A.3. Addressing Diseases During Pregnancy: Gender-based Violence</i></p> <p>➤ Clinical interventions can increase abused women’s safety-seeking behavior.</p>	<ul style="list-style-type: none"> A study of 132 pregnant U.S. women reporting abuse in the year before or during their present pregnancy, who were followed for one year after the completion of the pregnancy and were offered an intervention protocol, reported a significant increase in safety behavior adoption during and after pregnancy. All women were asked six questions to screen for abuse (<i>see Appendix 7, Protocols for Screening for Abuse of Pregnant Women</i>). At each of three education, advocacy, and community referral sessions, women were asked if they had adopted safety behaviors, such as removing weapons, having a hidden bag with extra clothing, asking neighbors for assistance, and so forth. Women were also offered a list of community resources, such as emergency shelter, legal aid, law enforcement, counseling, and support groups. Women were reminded that they are not at fault for violence incidents and that many women report abuse. The women who decided to leave the abuser frequently reported that safety behaviors they adopted during the intervention had enabled them to make their decision and ensure their safety (McFarlane et al., 1997). In the United States, brief clinical interventions have proven effective in increasing abused women’s safety-seeking behaviors (Parker et al., 1999, cited in McFarlane et al., 2002).

III.A. Care During Pregnancy: ANC

Intervention	Supporting research
<p><i>III.A.3. Addressing Diseases During Pregnancy: Gender-based Violence, continued</i></p> <p>➤ A simple abuse assessment protocol during ANC can lead to increased detection of abuse and referral.</p>	<ul style="list-style-type: none"> • A study by International Planned Parenthood Federation (IPPF) in Venezuela found that a screening tool (<i>see Appendix 7</i>) used systematically with each client identified 38 of 429 new clients as victims of violence as compared to only 7 percent when counselors relied on unsystematic screening. IPPF and the Asociacion Civil de Planificacion Familiar (PLAFAM) used three strategies to address gender-based violence (GBV) in their reproductive health services: (1) training staff; (2) developing materials for clients on violence and sources of support, including the <i>Institutional Directory of Gender-based Violence Service Providers</i>; and (3) collaborating with existing community alliances to create a law outlawing violence against women. Providers have been trained to ask questions to assess a victim's current safety and assist with the development of a safety plan. Clinicians "have been trained to recognize symptoms by observing marks on the body, to be responsive if a client chooses to disclose that she is being abused and to provide related counseling" (Guedes et al., 2002). The evaluation is ongoing, and further information from this study will be included in the section on GBV in the forthcoming module on reducing unintended pregnancy. • A study conducted at three matched prenatal clinics in the United States, serving a total of 12,000 maternity patients per year, found that "Prenatal care provides a 'window of opportunity' to implement abuse protocols" in clinics. The intervention consisted of including in all charts prepared for new maternity patients an abuse assessment protocol to be administered at their first routine prenatal intake interview. At clinics using an abuse assessment protocol, detection of abuse increased from 0.8 to 7 percent, and documentation of referral was included in 67 percent of the charts of abused women after three months. Incorporation of an abuse assessment protocol into routine procedures increased the assessment, identification, and referral for abuse among pregnant women (Wiist and McFarlane, 1999). • A simple abuse assessment and intervention protocol integrated into the routine procedures of a prenatal clinic can lead to increased detection of abuse and referral (Covington et al., 1997, cited in McFarlane et al., 2002).
<p><i>III.A.3. Addressing Diseases During Pregnancy: STDs, HIV, and AIDS</i></p>	<p><i>Refer to the forthcoming module on STDs, HIV, and AIDS, including HIV in pregnancy and MTCT.</i></p>

III.B. Care During Pregnancy: Health Providers for ANC

Intervention	Supporting research
<p>➤ Routine ANC provided by midwives or general practitioners can have similar outcomes, as when ANC is provided by obstetricians–gynecologists (Ob–Gyns).</p> <p>➤ Midwives can be trained to provide EmOC.</p>	<ul style="list-style-type: none"> • A WHO multicenter trial in Argentina, Cuba, Saudi Arabia, and Thailand found that routine ANC provided by midwives or general practitioners had similar outcomes to that provided by Ob–Gyns. While the rates of pregnancy-induced hypertension and pre-eclampsia were consistently lower in the midwife/general practitioner group than in the obstetrician-led ANC, the midwife/general practitioner group was less likely to recognize fetal malpresentation. No differences were observed in perinatal outcomes (Villar and Khan-Neelofur, 2000, cited in Carroli et al., 2001). • A 1995 meta-analysis of nine U.S. studies compared the outcomes of care provided by Certified Nurse Midwives (CNMs) and physicians. Few differences were found, except for reduced numbers of low-birth weight for babies born to women whose ANC was provided by nurse midwives (Brown and Grimes, 1995, cited in Pew Health Professions Commission and the University of California, San Francisco Center for Health Professionals, 1999). • The Kumasi Prevention of Maternal Mortality (PMM) team upgraded the Juaben Teaching Health Center in Ghana and trained the midwives in EmOC. The number of women with complications coming to the health center for treatment increased from 26 in 1993 to 73 in 1995. In addition, the proportion of women who needed to be referred to the hospital decreased. Midwives now provide a large portion of care (Maine, 1997).
<p>➤ Midwives, particularly with training, can become sources of health information for pregnant women.</p>	<ul style="list-style-type: none"> • Between 1990 and 1998, Indonesia trained 50,000 midwives who were placed in poor communities relatively distant from health centers. When women were asked where or from whom they had received information about health and health problems during pregnancy and delivery, the percentage of women who mentioned a village midwife rose significantly, from 12 percent in 1996 to 40 percent in 1999 (Koblinsky et al., 2000). • In Indonesia, a program that trained every village midwife in three districts in interpersonal counseling and communication, as well as 53 percent of midwives in life saving skills, resulted in increased numbers of pregnant women turning to village midwives for health information during pregnancy. Recently delivered and currently pregnant women reported in a survey that they received information about health and health problems during pregnancy rose from 12 percent in 1996 to 40 percent in 1999. The percentage who found health service personnel a convincing source of information increased from 73 percent in 1996 to 87 percent in 1999 (Ronsmans et al., 2001).

III.B. Care During Pregnancy: Health Providers for ANC

Intervention	Supporting research
<p>➤ Traditional birth attendants (TBAs) and community volunteers can be effective in distributing iron tablet supplements.</p> <p><i>See also section III.D. Care During Pregnancy: Nutrition to Support Safe Motherhood</i></p>	<ul style="list-style-type: none"> • A project that provided a seven-day training to community health workers (CHWs) in India to communicate with pregnant women and their families to motivate better compliance with iron supplementation achieved greater iron consumption among pregnant women. Pregnant women who received iron from government hospitals or primary health centers increased from a baseline of 27.7 to 35.4 percent; pregnant women receiving iron from CHWs went from a baseline of 0 to 15.4 percent, and pregnant women who consumed more than 100 iron tablets increased from a baseline of 16.7 to 92.8 percent (Stephens, 2000). • A study in Indonesia demonstrated that TBAs are effective in distributing and monitoring the intake of iron/folate tablets and in educating pregnant women in rural areas about the importance of anemia treatment and prevention. Daily dosing is more efficacious than once-a-week regimens. Five hundred eighty pregnant women were followed for 12 to 20 weeks on three different iron-supplementation regimens. In group one, in which TBAs supplied and monitored the distribution of regimens and educated women on the importance of treating maternal anemia, subjects consumed an average of 95 tablets during the 20-week course compared with 65 tablets in the control group. Compliance in the TBA daily group one subjects was 70 percent compared with 47 percent in the control group. The proportion of anemic women in the TBA daily group one was reduced from 2 to 15 percent, and the proportion in the control group increased from 13 to 30 percent. Consistent hemoglobin improvement requires 100 or more tablets consumed over 12 to 20 weeks. In Group One, women during pregnancy demonstrated an increase in knowledge of the symptoms, risks, and prevention of anemia that surpassed that of the control group (Robinson, 2000). • TBAs in Java increased the consumption of iron/folate tablets by pregnant women through door-to-door distribution. The average number of tablets consumed during each pregnancy was significantly greater in the experimental area than the control area (64 vs. 23 tablets) and the proportion of pregnant women who took iron/folate increased (Moore et al., 1991, cited in Robinson, 2000).

III.C. Care During Pregnancy: Health Promotion for Mothers, Partners, and Communities

Rapid recognition of the signs of emergency obstetric complications improves women's odds of survival by reducing the delay to obtaining treatment if she also receives care promptly (Thaddeus and Maine, 1990). Knowledge of the danger signals requiring EmOC and need for skilled attendants can mobilize women, their partners, and entire communities to save maternal lives. For example, an Egypt study determined that failure by the woman or her family to recognize problems and to delay in seeking medical care were significant avoidable factors, contributing to 27 percent (23 maternal deaths per 100,000) and 21 percent of maternal deaths (18 maternal deaths per 100,000), respectively, in 2000. Failure to recognize danger signs usually contributed to a delay in seeking care (Ministry of Health and Population, Egypt, 2001). Involvement of male partners, while respecting women's autonomy for decision making, can increase needed care during pregnancy and birth. "The process of bringing men in needs to be carefully considered so that in no way are we undermining the often precarious rights of women to control their own bodies and make their own decisions. ...It must always be kept in mind that what needs to be protected at all costs is the right of each individual woman not to involve her partner if she so chooses—without the need of an explanation" (Raju and Leonard, 2000: 51).

III.C. Care During Pregnancy: **Health Promotion for Mothers, Partners, and Communities**

Intervention	Supporting research
<p><i>III.C.1. Health Education to Increase Hospital Deliveries When Needed</i></p> <p>Health education is effective in improving the numbers of women who seek skilled attendance with lower rates of stillbirths and neonatal deaths.</p>	<ul style="list-style-type: none"> • In India, the Rural Women's Social Education Centre undertook an intensive health education campaign covering 23,562 rural poor agricultural laborers in 4,386 households. The campaign identified pregnant women who were given health advice and encouraged to deliver in the hospital. Community health workers identified 284 pregnant women, of whom 37 were ages 15–19. Pamphlets on risk factors and danger signals in pregnancy were read aloud, explained, and given to pregnant women. A series of workshops explained the process of pregnancy and childbirth, and appropriate self-care. Two postpartum visits were made to advise on self-care and care of the baby. Nearly one-half of the deliveries (45.5%) were institutional compared with 22 percent prior to this campaign. Three-quarters (76%) of those with complications, such as prolonged or obstructed labor, heavy loss of blood during labor or postpartum, and hypertensive disorders of pregnancy, delivered in the hospital. The rate of stillbirths and early neonatal deaths declined steeply from 38.7 and 43.3 per 1,000 total births to 25.5 and 29.1 per 1,000 total births. Women between the ages of 20 and 24 suffered a higher proportion of negative outcomes (11.7%) than women ages 15–19 (0%). Confounding factors such as socioeconomic status, literacy, caste, and family land ownership did not alter the higher proportion of negative pregnancy outcome for women between 20 and 24. Girls ages 15–19 returned to their maternal home, where they received good care during pregnancy and delivery. However, women ages 20–24 stayed in their marital home, whereas daughters-in-law they are powerless with little autonomy and limited possibility for self-care and good nutrition (Sundari, 1993). • Improved knowledge of danger signals and where to go for skilled obstetric care, combined with improving the skills of providers to manage safe birth or refer complicated cases, increased the numbers women giving birth with a skilled attendant in Bolivia, Guatemala, and Indonesia. In Guatemala, coverage of births with a skilled birth attendants increased 38 percent in one area and 53 percent in another; in Bolivia, 63 percent; and in Indonesia, 57 percent (MotherCare, 2000a).

III.C. Care During Pregnancy: **Health Promotion for Mothers, Partners, and Communities**

Intervention	Supporting research
<p><i>III.C.1. Health Education to Increase Hospital Deliveries When Needed, continued</i></p> <p>➤ Health education is effective in improving the numbers of women who seek skilled attendance with lower rates of stillbirths and neonatal deaths, <i>continued</i>.</p>	<ul style="list-style-type: none"> • Egypt reduced its maternal mortality ratio by more than 50 percent in eight years from 174 in 1992 to 84 per 100,000 live births in 2000. “The lower proportion of home deliveries among women who died suggests that women seek medical care when they experience problems and this is confirmed by the 2000 data which found that 93% of women who died had sought medical help at some point during the events leading to their deaths.” The study was based on information collected from 149 health bureaus in all 27 governorates in Egypt, identifying all deaths in women of reproductive age and those considered to be maternal deaths. All maternal deaths were investigated by interviewing the families of the deceased women and any health provider involved in their care. In each governorate, a local advisory group comprising the Undersecretary of Health, Director of MCH, an obstetrician, and a pediatrician reviewed the cases of all women who had died and assigned medical causes and avoidable factors for all maternal death (Ministry of Health and Population, Egypt, 2001).

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Intervention	Supporting research
<p><i>III.C.2. Providing Women and Men With Adequate Information</i></p> <p>➤ Women and men desire more information on birth, breastfeeding, family planning, and couple communication.</p>	<ul style="list-style-type: none"> • Focus-group discussions in Moldova revealed that both women and men said that they were given little information on birth, breastfeeding, and family planning; however, both women and men desired more information about these topics and about newborn care (Mercer, 2000). • A study in Kenya with 701 women and 289 men found that while only 13 percent of women seeking ANC were accompanied by their partners, 90 percent of both men and women considered it acceptable for men to accompany their partners for antenatal visits; and of these, 94 percent felt that it was appropriate for men to be present during consultations. When asked specifically about ANC, 90 percent of all male respondents said they would like to be involved. Both men and women found that “structural and attitudinal constraints at the health facilities were seen as playing a major role in keeping men away” (Muia et al., 2000: 21). • A study in Turkey with 253 couples assessed the effect of providing health education services for mothers and fathers through four antenatal group education sessions covering pregnancy, childbirth, infant feeding and care, and postpartum women’s health and family planning; a booklet containing answers to frequently asked questions about health during pregnancy, childbirth, and the postpartum period; and access to a telephone counseling service during the postpartum period. Couple communication was increased, with 70 percent of wives who attended at least one group session reporting that they had talked to their husbands about the session afterward and 77 percent of husbands who attended at least one session had talked to their wives about the session afterward. The use of contraceptives postpartum, such as the IUD, contraceptive pills, sterilization, and condoms, was 62 percent for the couples who participated in the intervention as compared with 45 percent in the control group (Turan et al., 2002).

III.C. Care During Pregnancy: Health Promotion for Mothers, Partners, and Communities

Intervention	Supporting research
<p><i>III.C.3. Involving Men in Maternity Care</i></p> <ul style="list-style-type: none"> ➤ Training providers to involve men in maternity care and provide STI counseling and services can increase the numbers of men accompanying their wives to ANC clinics. 	<ul style="list-style-type: none"> • Initial results from an operations research project in India found that training physicians and auxiliary nurse midwives (ANMs) on involving men in maternity care and providing STI counseling and services has lead to more husbands accompanying their wives to antenatal clinics and increased STI counseling (Varkey, 2001)
<ul style="list-style-type: none"> ➤ Educating male partners and family members concerning safe motherhood improves ANC attendance. 	<ul style="list-style-type: none"> • A study in India compared outcomes for 405 women in the control group and 270 women whose husbands were invited and came to the health center to be educated individually and in groups about the husbands' role in the nutrition and health of their wives during pregnancy. Husbands in the intervention group received detailed explanations of the physiology of pregnancy, complications of pregnancy, and ways to prevent complications. More than 80 percent of the women in the intervention group attended four or more ANC visits as compared with the control group, in which less than 62 percent of the women attended four or more ANC visits. Perinatal mortality was double among the women in the control group (less than 4 percent as compared with less than 2 percent in the intervention group) (Bhalerao et al., 1984). • An NGO program in India, Deepak Charitable Trust, contracted husbands of pregnant women. In the project area where husbands were contacted, more women attended ANC. Of the 64 men in the intervention group, 75 percent knew if their wives had had hemoglobin tests compared with the 16.3 percent of the 49 men not in the intervention; 84.4 percent in the intervention group knew their wife had had their blood pressure taken compared with 30.6 percent not in the intervention group; and 98.4 percent knew that their wife had received a tetanus toxoid immunization in the intervention group compared with 63.3 percent not in the intervention group (Raju and Leonard, 2000).

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Intervention	Supporting research
<p>III.C.3. Involving Men in Maternity Care, continued</p> <p>➤ Educating male partners and family members concerning safe motherhood improves ANC attendance, continued.</p>	<ul style="list-style-type: none"> • An NGO program in India, SEWA-rural, that involved men in maternal health care by scheduling field visits at times when men were most likely to be present increased the number of men seeking out health workers to register their wives for early ANC by 40 percent (Raju and Leonard, 2000). • A population-based cross-sectional survey study of 211 women interviewed in Rakai District, Uganda, who had given birth in the previous year, found that educating fathers about safer delivery discourages home deliveries. Fifty-eight percent of women said that the delivery site depended on their spouse (Nuwaha and Amooti-Kaguna, 1999). • “Research suggests that, in addition to biomedical interventions and the strengthening of health care services, improving awareness of obstetric complications among members of a pregnant woman’s immediate and wider social network is an important step in improving her chances of survival when such complications occur” (Khan et al., 1997, cited in Roth and Mbizvo, 2001).
<p>➤ Educating male partners concerning safe motherhood improves maternal health outcomes.</p>	<ul style="list-style-type: none"> • A study in a Khmer refugee camp in Thailand from 1988–1989 with 488 pregnant women in an intervention group and 486 women in a control group found that providing nutrition education to the women’s husbands led to highly significant reductions in the incidence of low birthweight infants, increases in weekly weight gains, and increases in the knowledge of both the women who attended at least nine classes and spouses who attended three or more classes. For all women who completed three months in the intervention group, the incidence of low birthweight babies decreased by more than 50 percent. Both the control and the intervention groups received the same family rations and take-home supplementary food ration. The control group received the preexisting nutrition education curriculum and noninteractive, nonjudgmental feedback about their weight gain. The intervention group was encouraged to gain at least one kilogram per month and through discussions of how to eat more. Focus-group discussions found that men would be willing to help women improve their diets, but that neither men nor women understood the importance of weight gain during pregnancy (Roesel et al., 1990). • Research in the United States found that when men are prepared and supported with antenatal education, their “gains in knowledge led to more supportive behavior for the mother and infant” (Westney, 1988, cited in Levine and Pitt, 1995).

III.C. Care During Pregnancy: Health Promotion for Mothers, Partners, and Communities

Intervention	Supporting research
<p><i>III.C.4. Education about Danger Signs and Need for EmOC</i></p> <p>➤ Community education programs as well as individual counseling programs about danger signals requiring EmOC can increase knowledge and use of EmOC.</p>	<p>Signs and symptoms of serious obstetric complications should be taught to all in the community, not just to the TBAs or pregnant women: bleeding during pregnancy; excessive bleeding during or after delivery; convulsions; fever, chills, and foul vaginal discharge; headaches in combination with swollen hands, face, and feet; and labor for more than 12 hours (Bailey et al., 1995).</p> <ul style="list-style-type: none"> • In rural Bangladesh, a pictorial card was introduced to 831 pregnant women out of 1,566 women studied to raise community awareness about the complications of pregnancy and childbirth and to encourage women to use health facilities in emergencies. Pregnant women who received the pictorial cards were more likely to use ANC services compared with those who did not receive them. Of the pregnant women who had the pictorial card, 80 percent attended ANC compared with only 32 percent among those not in the intervention area. Moreover, women who had a card were more likely to use institutional facilities for management of their obstetric complications compared with those who did not. Percentages of women with complications admitted to maternity wards increased from 1.7 to 5 percent in one area and from 6.5 to 8.4 percent in another area (Khanum et al., 2000). • A study in Bangladesh surveying 542 women found that “possession of general knowledge about emergency obstetric problems also has a significant impact on the utilization of emergency obstetric care facilities.” Unprompted knowledge of 10 obstetric problems was correlated with increased use of EmOC (Barkat et al., 1997). • “A review of lessons learned from community-based safe motherhood efforts in Asia suggests that community health workers and members of locally based women, youth, and religious organizations can be effective members of health promotion and outreach teams” (UNICEF/CIDA, 1997, cited in Roth and Mbizvo, 2001). • In Ghana, after community education by village health workers, committees, midwives, and nurses, the number of women with obstetric complications presenting for care increased from 23 to 73 per year. They also arrived earlier and in better condition than previously (Opoku et al., 1997). • A study of 60 pregnant women, 26 health workers and six key informants in southern Tanzania found that, whereas 99 percent of women attend ANC, 61 percent of women give birth at home. Women were dependent on the consent of family elders and husbands to comply with referral advice and depend on their financial support (Kowalewski et al., 2000).

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Intervention	Supporting research
<p><i>III.C.4. Education about Danger Signs and Need for EmOC, continued</i></p> <p>➤ Community education programs as well as individual counseling programs about danger signals requiring EmOC are effective in increasing referrals to EmOC, continued.</p>	<ul style="list-style-type: none"> • A project carried out by CARE in Bangladesh tested several interventions to increase the use of EmOC in case of obstetric emergencies. In the intervention area, EmOC facilities were upgraded and the quality of EmOC was enhanced. Community Support Systems (CmSS), a stakeholder committee, was created with both male and female representatives from village households to mobilize the community and create community support. In the comparison area, EmOC was upgraded but no CmSS created. In the control area, EmOC was not upgraded and no other community mobilization occurred. In the intervention area, 44 percent knew three or more of the five danger signs compared to only 4 percent of women in the comparison area and 6 percent of women in the control area. There was a significant increase in institutional deliveries in the intervention area from 2 to 10 percent, whereas in the control area the percentage of total births taking place in a facility increased from 4.5 to 5 percent (Hossain, 2002). • A network of private clinics together with a hospital with subsidized care for those who could not pay, provided effective EmOC in a remote rural area in India with only 15 percent of deliveries in hospitals. A study of obstetric care in rural India, which followed 2,905 pregnancies, found that 85 percent of 2,861 pregnancies were at home. A total of 14.4 percent of women who gave birth after 24 weeks had obstetric complications. Of these complicated deliveries, 78.9 percent were in a hospital. Hospitalized patients with obstetric complication constituted 11.4 percent of all deliveries. Hospital care fatality was 0.3 percent. “Almost every family knows that obstructed labor, hemorrhage, convulsions and sepsis are treatable conditions,” and the project has engendered “intelligent self-selection of patients who need hospital care.” The project’s “effort to teach when referral is needed during delivery was an important factor in these results” (McCord et al., 2001:305).

III.C. Care During Pregnancy: Health Promotion for Mothers, Partners, and Communities

Intervention	Supporting research
<p>III.C.5. Breastfeeding Promotion</p> <p>➤ Women, families, and communities should be counseled on the short-term and long-term positive effects of breastfeeding for the health of infants and the mother, and the need and/or provision of adequate nutrition for the breastfeeding woman.</p> <p><i>Please refer to section II.C. Postnatal Care: Breastfeeding</i></p> <p><i>Refer to the module in the guide on MTCT for breastfeeding by women who are HIV-positive.</i></p>	<p><i>Long-term benefits of breastfeeding for the mother:</i></p> <ul style="list-style-type: none"> • Individual data from 47 epidemiological studies in 30 countries that included information on breastfeeding patterns were analyzed for 50,302 women and 96,973 controls and found that the relative risk of breast cancer decreased by 4.3% for every 12 months of breastfeeding (Collaborative Group on Hormonal Factors in Breast Cancer and Berah, 2002). • Breastfeeding is protective against ovarian and premenopausal breast cancer and also reduces the risk of ovarian cancer (Hatcher et al., 1994; Labbok, 1999). <p><i>Benefits for the infant of breastfeeding:</i></p> <ul style="list-style-type: none"> • Data from Brazil, Pakistan, and the Philippines provided information on 1,223 deaths of children less than two years of age. Protection provided by breastmilk was highest for infants under two months, but still significant for the first 11 months of life, protecting both against diarrhea and acute respiratory infection. Protection was highest when maternal education was low (WHO Collaborative Study Team on the Role of Breastfeeding on the Prevention of Infant Mortality, 2000). • A case control study of poor communities in Lima, Peru, reviewed 71 cases of infant deaths and 142 of infants who lived. For infants who died, the mean duration of exclusive breastfeeding and age at which water supplements and formula was introduced was significantly lower than in the controls. Infants who died from an infectious disease were 15.4 times more likely to have never been breastfed than control infants and three times more likely to have been exclusively breastfed for less than one month than controls (Lu and Costello, 2000). • Breastfeeding prevents malnutrition in infants from poor socioeconomic backgrounds and obesity in infants from affluent families (Nkanginieme, 1993). • Breastfeeding significantly reduces the risk of diarrhea in infants, especially for one-month-old infants, and thus prevents adverse nutritional effects of diarrhea (de Zoysa et al., 1991).

III.C. Care During Pregnancy: Health Promotion for Mothers, Partners, and Communities

Intervention	Supporting research
<p><i>III.C.5. Breastfeeding Promotion, continued</i></p> <p>Women, families, and communities should be counseled on the short-term and long-term positive effects of breastfeeding for the health of infants and the mother, and the need and/or provision of adequate nutrition for the breastfeeding woman, continued.</p> <p><i>Please refer to section II.C. Postnatal Care: Breastfeeding</i></p> <p><i>Refer to the module in the guide on MTCT for breastfeeding by women who are HIV-positive.</i></p>	<p><i>Benefits for the infant of breastfeeding (continued):</i></p> <ul style="list-style-type: none"> • A study in India found that the infection rate in the first week of life among low birth-weight newborns was lowest in the children exclusively breastfed (Narayannan et al., 1984, cited in Black, 1999). • Breastmilk has particular benefits for the premature infant, leading to lower rates of infection, improved gastrointestinal function, and neurodevelopment (Schanler and Atkinson, 1999). <p><i>Long term benefits for those who have been breastfed:</i></p> <ul style="list-style-type: none"> • A prospective longitudinal birth cohort study of 3,253 men and women born in Denmark found that duration of breastfeeding was associated with significantly higher scores on two different intelligence tests independent of a wide range of possible confounding factors. Intelligence was assessed between the ages of 18 and 28. Those who were breastfed until nine months had consistently higher scores than those who were breastfed for those who were breastfed for less than six months (Mortensen et al., 2002). <p><i>Need for adequate maternal nutrition:</i></p> <ul style="list-style-type: none"> • A study in Indonesia found that the “micronutrient status of lactating mothers and that of their infants were closely related.” One hundred fifty-five lactating mothers and their healthy infants in rural West Java, Indonesia, were assessed anthropometrically, and blood, urine, and breastmilk samples were obtained. Adequate maternal nutrition is essential for breastfeeding (Dijkhuizen et al., 2001). • Financial savings from not purchasing formula is an added advantage, but only if the funds saved also are spent on nutritional intake for the mother (Smith, 1990). • While breastfeeding is good for infant health, the tradeoffs in maternal health may not be as advantageous, particularly in the presence of severe malnutrition and famine (IOM, 1996). Production of breastmilk requires extra energy expenditure by the mother, energy she would not expend were she not lactating. To 45 percent of women ages 15–44 in developing countries do not consume enough calories daily, even when not pregnant (IOM, 1996).

III.C. Care During Pregnancy: Health Promotion for Mothers, Partners, and Communities

Intervention	Supporting research
<p>III.C.6. Cigarette Smoke Prevention</p> <p>➤ Providers can successfully encourage pregnant women to stop smoking, as well as other family members who live with the woman (Kum-Nji et al., 2001).</p>	<ul style="list-style-type: none"> • Evaluation studies conducted in the United States, Australia, Canada, England, Norway, and Sweden have confirmed that if a specific set of patient education procedures is routinely delivered by a trained professional such as physician, nurse, midwife, or health educator, cessation rates and reduction rates among pregnant smokers can be significantly increased among normal quit rates (Windsor, 2001). • Children of mothers who smoke during pregnancy are at greater risk of developing diabetes and obesity. Using data from the British National Child Development Study, an analysis of 17,000 births found that the risk of diabetes increased 4.55-fold in the offspring of those who smoked more than 10 cigarettes a day compared with nonsmokers. The offspring of mothers who smoked fewer than 10 cigarettes a day had an increase risk of 4.13. The risk of obesity was increased 1.38 in the offspring of those who smoked more than 10 cigarettes a day during pregnancy, independently of the risk of diabetes (Montgomery and Ekblom 2002). • Maternal smoking during pregnancy and maternal passive smoking during the post-neonatal period has been shown to be one of the most significant predictors of Sudden Infant Death Syndrome (SIDS), otitis media, serous bacterial and/or respiratory tract infections, and possible cancer in U.S. studies (Kum-Nji et al., 2001). • A study of a population-based cohort of 243,858 women in Sweden from 1983–1993 found that the risk of a very preterm delivery in successive pregnancies is correlated with smoking. Smoking was attributable to 12.6 percent of very preterm deliveries and 8.5 percent of moderately preterm deliveries. Among nonsmoking women who previously had a term delivery, starting smoking during a subsequent pregnancy increased the risk of having a very or moderately preterm delivery (Cnattingius et al., 1999). • Smoking during pregnancy has been associated with premature delivery, spontaneous abortion, and fetal and perinatal death (Chollat-Traquet, 1992). • A study in India found that the stillbirth rate among women who chewed tobacco during pregnancy was much higher than among women who did not (Krishna, 1978, cited in Chollat-Traquet, 1992). • If a mother is able to give up smoking by the fourth month of gestation, her risk of delivering a low-birthweight baby is similar to that of a nonsmoker. In a study in New York, the risk of having a spontaneous abortion for regular smokers increased by 46 percent for the first 10 cigarettes smoked a day and by 61 percent for the first 20 cigarettes (Chollat-Traquet, 1992).

III.C. Care During Pregnancy: Health Promotion for Mothers, Partners, and Communities

Intervention	Supporting research
<i>III.C.6. Cigarette Smoke Prevention, continued</i> ➤ Education efforts should encourage pregnant women to stop smoking, as well as other family members who live with the woman (Kum-Nji et al., 2001).	<ul style="list-style-type: none">• A study in South Africa in 1992 found that most women who smoked stopped or reduced tobacco use during their pregnancy. However, 70 percent of these women lived with at least one smoker in the house, thus exposing themselves and their fetus/infant to the risks of passive smoking (Steyn et al., 1997, cited in Samet and Yang, 2001). Exposure to tobacco was found to be a cause of lower birth weight for infants of nonsmoking women passively exposed to tobacco smoke during pregnancy (Martin and Bracken, 1986; Rubin et al., 1986, cited in Samet and Yang, 2001).• Clinicians should always seize the opportunity to educate parents or guardians on the health hazards of tobacco smoke. Families should be encouraged to give up smoking, or smoke only outside. Families should be instructed that even though they may not smoke at home in the presence of the infant, tobacco toxins are still present on their hair and clothes and are easily transferable to their baby (Kum-Nji et al., 2001).

III.D. Care During Pregnancy: Nutrition to Support Safe Motherhood

“Maternal nutritional status is important for the health and quality of life of women and for the health of their newborn infants” (IOM, 1990, cited in Winkvist, 2002). A number of nutrition interventions can take place throughout the life cycle, starting in infancy and through the reproductive years. Rather than split the nutrition interventions between pre-pregnancy and care during pregnancy, this guide presents all nutrition interventions in this section. “For three of the central causes of maternal mortality (i.e. induced abortion, puerperal infection, and pregnancy-induced hypertension, knowledge of the contribution of nutrition is too scanty for programmatic application” (Rush, 2000: 212S). To reduce maternal mortality, a first priority would be to offer obstetric care to lower risk and then to judge what the incremental benefit might be from nutritional supplementation (Rush, 2000). However, “insufficient attention has been paid to the extent to which anemia affects the mother’s quality of life, including her level of fatigue and ability to cope with the stress of pregnancy and a young infant” (Allen, 2000:1282S).

Nutritional interventions are most effective until age three (Rush, 2000), arguing for an approach that would target gender inequalities that deprive girls of adequate nutrition. Adequate nutrition for girls can increase height and pelvic size, decreasing the likelihood of needing cesarean section in a future generation (Rush, 2000).

III.D. Care During Pregnancy: **Nutrition to Support Safe Motherhood**

Intervention	Supporting research
➤ Universal or targeted food fortification can reduce nutritional deficits. In most societies, women are more likely to be malnourished.	<ul style="list-style-type: none"> A review of studies conducted on food fortification found that food fortification of salt with iodine, that of wheat flour with iron, vitamins B1 and B2, and niacin, and that of milk and margarine with vitamins A and D lead to reductions in anemia and iron deficiency and is efficient and sustainable (Nilson and Pizza, 1998).
➤ Increasing food intakes for girls until three years of age may increase their adult height and decrease risk of maternal mortality.	<ul style="list-style-type: none"> Greater height appears to protect against trauma during delivery, both for the pregnant woman and her offspring. Adult height can be increased with increased food intake to age three (Rush, 2000).
➤ Treating severe iron-deficiency during pregnancy may reduce the risk of maternal mortality.	<ul style="list-style-type: none"> A study in Malawi following a cohort of 3,740 pregnant women prospectively found that of the 6.2 percent of women with hemocrit concentrations under 0.25 were far more likely to result in maternal deaths (McDermott et al., 1996, cited in Rush, 2000).

III.D. Care During Pregnancy: **Nutrition to Support Safe Motherhood**

Intervention	Supporting research
<p>➤ Treating iron-deficiency anemia with iron during pregnancy has been shown to reduce the prevalence of anemia and maternal morbidity; in the second trimester, providing iron together with folate, B12, riboflavin, and treatment for parasitic infections reduces the risk of maternal morbidity.</p>	<ul style="list-style-type: none"> • A Cochrane Collaboration review of 20 trials found that iron supplementation appears to prevent low hemoglobin at birth or at six months postpartum; however, little information exists for pregnancy outcomes for mothers or babies (Mohamed, 2000). • A review of placebo-controlled studies identified from the Cochrane database found that an iron supplement of 65 mg per day from 20 weeks of gestation is adequate to prevent iron-deficiency anemia. Iron-treated pregnant women have higher hemoglobin levels and a lower prevalence of iron-deficiency anemia than placebo-treated mothers in both pregnancy and postpartum. Children born to iron-treated mothers have higher serum ferritin levels than those born to placebo-treated mothers (Milman et al., 1999). • The benefits of iron supplementation on maternal iron status during pregnancy are most evident postpartum. A study in Denmark found that serum ferritin concentrations at two months postpartum in women supplemented during pregnancy were twice than those of women who did not receive iron (Milman et al., 1991, cited in Allen, 2000).
<p>➤ Training, IEC campaigns, and distribution of iron tablets can reduce anemia.</p>	<ul style="list-style-type: none"> • Starting in 1995, iron tablets distributed during 33 months in Malawi, along with training and IEC campaigns to explain their importance, reduced the prevalence for anemia. Of 210 pregnant women, 66.7 percent were anemic prior to the distribution of iron tablets; however, 59.5 percent were anemic following the distribution of iron tablets. Of 210 women who gave birth, 61 percent were anemic prior to the distribution of iron tablets and 51 percent were anemic following the distribution of iron tablets. Among women who gave birth, 15.8 percent, or 33, had moderate anemia prior to the distribution of iron tablets and only 8.6 percent, or 18, had moderate anemia following the distribution of iron tablets. Distribution of iron tablets reduced the percent of pregnant women who were not anemic from 33.3 to 40.5 percentage, and among women who gave birth from 39 to 49 percent (Kachingwe and Mbweza, 2000).

III.D. Care During Pregnancy: **Nutrition to Support Safe Motherhood**

Intervention	Supporting research
<p>➤ Treating hookworm reduces the prevalence of anemia.</p>	<ul style="list-style-type: none"> • Hookworms affect anemia. A study in Nepal found that prevalence of iron-deficiency anemia was 50 percent higher in women with hookworm. Where anemia rates are high, even with daily supplements in randomized, controlled trials starting in the second trimester, significant levels of anemia persist (Mackey, 2000). • A study in India treated hookworm, which resulted in reduced prevalence of anemia. Blood samples were obtained from 403 pregnant women and 425 in a control group. A total of 216 from the study group and 223 in the control group gave samples for serum ferritin levels. Stool samples were collected from pregnant women (111 study area, 42 control area) and tested for the presence of hookworm ova. Messages on anemia were developed through a participatory process involving all levels of workers and Family Care Volunteers (FCVs). Pregnant women were routinely issued mebendazole tablets in the mobile clinic either in the second or third trimester. Each woman received six 100 mg tablets with instructions to take one tablet twice daily for three days. FCVs made field visits to each pregnant woman to confirm consumption of tablets. The baseline survey revealed a 70.3 percent prevalence of anemia at a gestational age of 24 weeks and older and a decrease to 50.4 percent after the intervention. By contrast, the prevalence of anemia increased from 68.2 to 75.5 percent in the control area. A significant difference of 19.9 percent was observed in the post-intervention assessment between the study and control area. Prior to the intervention, 39.2 percent of pregnant women in the study area were diagnosed with iron depletion, which fell to 27.3 percent after the intervention. Iron depletion decreased from 47.7 to 35.2 percent in the study area. In the control area, iron depletion increased from 32.7 to 35.4 percent. Iron-deficiency anemia decreased significantly from 33.1 to 20.8 percent in the study area. The percentage of women classified with no iron deficiency increased significantly in the study area from 24 to 46.3 percent. Pregnant women's knowledge of anemia came primarily by flash cards on anemia. After treatment, only 14 percent of pregnant women had hookworm ova in the intervention area in contrast to 43.8 percent in the control area (Abel et al., 2000). • An observational study of pregnant tea plantation workers in Sri Lanka found that among women supplemented with iron and folate, only those who also received treatment for the elimination of intestinal worms had increased hemoglobin and serum ferritin concentrations (Atukorala et al., 1994, cited in Rush, 2000).

III.D. Care During Pregnancy: **Nutrition to Support Safe Motherhood**

Intervention	Supporting research
➤ Periconceptual intake of 400ug of folic acid daily can reduce the risk of neural tube defects, including anencephaly, spina bifida, iniencephaly, craniorachischisis, and encephalocele, but not isolated hydrocephalus.	<ul style="list-style-type: none"> • A study was conducted of 130,142 women in China who took folic acid at any time before or during pregnancy and 117,689 women who did not take folic acid. Among the women who did not take any folic acid, the rates of neural tube defects among fetuses or infants were 6.5 per 1,000 pregnancies of at least 20 weeks gestation. Among the women with any folic acid use, rates of neural tube defects among fetuses or infants were 1.3 per 1,000 pregnancies of at least 20 weeks gestation. The greatest reduction of risk occurred among the fetuses or infants of a subgroup of women with periconceptual use who took folic acid pills more than 80 percent of the time (Berry et al., 1999). • A review of 35 published studies for a Cochrane Collaboration review found that periconceptual folate supplementation reduced the incidence of neural tube defects by as much as 70 percent (Lumley et al., 2000, cited in Kolsteren and DeSouza, 2001).
➤ Adequate amounts of calcium and magnesium reduce the risk of eclampsia and prematurity.	<ul style="list-style-type: none"> • A study of 10,110 women with pre-eclampsia in 33 countries at 175 secondary and tertiary hospitals were randomized to magnesium sulphate or placebo and found that women allocated magnesium sulphate had a 58 percent lower risk of eclampsia. Maternal mortality was 45 percent lower among women allocated magnesium sulphate. There were no substantive harmful effects to mother or baby in the short term. There was a lowered risk of placental abruption in the magnesium sulphate group. More women experienced side effects with the intramuscular injection rather than the intravenous regimen. Safe monitoring was achieved using clinical assessment of tendon reflexes, respiratory rate, and urine output. This trial included women only after admission to a hospital. The study's authors recommended that duration of treatment should not exceed 24 hours (Magpie Trial Collaborative Group, 2002). • A Cochrane Collaboration review of 10 studies found a slight reduction in blood pressure with calcium supplementation. Risk of pre-eclampsia decreased after calcium supplementation. "The present evidence supports the concept that calcium supplements during pregnancy can reduce pre-eclampsia when given to women with deficient calcium intake or when they are at risk for pre-eclampsia" (Atallah et al., 2000).

III.D. Care During Pregnancy: **Nutrition to Support Safe Motherhood**

Intervention	Supporting research
➤ Adequate amounts of calcium and magnesium reduce the risk of eclampsia and prematurity, <i>continued</i>	<ul style="list-style-type: none"> • A review of randomized clinical trials found that calcium supplementation in women at high risk of pregnancy hypertension reduced the incidence of high blood pressure and pre-eclampsia. In women at low risk of pregnancy, hypertension, or with adequate baseline calcium intake, the beneficial effects of calcium are unlikely to be of clinical significance (Kulier et al., 1998). • In India, where the dietary intakes of calcium is 350 mg per day, the incidence of gestational hypertension was 6 percent in women receiving 2g of calcium per day from 20 weeks gestation compared with 17 percent in the placebo group; and the incidence of pre-eclampsia was 2 percent compared with 12 percent (Mackey, 2000).
➤ Adequate maternal iodine can halve infant mortality rates and improve infant health.	<ul style="list-style-type: none"> • After a major water supply in China was iodized, a 50 percent reduction in neonatal mortality was documented (DeLong et al., 1997 cited in Black, 1999). • A review of trials involving 1,551 women with iodine supplementation found a statistically significant reduction in infant deaths and during early childhood (Mohamed and Gülmezoglu, 2000). • A study in Tanzania found that distribution of oral iodized capsules is an important intervention in areas with iodine deficiency disorders and low coverage of iodized salt. The mean-reported coverage of 57 distribution campaigns of oral iodized oil capsules (IOCs) from 1986–1994 for people ages 1–45 in 27 districts of Tanzania was 64 percent. Correction of iodine deficiency may halve the infant mortality rate (DeLong et al., 1997, cited in Peterson et al., 1999). • In areas with severe endemic iodine deficiency, iodine treatment before the end of the second trimester protects the fetal brain from the effects of iodine deficiency. Treatment of women later in pregnancy or of children after birth may partially improve brain growth and development achievement, but does not improve neurological status (Mackey, 2000).
➤ A 7,000 ug retinol equivalent of weekly supplement of vitamin A prior to conception, through pregnancy and lactation, can reduce maternal mortality and morbidity.	<ul style="list-style-type: none"> • A trial conducted in Nepal that reviewed more than 20,000 pregnancy outcomes indicated a 44% reduction in maternal mortality in groups receiving 7,000 ug retinol equivalents of weekly supplement of vitamin A (either B-carotene or retinyl palmitate) through pregnancy and lactation compared with women who received a placebo. Among 265 women receiving a placebo, 19 percent had under 0.70 umol of retinol, and of 261 women receiving the placebo, 43 percent had under 0.09 umol of beta-carotene (West et al., 1999).

III.D. Care During Pregnancy: **Nutrition to Support Safe Motherhood**

Intervention	Supporting research
➤ A 7,000 ug retinol equivalent of weekly supplement of vitamin A prior to conception, through pregnancy and lactation, can reduce maternal mortality and morbidity, <i>continued</i>.	<ul style="list-style-type: none"> Night blindness during pregnancy is a risk factor of both short- and long-term morbidity among women. In a continuation of the study described by West et al. (1999) in Nepal, vitamin A/b-carotene supplementation ameliorates this risk to a large degree. Subjects included 877 women with night blindness and 9,545 women without blindness during pregnancy. Mortality of night-blind women in the placebo group was 3.061 per 1,000 pregnancies. In comparison, the relative risk of dying among nonnight-blind women in the placebo group was 0.26 (95% confidence interval (CI): 0.13, 0.55), and the relative risk among women with or without night blindness in the vitamin A/b-carotene group was 0.32 (95% CI 0.10, 0.91) and 0.18 (95% CI 0.09, 0.36), prospectively. Night-blind women were five times more likely to die from infections than were women who were not night blind (Christian et al., 2000).
➤ Daily low dose vitamin A given during the second and third trimesters of pregnancy substantially reduces the risk of maternal postpartum infections in women who are deficient in vitamin A.	<ul style="list-style-type: none"> A study in rural Indonesia used a factorial design with four daily supplementation treatment groups: (1) vitamin A; (2) zinc; (3) both zinc and vitamin A; and (4) a placebo with no vitamin A or zinc. Maternal postpartum infection was ascertained from the first 627 women enrolled in the trial who delivered. The proportion of women reporting at least two days of feverishness during postpartum was 12 percent in the placebo group. Only 5.2 percent of women receiving vitamin A supplementation reported at least two days of feverishness. Fever was reported in two or more days in 6.7 percent of the non-vitamin A-treated women; however, this fell to 2.8 percent in the vitamin A-treated women. Puerperal sepsis, with body temperature above 38°C on at least one day in the postpartum period, was observed in 11.3 percent of the women in the placebo group. The proportion of women with puerperal sepsis was 2.58 percent in the vitamin A-treated groups (Hakimi et al., 2000).
➤ Increasing women's access to microcredit, nutritional information, and technical assistance, may improve the effectiveness of micronutrient interventions.	<ul style="list-style-type: none"> In a study in Peru, where women who organized communal eating (community kitchens) were given health and nutrition education, skill training, and seed grants to upgrade equipment and infrastructure, there was a 35 percent increase in iron content of the meals. Bioavailability of iron increased from 3.7 to 4.2 percent. There was a decrease in anemia from 49 to 41 percent (Johnson-Welch, 1999). In a study in Thailand in which women leaders were encouraged to produce and consume vitamin A rich foods and fat (to enhance vitamin A absorption), vitamin A intake increased significantly among pregnant and lactating women (Johnson-Welch, 1999).

IV. Pre-pregnancy Care

IV. Pre-pregnancy Care

A number of multisectoral and health-specific interventions can be carried out during a woman's pre-adolescent and adolescent years that will have positive effects on her health during pregnancy, birth, and the postpartum period. Education, particularly for girls, is associated with a number of healthy outcomes, including reduced unwanted fertility (and thus reduced maternal mortality) and better care for children. Smoking cessation programs starting in adolescence can reduce smoking among women once they reach reproductive age, thus improving some birth outcomes. These early inputs to a woman's life can have positive health effects on the rest of her life and on future generations of children. Reducing or eliminating female genital cutting (FGC) can reduce maternal morbidity and mortality.

Access to affordable, high-quality family planning services is one of the most important

interventions to reduce maternal mortality. In the six years following the 1994 ICPD (1995–2000), the world's 1.3 billion women of childbearing age experienced a total of more than 1.2 billion pregnancies. Of these, more than 300 million pregnancies, or more than one-quarter, were unintended. During this six-year time period, nearly 700,000 women lost their lives as a result of these unintended and unwanted pregnancies. More than one-third died from the problems “associated with pregnancy, labor and delivery. The majority (more than 400,000) died as a result of complications resulting from abortions carried out in unsafe, unsanitary and often illegal conditions” (Daulaire et al., 2002: 8). *(Please refer to the forthcoming modules on Reducing Unintended Pregnancy and Postabortion Care).* Reducing unwanted pregnancies and unsafe abortions can have major impacts on reducing maternal mortality.

IV.A. Pre-pregnancy Care: Education for Girls

Intervention	Supporting research
➤ Higher levels of schooling for girls and women are correlated with increased obstetric survival.	<ul style="list-style-type: none">• A study in Mexico compared women who died in the hospital and those who survived similar obstetric problems. The study yielded only one socioeconomic variable that was statistically significant: the number of years of schooling for the woman and her partner. A higher level of schooling may help women to decide to go to another health center or encourage a different attitude among health providers, who often refer women with more education to facilities where they receive the care they need (Langer, 1999, cited in Koblinsky, et al., 2000).• A study using maternal mortality estimates from the Reproductive Age Mortality Survey, from the Demographic and Health Surveys (DHS), and from the vital registration systems of developed countries found that there is a strong negative correlation between maternal mortality and female gross secondary-school enrollment rate (Shiffman, 2000).

IV.B. Pre-pregnancy Care: Reducing Prevalence of FGC

Intervention	Supporting research
<p>➤ Conducting community wide education and creating alternative rituals for FGC can reduce the risks of maternal morbidity and stillbirths.</p>	<ul style="list-style-type: none"> • A study of 1,851 Nigerian women seeking family planning or ANC found that those who had undergone FGC had significantly higher risks of tearing and stillbirths even after controlling for other variables, such as place of delivery, assistance at delivery, age, and marital status. Circumcised women reported 1.8 percent rates of tearing for those with Type 1 FGC and 3.5 percent of tearing with Type 2, compared with 1.6 percent of uncircumcised women. Deliveries resulting in a stillbirth included 6.3 percent of first pregnancies and 3.8 percent of all pregnancies for uncircumcised women, and 9.2 percent and 4.7 percent for women with Type 1 FGC (Larsen and Okonofua, 2002). • A study of population-based surveys from Kenya and other parts of Africa by type of female circumcision (see Glossary of Terms and Definitions) found that 39.9 percent of women with Type 2 FGC experienced a difficult childbirth (Shell-Duncan, 2001, cited in Larsen and Okonofua, 2002). • A clinic-based study of health complications and female circumcision in 1998 in Burkina Faso and Mali found that circumcised women experienced significantly more obstetric complications, such as episiotomy, perineal tear, hemorrhage, obstructed labor, and cesarean section, than uncircumcised women. Between 5 and 14 percent of women who had been cut also had an observable complication that could be associated directly or indirectly with FGM. Five percent of women without cutting experienced difficulty during delivery compared with 18 percent of women with Type 1 FGC, 30 percent of women with Type 2, and 36 percent of women with Type 3. Conducted in 1998, this study interviewed 5,337 women (Jones et al., 1999). • A study of 1,157 women in rural Gambia found that the prevalence for stillbirths was 15 percent for circumcised women and 11 percent of uncircumcised women (Morison et al., 2001, cited in Larsen and Okonofua, 2002). • A project in Senegal designed and conducted education classes for 900 women in 30 villages concerning the health effects of FGC. By teaching women problem-solving skills, self-awareness, and assertiveness, the project ultimately led to public denunciation of FGC in over 105 villages (Population Council, 1999, cited in Boender et al., 2003). • An intervention in Kenya that involved training for the entire community concerning the health effects of FGC and addressing fundamental beliefs about female sexuality, along with alternative rites of passage for girls, resulted in a significant decline in the overall prevalence of FGC, from 90 percent of women and girls age 14 to 60 at baseline to 82 percent in 1999. Among girls ages 14–19, prevalence declined from 78 percent in 1992–1993 to 56 percent in 1999. The percentage of women favoring discontinuation of female genital cutting rose from 37 to 53 percent. Mothers' intentions to circumcise their daughters fell from 67 to 29 percent. Following the intervention, community members were more knowledgeable about the effect of FGC on health and sexuality than prior to the intervention. Of 430 unmarried male adolescents, 55 percent favored marrying uncircumcised females. Interventions also included graduates of the program testifying about what they had learned, and parents and circumcised girls witnessing alternative seclusion. (Mohamud et al., 2002).

IV.C. Pre-pregnancy Care: **Deliver Micronutrient Supplementation Through Schools**

Intervention	Supporting research
➤ Iron supplementation delivered through the school and targeted to at-risk adolescents is an effective way to prevent anemia and iron deficiency.	<ul style="list-style-type: none">• A double-blind, placebo-controlled study of 381 girls in Lima, Peru, found that 10 percent of the girls were anemic. Serum ferritin tests found 25 percent of the girls to be iron deficient. Three hundred twelve girls, ages 12–18, were randomly assigned to one of three groups: (1) iron sulfate, 60 mg elemental iron daily, Monday–Friday; (2) iron sulfate, 60mg elemental iron, two days a week; or (3) a daily placebo. Of the 296 girls who completed the study, those who received supplements had significantly higher hemoglobin levels than those in the placebo group. Girls who had taken a daily iron supplement had significantly higher hemoglobin levels than those in the intermittent group. At the beginning of the study, the proportion of anemic subjects was similar in the three groups. After 17 weeks, the proportion of anemia in the daily group (10.9%) was lower than the placebo (22.7%) and intermittent group (17.3%) (Pimental Zalaveta et al., 2000)

IV.D. Pre-pregnancy Care: Providing Multivitamins Prior to Conception Can Improve Maternal Health

Intervention	Supporting research
➤ Combined supplements prior to conception are more effective than single supplements.	<ul style="list-style-type: none">• Providing multivitamins of iron, vitamin A, riboflavin, zinc, magnesium, calcium, and iodine prior to conception prevents cleft palate and other birth defects and improves maternal health. Women are usually deficient in more than one micronutrient (Mackey, 2000).

IV.E. Pre-pregnancy Care: Start Smoking Cessation Programs in Adolescence

Intervention	Supporting research
<p>➤ Smoking cessation education programs for adolescents can be effective in preventing tobacco use.</p>	<ul style="list-style-type: none">• The British Cancer Research Campaign developed programs that have been successful in preventing young people from smoking (Chollat-Traquet, 1992).• In the United States, because 82 percent of daily smokers begin smoking before the age of 18, school programs designed to prevent tobacco use have been identified as some of the most effective strategies available. Studies have shown that selected school-based, tobacco-use prevention programs have resulted in behavior change. A 10-lesson curriculum designed to counteract social influences and misconceptions that lead to tobacco use was presented by trained health educators to a cohort of 1,234 seventh-grade students in eight junior high schools. A two-lesson booster session was presented to eighth-grade students. The program teaches refusal skills, awareness of social misperceptions about tobacco use, and misconceptions about physical consequences. The efficacy evaluation was based on 770 ninth-grade students who participated in grades seven and eight, and in both the baseline and the two-year follow-up. The Centers for Disease Control (CDC) found that this program is effective (Wang et al., 2001).

IV.F. Pre-pregnancy Care: Provide Family Planning

Intervention	Supporting research
<p>➤ Access to a choice of safe, affordable and appropriate family planning knowledge and methods, including for adolescents, is essential to ensuring safe motherhood by reducing unwanted pregnancies.</p> <p><i>Also refer to the forthcoming module on Reducing Unintended Pregnancy</i></p>	<ul style="list-style-type: none"> • Maternal mortality is highest in countries where women are least likely to have access to modern contraceptive methods. In Burkina Faso, for example, where only 4 percent of married women (including consensual unions) use modern family planning methods, one woman in 14 die of maternal causes during her lifetime; in Brazil, where nearly 75 percent of the female population regularly uses family planning services, their lifetime risk of maternal mortality is one in 130 (Daulaire et al., 2002). • A study of Bolivia, Egypt, and Thailand found that women who had previously used modern contraception were more likely to use ANC and modern contraceptives after the index birth than those who had not (Zerai and Tsia, 2001). • A study of ANC patients in Kenya found that pregnancies that are mistimed or not wanted are associated with irregular and later ANC visits than pregnancies that are wanted (Magadi et al., 2000). • With an unwanted pregnancy in the United States, “the mother is more likely to seek prenatal care after the first trimester or not to obtain care. The child of an unwanted conception is at greater risk of low birth weight, dying in its first year of life, of being abused, and of not receiving sufficient resources for healthy development” (IOM, 1988). • Numerous studies have shown that adolescent girls under age 20 had higher maternal mortality rates than adult women ages 20–34 (Bhatia, 1993; Faveau et al., 1988; and Fortney et al., 1988 cited in Kurz, 1997). • Studies undertaken in Jamaica and Nigeria found that girls younger than age 15 are four to eight times more likely to die during pregnancy or delivery than women ages 15–19 (AGI, 1998, cited in Daularie et al., 2002). • “...Rural Indigenous women often refuse to be taken to government hospitals in the event of obstetric complications for fear of being sterilized postpartum without consent—a problem that has been documented in various parts of Mexico” (Yamin and Maine, 1999: 599). • A study of maternal mortality in Egypt in 2000 found that among women who died, 22 percent of pregnancies were unwanted compared with 13 percent in the general population. The study was based on information collected from 149 health bureaus in all 27 governorates in Egypt, identifying all deaths in women of reproductive age and those considered to be maternal deaths. All maternal deaths were investigated by interviewing the families of the deceased women and any health provider involved in their care. In each governorate, a local advisory group comprising the Undersecretary of Health, Director of MCH, an obstetrician, and a pediatrician reviewed the cases of all women who had died and assigned medical causes and avoidable factors for all maternal deaths (Ministry of Health and Population, Egypt, 2001).

V. Policy and Program Issues in Safe Motherhood

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Political will is crucial to reduce high levels of maternal mortality. Policies that target maternal mortality make a difference. Addressing access, financial barriers, and quality of care can reduce levels of maternal mortality, even in low resource settings. “It is illogical (even unethical) to encourage people to seek treatment for problems related to pregnancy until you have made sure that the obstetric services exist and are functioning properly” (Maine, 1997). In addition, involving women and community stakeholders in designing programs to reduce maternal mortality is also crucial for the success of programs.

Successful interventions that have improved access and reduced financial barriers have included increasing the number of trained midwives in communities and establishing loan programs, emergency funds, community funds, and insurance schemes to provide money for seeking EmOC. In addition, transportation systems have been set up to ensure that women who need transport are able to reach EmOC facilities.

Establishing fully supplied and technically competent obstetric services is only the first necessary step for women giving birth in these facilities. The quality of care at EOCs is also critical. A study in Yemen consisting of random selection of households that interviewed 250 women with childbirth experiences found that the majority chose to deliver at home, despite acknowledging the importance of their medical needs, because of fear of bad experiences or prior bad experiences with institutional deliveries. The study authors noted that “a physical expansion of (MCH) services is a necessary

but apparently not a sufficient strategy for a change of the health care-seeking behavior

towards safer delivery practices...” (Kempe et al., 1994).

A more recent, unpublished study presented at the “International Conference on Safe Motherhood Best Practices” in India in 2002 found that of 650 women from an urban slum who gave birth in an institution, 59 percent got an enema; 57 percent were shaved, and 98 percent were forced to deliver lying on their backs. All of these practices are unnecessary and even harmful. However, only 22 percent of these women were given an abdominal exam, which is medically necessary. In addition, their birthing experiences were abusive, with 26 percent reporting that they were shouted at or slapped and that they were left alone when they were worried to be alone (Hulton, 2002). Because India’s national population policy stipulates that 80 percent of deliveries should take place in institutions by 2010, mistreatment of women in institutions is of grave concern.

Evidence from around the world confirms that a major impediment to accessing EmOC where it is available is fear of the poor quality of care at medical facilities. Women (and their families) are more likely to avail of EmOC facilities if they are assured of adequate quality care. Women who are included in decision making about their care in medical facilities are more likely than those who are not to be satisfied with their care during labor and delivery.

A recent definition for quality in maternity care is as follows: “High quality of care in maternity services involves providing a

minimum level of care to all pregnant women and their newborn babies and a higher level of care to those who need it. This should be done while obtaining the best possible medical outcome and while providing care that satisfies women and their families and their care providers. Such care should maintain sound managerial and financial performance and develop existing services in order to raise the standards of care provided to all women...care should be evidence based (the potential for harm must be known and it must be low) and cost effective (greatest benefit for effectiveness for least cost)...Higher-level care is care that achieves

the best outcomes when provided to some, but not all women. For example, blood transfusions can save some women's lives but increase the risk of infectious diseases (e.g., HIV) to women who do not need blood. Similarly delivering a woman with severe pre-eclampsia at 38 weeks is beneficial but routinely inducing labor at 38 weeks gestation for all women is not...Providing higher-level care for some should generally not interfere with providing minimum care to the entire population" (Pittrof et al., 2002: 278–279).

V.A. Policy and Program Issues in Safe Motherhood: Increasing Access to Care

Intervention	Supporting research
<p>➤ Policies explicitly targeting maternal mortality reduction can be successful.</p>	<ul style="list-style-type: none"> • Egypt reduced its maternal mortality by more than 50 percent from 174 in 1992 to 84 per 100,000 live births in 2000. In 1994, “as host nation of the International Conference on Population and Development, the Government of Egypt endorsed a comprehensive approach to women’s health, with a focus on reducing maternal mortality. Reducing maternal mortality was also a key goal of the National five Year Plan (1998–2002) of the Ministry of Health and Population” (Ministry of Health and Population, Egypt, 2001: 14). • Honduras targeted maternal mortality as an explicit goal after a surveillance study showed a higher than desired maternal mortality rate (MMR) in 1990. Results in rural areas showed a 33 percent increase in the use of a skilled birth attendant between 1990 and 1996. Access to EmOC also increased (<i>see above</i>). “Other important changes in national policy that had an impact on health policy included the end of the ‘cold war’ in the late 1980s which permitted the diversion of some of the money that had been spent on the armed forces towards social programs including health....Honduras spends a greater percentage of its GDP (approximately 7.2%) on health and social services than most other countries in Latin America” (Danel, 1998: 5; Ministry of Health, 1991, and Ministry of Health, 1996, cited in Koblinsky et al., 2000). • A study using maternal mortality estimates from the Reproductive Age Mortality Survey, from the DHS and the vital registration systems of developed countries, indicates that public health and social interventions have an association with lower rates of maternal mortality even in countries with low per capita income. A number of countries have experienced sharp maternal mortality declines that have proceeded much more rapidly than general socioeconomic development. The starkest example is Sri Lanka, a country with a gross national product income per capital of \$600 per year in 1993. In 1950, Sri Lanka’s maternal mortality ration was 550, but only 80 by 1980. Some low-income countries have reached moderately low maternal mortality levels, suggesting that high levels of national wealth are not a necessary condition for maternal mortality transition. Female education and trained delivery assistance indicators are strong predictors of national maternal mortality levels even when controlling for income per capita. “...High standards of living are not a necessary condition for lowering maternal mortality levels. The interventions that appear to be most critical are educating women, devoting priority to health care, and ensuring that pregnant women have access to appropriate medical services, all measures that may be within the reach of even the poorest developing countries” (Shiffman, 2000).

V.A. Policy and Program Issues in Safe Motherhood: Increasing Access to Care

Intervention	Supporting research
<p>➤ Projects that reduce financial barriers and loan funds can reduce maternal mortality and increase access for needed maternal health services.</p>	<ul style="list-style-type: none"> • Emergency loan funds were established in two of six chiefdoms in Bo, Sierra Leone. Use of the district hospital by women with obstetric combinations increased in these two chiefdoms, but not the other four (Maine, 1997). • A study in Bangladesh of 542 women found that “economic status has a serious influence on people’s decision to go to emergency obstetric care facilities.” Those women whose families owned more than 250 decimals of land were significantly more likely to use EmOC facilities than women whose families owned less than 250 decimals of land or whose families were landless (Barkat et al., 1997). • A study in Zimbabwe, in which 200 pregnant women were interviewed, found that the major problem limiting access to ANC was lack of money to pay for booking fees (Murira et al., 1997). • Having health insurance coverage in Turkey was found to have a positive and significant impact on ANC and delivering in a facility compared to home delivery. In addition, household wealth was also found to be associated with ANC use and delivery in a facility compared to home delivery (Celik and Hotchkiss, 2000). • The majority of women interviewed for a study in 1996 and 1997 in Peru stated that they felt compelled to give birth at home because they could not afford hospital fees (CLADEM and CRLP, 1999). • A survey of 450 pregnant patients at the University of Benin teaching hospital, where attendance by patients at the antenatal clinic declined from 3,000 to 600 per year with a corresponding rise in maternal mortality rate from 563 to 827 per 100,000 births, found that 70 percent of the nulliparous women thought the cost of ANC was exorbitant (Gharoro and Okonkwo, 1999). • In Benin, 12 of 13 clans gave loan funds to 380 families for obstetric emergencies, 93 percent of which were repaid in full (Maine, 1997). • In Tanzania and Kenya, deliveries in health facilities dropped by at least 12 percent after cost-sharing measures were implemented (Mbugua et al., 1995, cited in Ferrinho et al., 2001).

V.A. Policy and Program Issues in Safe Motherhood: Increasing Access to Care

Intervention	Supporting research
➤ Increasing the numbers of midwives and deploying a midwife for each village has increased skilled attendance at birth.	<ul style="list-style-type: none"> In Indonesia, the government's strategy of placing a midwife in every village increased skilled attendance at delivery from 37 to 59 percent, with the strongest increase in home deliveries with a village midwife present (MotherCare, 2000b, cited in Ronsmans, 2001).
➤ Maternity care provided at no cost has considerable hidden costs for users and their families and may be a major contributor to low use of maternity services.	<ul style="list-style-type: none"> Questionnaires were administered and in-depth interviews conducted with 220 postpartum mothers and their husbands at four government maternity facilities in Bangladesh. Mothers with serious complications were excluded. Information was collected on the costs of maternity care, household income, sources of finance used to cover the costs, and the family's willingness to pay for maternity services. The mean cost for normal delivery was \$31.90, and for cesarean section, \$117.50. Although average monthly income was \$123, 21 percent of families were spending 51 to 100 percent of their monthly income on maternity care, and 27 percent of families were spending two to eight times their monthly income for maternity care. Overall, 51 percent of families and 74 percent of those having a cesarean section, did not have enough money to pay; of these, 79 percent had to borrow from a moneylender or relative. Costs were incurred for medicine, blood, travel, food, hospital fees, and tips (Nahar and Costello, 1998).

V.A. Policy and Program Issues in Safe Motherhood: Increasing Access to Care

Intervention	Supporting research
<p>➤ Providing refugee assistance by subsidizing host-country health systems can improve the rates of major obstetric interventions for the host population, as well as improving host-country health and transportation systems.</p>	<ul style="list-style-type: none"> • Since 1990, 500,000 people have fled Liberia and Sierra Leone to Guinea, West Africa, where the government allowed refugees to settle wherever they thought they had the best chance of survival. The UN High Commission on Refugees (UNHCR) covered the cost of refugees' health care on a fee-for-service basis. Refugees had access to the Guinean health services at no cost to the refugees. Fees from UNHCR were used to improve the Guinean health services. After the refugees arrived, the rates of major obstetric interventions rose from 0.03 to 1.06 percent in the area with high numbers of refugees; from 0.34 to 0.92 percent in the area with medium numbers of refugees; and from 0.07 to 0.27 percent in the area with low numbers of refugees. Transport infrastructure was improved to allow food aid to be transported to the refugee settlement. The ambulance, free-of-charge for all, permanently stationed at the rural hospital in the area with many refugees facilitated referral to the district hospital. In addition, "there was probably a 'refugee-induced demand for health care. Before the war, health services in Liberia and Sierra Leone were better and more advanced than in Guinea, and the population used them more often. <p>"When confronted with a serious disorder, therefore, refugees living in close contract with the Guineans may have encouraged them to use the health services" (Van Damme et al., 1998: 1,612). "The refugee policy in Guinea has been in sharp contrast to the more common refugee camps with parallel refugee health services" (Van Damme, 1995, cited in Van Damme et al., 1998: 1,609). Data were collected retrospectively on all women who had a major obstetric intervention between 1988 and 1996, during which 981 major obstetric interventions were performed in the hospital. An analysis of the 249 major obstetric interventions carried on host-country Guinean women found that from 1998–1999, before the arrival of the refugees, intervention rates were very low in rural areas. The only obvious difference between the areas with high and low numbers of refugees was the impact of the refugees and the refugee assistance program (Van Damme et al., 1998).</p>

V.B. Policy and Program Issues in Safe Motherhood: Provider Training

Intervention	Supporting research
<p>➤ Increasing stakeholder participation resulted in increased levels of use of EmOC and immunizations.</p>	<ul style="list-style-type: none"> • A project carried out by CARE in Bangladesh tested several interventions. In the intervention area, EmOC was upgraded, mobilizing the community, creating community support and a stakeholder committee, and enhancing the quality of EmOC. In the comparison area, EmOC was upgraded. In the control area, EmOC was not upgraded and no other community mobilization occurred. Forty-four percent in the intervention area knew three or more of the five danger signs, compared with only 4 percent of the women in the comparison area and 6 percent in the control area. There was a significant increase in institutional deliveries in the intervention area from 2 to 10percent, whereas in the control area the percentage of total births taking place in a facility increased from 4.5 to 5percent (Hossain, 2002). • In 10-pilot communities in Peru and Bolivia, a total of 2,334 people participated in regular monthly meetings to analyze their health data and plan solutions with service providers. The community health system provides data for community members and providers to jointly make decisions, set priorities, plan activities, and monitor progress. Children in communities participating in regular joint planning with health providers were three times more likely than children in comparable communities to be completely immunized by age five (Howard-Grabman, 2000). • A simple model of community-level problem solving used in Bolivia, called Warmi, which consisted of identifying and prioritizing problems and developing strategies and action plans by community and women's groups to solve their own problems and implementation of group plans, led to a reduction of perinatal deaths from 75 to 31 in two years. Activities included educating women and men on hemorrhage, providing family planning, providing radio programs and emphasizing the need for referral (Howard-Grabman, 1993, cited in Ross, 1998).
<p><i>V.B.1. Provider Training to Support EOC</i></p> <p>➤ In-service training for health providers can improve providers' skills.</p>	<ul style="list-style-type: none"> • In Indonesia, the training of 128 midwives in a series of two-week courses in life saving skills curriculum significantly increased their knowledge (63% compared with 48% for untrained midwives) and ability to perform the key skills of manual removal of the placenta, neonatal resuscitation, bimanual compression, and use of the partograph. Trained midwives were more confident in their skills (59% compared with 47% for untrained midwives). Trained midwives scored an average of 67 percent compared with untrained midwives who scored 40 percent in infection prevention, neonatal resuscitation, and manual removal of the placenta. Of trained midwives, 46 percent scored more than 70 percent on the knowledge test for five major skills; untrained midwives scored 0. Trained midwives consistently reported that training had improved their knowledge, skills, and confidence (McDermott et al., 1999).

V.B. Policy and Program Issues in Safe Motherhood: Provider Training

V.B.1. Provider Training to Support EOC, continued

➤ **In-service training for health providers can improve health services for mothers and newborns.**

- In Bolivia, the knowledge skills and attitudes of doctors, nurses, and auxiliaries were compared between an area that received MotherCare's four-week in-service training program (17) and providers who had not received the in-service training (11), selected from 291 participants who had 12 courses of in-service training during 1997 and 1998. Providers who received in-service training reported more confidence. Trained providers scored better in skills competency for ANC, care in labor and delivery, immediate newborn care, and management of postpartum hemorrhage. Interpersonal communications and counseling skills related to the prevention and control of anemia improved after in-service training. However, in-service training cannot compensate for inadequate preservice training or for high turnover rates of staff. Supervision and continuing education is necessary to maintain skills (Ugalde et al., 1999).
- In-service training in Guatemala increased the confidence and ability of providers to use skills that are crucial to maternal and neonatal survival. Trained providers reported feeling more confident than providers who had not received training in obtaining history, in identifying women with severe pre-eclampsia, in identifying women with abnormal labor, and in identifying newborns with sepsis. Trained providers used the partograph better. Skill levels among trained providers in providing care for emergency breech delivery, confirming full cervix dilation, maintaining flexion of the head, and preparing for resuscitation were higher than at baseline (Ruano et al., 1999).

➤ **Trained medical assistants can also administer EmOC.**

- In Mozambique, follow-up was conducted with 14 medical assistants who had three or more years of experience in rural areas and were trained for three years, with the third year as an internship in a provincial hospital under the direct supervision of a surgeon. Fourteen assistant medical officers performed 10,258 surgical procedures. Complication rates were low: for 377 cases, postoperative mortality was approximately 0.4 percent for emergencies and 0.1 percent for elective procedures. A comparison of 1,000 cesarean sections conducted by Ob-Gyns and those by medical assistants indicated that the only significant differences in outcomes concerned more frequent superficial wound separation due to haematoma among the medical assistant group (Vaz et al., 1999).

V.B. Policy and Program Issues in Safe Motherhood: Provider Training

V.B.1. Provider Training to Support EOC, continued

- **Training clinic staff and creating adolescent-friendly sexual and reproductive health services can increase the numbers of adolescents who receive ANC.**

- A project in Lusaka established a network of 125 adolescents ages 14–18, both school going and out of school, to serve as volunteer community counselors. Clinic staff was trained to be nonjudgmental. Female adolescent attendance at antenatal clinics increased by 93 percent to 2,628 visits, and female adolescent attendance at antenatal clinics within the first trimester increased by 87 percent to 572 visits (Zambezi et al., 2000).
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V.B.2. Traditional Birth Attendant (TBA) Training

With the focus on skilled attendance at birth under the Safe Motherhood Initiative, there is a controversy over the cost-effectiveness of TBA training (Bergstrom and Goodman, 2001; Starrs, 1998, cited in Sibley et al., 2002). “On the one hand, TBAs attend a significant proportion of births, and from a public health perspective they should not be ignored. On the other hand, it is claimed that TBAs cannot prevent or treat most maternal life-threatening complications; thus, it is a waste of resources to train them” (Fortney and Smith, 1997, cited in Sibley et al., 2002). Some experts argue that further investment in training of TBAs will only prolong the time that women in developing countries have access only to inferior care “and delays the time when countries need to address the need to deliver first class care to pregnant women” (Sibley et al., 2002). Evidence suggests that the impact of training TBAs on maternal mortality is low. “An emphasis on large scale TBA training efforts could also be counterproductive, by holding back the training of the necessary numbers of...midwives” (Bergstrom and Goodburn, 2001). Smith et al. (2000) also argue that TBA training is “not cost-effective, because most TBAs have a low case load.”

An analysis of data from the 1995–1999 DHSs on percentage distribution of live births by type of assistance during delivery, with data from 46 developing countries representing five regions of the world, found that TBAs assisted 24 percent of the total sample of 213,466 live births. Reporting on “attendance at birth” does not clearly distinguish between a TBA, a family TBA or a relative who occasionally attends birth. If these categories of assistance are combined, TBAs, relatives, and others—unskilled attendants—assisted at 43 percent of live births (Sibley et al., 2002). A recent meta-analysis of TBA training (*see below*) confirms that TBA training has not been found to decrease maternal mortality, but can increase referrals to EmOC (Sibley et al., 2002).

V.B. Policy and Program Issues in Safe Motherhood: Provider Training

Intervention	Supporting research
<p><i>V.B.2. TBA Training, continued</i></p> <p>➤ Where TBAs deliver more than one-half of all births and receive training to conduct case management of complications backed by transport and EmOC, and where hospital staff are trained to accept TBAs, the training of TBAs may lead to increased referrals for EOC, reduced neonatal mortality, and improved maternal knowledge and behavior. <i>However, TBA training has not been found to decrease maternal mortality (see section VI).</i></p>	<ul style="list-style-type: none"> • A recent meta-analysis of TBA-training effectiveness indicated that, while TBAs have been found to reduce neonatal mortality, no clear evidence exists that shows that TBA training reduces maternal mortality. The meta-analysis reviewed citations for 1,200 documents, which were screened for TBA training. Treatment group data were derived from trained TBAs and/or women and neonates whose health care was provided by trained TBAs; comparison group data were derived from untrained TBAs or women and neonates whose health care was provided by untrained TBAs or other persons; dependent measures were related to knowledge, attitudes, behavior, or maternal and peri-neonatal health outcomes; and documents were in English and completed or published between January 1970 and June 1999. Research designs were either experimental or quasi-experimental, and the data were sufficient to calculate an effect size. Sixty-three ($n = 63$) studies met the inclusion criteria, of which 64 percent were published documents. The meta-analysis reviewed 126 datasets and 1,695 outcomes from these 63 studies. Results found a 38 percent improvement in women's knowledge and a 74 percent improvement in women's behavior for those women cared for by a trained TBA compared with an untrained TBA, such as knowledge of referral needed for EmOC or the need to breastfeed. The authors of the study concluded that in order for TBA training to be effective, TBAs must be able to recognize and refer women with obstetric complications to EmOC (Sibley and Sipe, 2002). <p>There is a small and statistically significant decrease in neonatal complications (15%) associated with trained TBAs, as well as a small and significant decrease in peri-neonatal mortality associated with trained TBAs (4% fewer deaths overall, or 8% fewer deaths when one extremely large outlying study is excluded from the analysis). A decrease in neonatal deaths due to specific causes (i.e., birth asphyxia (11%) and tetanus (2%)) is also significant. However, this meta-analysis cannot establish a causal link between TBA training and observed outcomes, only an association. The data were primarily collected through interviews with TBAs and women cared for or living in areas served by TBAs or health and vital-record review. Data obtained through TBAs may overestimate the extent of desired behavior because trained TBAs know what is expected, whereas data from women may underestimate the extent of desired behavior because women may not know or be able to provide detailed behavioral information (Fortney and Smith, 1997, cited in Sibley et al., 2002).</p>

V.B. Policy and Program Issues in Safe Motherhood: Provider Training

<p><i>V.B.2. TBA Training, continued</i></p> <p>➤ Where TBAs deliver more than one-half of all births and receive training to conduct case management of complications backed by transport and EmOC, and where hospital staff are trained to accept TBAs, the training of TBAs may lead to increased referrals for EOC, reduced neonatal mortality, and improved maternal knowledge and behavior. <i>However, TBA training has not been found to decrease maternal mortality (see section VI.), continued.</i></p>	<ul style="list-style-type: none"> • A study of maternal mortality in Egypt in 2000 found TBAs (<i>dayas</i>) contributed to 8 percent of all maternal deaths (i.e., to seven maternal deaths per 1000,000 live births). Since an estimated 36 percent of Egyptian women use TBAs, “this suggests that training programs conducted by the Ministry of Health and Population in collaboration with UNICEF and USAID have been relatively successful in encouraging dayas to refer promptly women with complications and to reduce the use of harmful practices.” Other improvements that reduced maternal mortality included “improving the quality of obstetric care, [increasing] access to family planning, and [educating] women and families about seeking prompt medical care for problems during pregnancy...” (Ministry of Health and Population, Egypt, 2001:4). The study was based on information collected from 149 health bureaus in all 27 governorates in Egypt, identifying all deaths in women of reproductive age and those considered to be maternal deaths. All maternal deaths were investigated by interviewing the families of the deceased women and any health provider involved in their care. In each governorate, a local advisory group comprising the Undersecretary of Health, Director of MCH, an obstetrician, and a pediatrician reviewed the cases of all women who had died and assigned medical causes and avoidable factors for all maternal deaths (Ministry of Health and Population, Egypt, 2001: 37). • In Fortaleza, Brazil, in 1984 the maternal mortality ratio was 120 per 100,000 live births. Fifty-five percent of women gave birth at home with the help of a TBA. One-third of women went to local hospitals where only EOC was available, and 4 percent went to hospitals with surgery and specialists. Most complicated deliveries were thus managed in local hospitals without surgical capability. Nearly one-half of women with complications who gave birth in hospitals had been referred by TBAs. In 52 percent of instances, these referrals were considered to have been linked to a complication as diagnosed by clinically trained staff; however, this was true of self-referrals in only 18 percent of cases. TBAs apparently did not try to manage complications they diagnosed, but preferred to make referrals. Fortaleza’s achievement took place over a decade. TBAs received short training sessions, together with practical training in a maternity unit. Thus, TBAs could provide ANC, identify problem pregnancies, and assist in normal deliveries and postpartum care. The work of the TBAs was supported by periodic supervision and instruction by teaching staff and local hospital personnel. TBAs were given uniforms, supplies, and reimbursement for travel to meetings, but no salaries. TBAs used phones to arrange transport, which was provided for referred patients and hospital services at no cost (Koblinsky et al., 1999). TBAs were more likely to refer women with strict medical pathologies, such as hemorrhage and hypertension (Janowitz et al., 1988).
<p>➤ Hospital staff training can increase referrals from TBAs.</p>	<ul style="list-style-type: none"> • A study in Guatemala helped in the training of hospital staff to be supportive and understanding of TBAs and of mothers referred by TBAs. TBAs were also trained. Referrals increased by more than 200% (O’Rourke, 1995, cited in Bergstrom and Goodburn., 2001).

V.C. Policy and Program Issues in Safe Motherhood: Providers for EOC

Intervention	Supporting research
<p>➤ Midwives can effectively provide care and can be less likely to overmedicalize normal births.</p>	<ul style="list-style-type: none"> • A study of maternal mortality in Egypt in 2000 found that midwives contributed to only 4 percent of maternal deaths, even though they provided delivery care to 7 percent of women. General practitioners contributed to 11 percent of maternal deaths even though only about 1 percent of women seek care from a general practitioner. The study was based on information collected from 149 health bureaus in all 27 governorates in Egypt, identifying all deaths in women of reproductive age and those considered to be maternal deaths. All maternal deaths were investigated by interviewing the families of the deceased women and any health provider involved in their care. In each governorate, a local advisory group comprising the Undersecretary of Health, Director of MCH, an obstetrician, and a pediatrician reviewed the cases of all women who had died and assigned medical causes and avoidable factors for all maternal deaths (Ministry of Health and Population, Egypt, 2001). • A cohort study in Quebec with matched controls compared indicators of process and outcome of midwifery services associated with standard hospital-based medical services. Women receiving each type of care (961 per group) were matched on the basis of socio-demographic characteristics and level of obstetrical risk. Midwifery care was associated with less obstetrical intervention and a reduction in selected indicators of maternal morbidity (cesarean section and severe perineal injury). The interval from admission in labor to delivery was shorter for midwifery clients. Women receiving midwifery care had a lower cesarean section rate than those in the medical group. Women receiving midwifery care were less likely to have deliveries by forceps or vacuum, to undergo episiotomies, or to experience a third or fourth degree perineal tear. Assisted ventilation was required twice as often in the midwifery care group as in the medical care group (14 vs. 7 newborns). Midwives and obstetricians need training to improve collaboration (Fraser, Hatem-Asmar, et al., 2000).

V.D. Policy and Program Issues in Safe Motherhood: Ensuring Quality Care

Intervention	Supporting research
<p>➤ Improving the quality of care can increase the likelihood that pregnant women will go to health facilities in case of obstetric emergencies and can avert maternal deaths.</p>	<ul style="list-style-type: none"> • A review of 12 maternal deaths in Haiti through interviews with families and friends suggested that a lack of confidence in available medical options were decisive factors in delaying or not seeking care (Barnes-Josiah et al., 1998). • A qualitative study interviewing members of 164 households where a maternal death occurred in Mexico found that perceived quality of care in health services was a significant factor in a woman in labor delaying seeking medical care. Relatives reported that the “decision to not seek medical care when danger signs appear is an outright negative opinion that the woman and her partner has of modern health services, which derives from previous interactions with health providers.” Another frequent problem at the health services “is a lack of medical supervision, which translates into inadequate follow-up of patients.” In addition, massive workloads and responsibilities are delegated to the residents, even when they lack the proper training to respond. “...The scarce supervision of students may be virtually catastrophic” (Castro et al., 2000). • A study in Tanzania found that 21 percent of the women in the study population delivered at home; even though they believed it was safer to deliver in a health facility, they believed the staff there were “unkind” (Starrs, 1998). • A qualitative research study in Bolivia found that women considered respectful treatment to be of paramount importance and that condescending provider attitudes were the greatest deterrent to the use of maternal health services (Seone et al., 1996, cited in Morrissey and Rionda, 1999). • A study in southern Tanzania, in which 60 pregnant women, 26 health workers, and six key informants were interviewed, found that rural women avoid the hospital because they fear discrimination (Kowalewski et al., 2000). • A study in Yemen that randomly selected households and interviewed 250 women with childbirth experiences found that key elements for both rural and urban Yemeni women were: “to be in a position to receive all the emotional and practical support they needed and asked for, to have all their questions answered and their requests met, to be able to freely choose delivery positions and be supported in the choice.” The majority chose to deliver at home despite acknowledging the importance of their medical needs because of fear of bad experiences or prior bad experiences of institutional deliveries, including being forced to deliver lying on their back, attitudes of superiority on the part of providers, lack of support from providers, lack of authority during the birth, inability to have their questions answered, lack of support during the postpartum period, and separation of baby and mother at the facility. As one woman put it: “Hospital delivery, I never go back there” (Kempe et al., 1994).

V.D. Policy and Program Issues in Safe Motherhood: Ensuring Quality Care

Intervention	Supporting research
<p>➤ Improving the quality of care can increase the likelihood that pregnant women will go to health facilities in case of obstetric emergencies and can avert maternal deaths, <i>continued</i>.</p>	<ul style="list-style-type: none"> • A survey was conducted of 19,545 pregnant women in West Africa who were followed through the second trimester and puerperium and the 66 resulting maternal deaths were analyzed. Twenty women died outside health facilities. The analysis confirmed that “most of the maternal deaths might have been avoided had access to quality care been available.” Lack of attention to women in labor at health care facilities was also responsible for maternal deaths (Bouvier-Colle et al., 2001). • A study that administered a questionnaire to 950 pregnant women at the University of Benin Teaching Hospital (UBTH), Benin City, Nigeria, found that only 31 percent of patients were satisfied with the services provided. Patients were prepared to accept less clinically effective services in the community in exchange for the freedom to have their baby in a unit other than UBTH because there is less obstetric intervention (Gharoro and Okonkwo, 1999). • A community-based investigation of maternal deaths, undertaken in both rural and urban areas of Zimbabwe to assess their preventability, identified the lack of appropriately trained personnel as contributing significantly to maternal deaths (Fawcus et al., 1996, cited in Hulton et al., 2000). Suboptimal clinic and hospital management was identified in 67 percent of rural and 70 percent of urban deaths (Fawcus et al., 1996). • A study in which pregnant women were interviewed in India found that respondents identified the poor quality of services offered at government institutions to be a motivating factor for delivering at home (Griffiths and Stephenson, 2001). • A study of open-ended ethnographic interviews with 38 nonindigenous, economically marginal women in Mexico found that they most often choose TBAs for normal births because they valued being able to choose birthing positions and having relatives present during the birth, which they had to give up for medically attended births (Hunt et al., 2002).

V.D. Policy and Program Issues in Safe Motherhood: Ensuring Quality Care

Intervention	Supporting research
➤ Birth centers in some developed countries are as safe as standard maternity care.	<ul style="list-style-type: none">• A study evaluating birth centers in Stockholm, Sweden, found that birth centers effectively identify maternal complications and are as safe for women as standard maternity care (Waldenstrom and Nilsson, 1997, cited in Campbell and Pittrof, 2000).
➤ Involving women in decision making concerning their pregnancy and birth increases women's satisfaction with childbirth.	<ul style="list-style-type: none">• Involving women in the decision-making processes concerning their pregnancy and delivery, and thus contributing to their sense of control over the whole process, is viewed as an important determinant for women's satisfaction with childbirth (Kabakian-Khasholian et al., 2000).

V.D. Policy and Program Issues in Safe Motherhood: Ensuring Quality Care

Intervention	Supporting research
<p>➤ Continuity of care during pregnancy, labor, and delivery leads to better health outcomes and increased satisfaction.</p>	<ul style="list-style-type: none"> • A study of 3, 061 Swedish women through questionnaires found that 97 percent viewed continuity of their midwife caregiver as important (Hildingsson et al., 2002). • Two studies involving 1,815 women in Canada found that women who had continuity of care from a team of midwives were less likely to be admitted to the hospital during ANC and more likely to attend antenatal education programs. They were also less likely to have drugs for pain relief during labor, and their newborns were less likely to require resuscitation. These women were more likely to be pleased with their antenatal, intrapartum, and postnatal care (Hodnett, 2000). • One-to-one midwifery care in England increased satisfaction with quality of care and the woman's preparedness for birth. Women's responses to one-to-one midwifery services in London were evaluated through questionnaires, interviews, and focus groups with 728 in the study group and 675 in the control group. Study group women showed greater preparedness for birth than the control group (18% vs. 12%) and for the time after the baby's birth (26% vs. 15%). Women were more satisfied with the one-to-one model of care (McCourt et al., 1998). • A study of low-income women in the United States compared 400 women who received a high degree of continuity in prenatal care (a mean of 87% of their obstetric visits was performed by their primary physician, who was also their delivering physician) with 454 who received little continuity of care (only 18% of obstetric visits performed by their primary physician). Continuity in the prenatal care group had better outcomes in neonatal morbidity, birthweight, maternal weight gain, and both Apgar scores (Boss et al., 2001).

V.D. Policy and Program Issues in Safe Motherhood: Ensuring Quality Care

Intervention	Supporting research
<p>➤ Continuity of care during pregnancy, labor and delivery leads to better health outcomes and increased satisfaction, <i>continued</i>.</p>	<ul style="list-style-type: none"> • A systematic review of randomized controlled trials with seven trials in Europe, Australia, and Canada with 9,148 women found that continuity of midwifery care were associated with less use of obstetric interventions during labor, such as induction, augmentation of labor, electronic fetal monitoring, obstetric analgesia, instrumental vaginal delivery, and episiotomy. Continuity of care was defined as provided by a midwife or a small group of midwives from early pregnancy to the postnatal period. More perineal tears occurred, but there were no maternal deaths and no major difference in maternal morbidity. Women were “more satisfied with care during all phases of pregnancy” when they had continuity of care. Women with continuity of care reported that their providers were more caring and skilled, they felt more involved in decision making and more in control, and they reported more information-giving and communication with caregivers (Waldenstrom and Turnbull, 1998).
<p>➤ Training providers can improve quality of care.</p>	<ul style="list-style-type: none"> • A program to train providers in Moldova resulted in four sites welcoming fathers or family members as support persons for women in labor; maternity hospitals allowing family visits postpartum; women reporting increase in ambulation in labor and a decline in invasive and ineffective practices, such as enemas and shaving; providers reporting increased use of the WHO partograph; and more parents attending new childbirth classes (Mercer, 2000). • In Indonesia, training for midwives in client–provider communication and counseling improved client–provider communication and counseling, with those having scores of 78 percent having received training as compared to 54 percent for those with no training as measured by an interpersonal communication training and evaluation observation and checklist (MotherCare, 2000a). • Training 24 trainers in the Ukraine led to significantly lower levels of perineal shaves, analgesia, and use of enemas compared with controls during one year. Induction of labor and cesarean sections were lower. Providers in focus groups voiced support for the changes; they felt that the women giving birth are happier. Women expressed satisfaction as active participants in the birthing process and appreciated minimal use of interventions (Glatleider et al., 2000). • Training providers in Russia resulted in increased rooming in. Seventeen master trainers trained 121 health care workers. Rooming in increased from 0.5 to 86 percent one year later (MotherCare/SEATS, 2000).

V.D. Policy and Program Issues in Safe Motherhood: Ensuring Quality Care

Intervention	Supporting research
<p>➤ Low maternal mortality ratios are not guaranteed merely by having all births attended by professionals in hospitals.</p>	<ul style="list-style-type: none"> • In Romania, the maternal mortality ratio reached nearly 180 per 100,000 in the 1980s. In Mexico City, where most women give birth in large public hospitals, the maternal mortality ratio in 1988 was 114 per 100,000. Eight hundred fifteen of these deaths during 1988–1989 occurred in four hospitals, and 85 percent of the deaths with clinical records were preventable. Quality of care in hospitals is essential (Koblinsky et al., 1999). • A study of maternal mortality in Egypt in 2000 found that substandard care by obstetricians contributed to 43 percent of maternal deaths. By 2000, even in rural areas, 99 percent of women lived within 30 kilometers of a hospital. The proportion of births attended by a doctor or nurse increased. Even among the 36 percent of women who had home deliveries with TBAs, 93 percent experiencing obstetric complications sought medical care. The study was based on information collected from 149 health bureaus in all 27 governorates in Egypt, identifying all deaths in women of reproductive age and those considered to be maternal deaths. All maternal deaths were investigated by interviewing the families of the deceased women and any health provider involved in their care. In each governorate, a local advisory group comprising the Undersecretary of Health, Director of MCH, an obstetrician, and a pediatrician reviewed the cases of all women who had died and assigned medical causes and avoidable factors for all maternal deaths (Ministry of Health and Population, Egypt, 2001: 36). • A study of the Dominican Republic has a high maternal mortality rate of 110 to 229 deaths per 100,000 births despite the fact that it has almost universal prenatal care attendance, a 97.7 percent institutional delivery rate and 95 percent of deliveries covered by health personnel. Overmedicalization, a 27.5 percent cesarean section rate, norms not followed, and poor quality of care contribute to high maternal mortality rates (Miller et al., 2002). • “After the obligatory introduction of antisepsis into Swedish lying-in hospitals in 1880, hospital maternal mortality ratios from sepsis declined from 2,701 per 100,000 live births in the proceeding 15 years to 96 per 100,000 births in the subsequent 15 years, a decline of 96%” (Hogberg et al., 1986 cited in Rush, 2000: 214S).

V.D. Policy and Program Issues in Safe Motherhood: Ensuring Quality Care

Intervention	Supporting research
<p>➤ Introducing confidential inquiries and the concept of avoidable maternal deaths can lower rates of maternal mortality and improve the quality of obstetric care.</p>	<ul style="list-style-type: none"> • The concept of avoidable maternal deaths combines clinical experience with enquiries in maternal deaths. The concept of avoidable deaths has made it possible for decision makers to realize that maternal deaths are preventable and to generate information in a format that can be used for pressuring for resources and accountability (Van Lerberghe and De Brouwere, 2001). • In Sweden, the introduction of the concept of “avoidable maternal deaths” in the 1800s led to the introduction of aseptic techniques by midwives and a consequent lowering of maternal mortality rates in Sweden (Van Lerberghe and De Brouwere, 2001). • A criterion-based clinical audit in four district hospitals in Ghana and Jamaica lead to improvements in quality of obstetric care. Recording of key items of information (e.g., complications in previous pregnancies) increased from 34 to 63 percent; recording of pulse on admission improved from 63 to 86 percent, and recording of blood pressure on admission from 77 to 90 percent. In case of obstetric hemorrhage, the proportion of women who underwent blood typing/crossmatching increased and hemoglobin estimation increased from 49 to 74 percent. Hourly monitoring of urine output following obstetric hemorrhage increased from 64 to 79 percent. Monitoring of tendon reflexes when on magnesium sulphate increased from 36 to 84 percent, and maintenance of fluid balance charts in patients with eclampsia increased from 72 to 100 percent. In addition, patients treated with antibiotics for genital tract sepsis increased from 65 to 93 percent. Criteria were established for good quality care; current practices were measured; meetings were held with hospital staff to highlight areas and means for improvement within limited budgets; staff were presented with how targets were met concerning women who presented with obstetric complications; and results were analyzed (Wagaarachchi et al., 2001). <i>(Please see Appendix 8, “Changing Obstetric Practice through Criterion-based Clinical Audit: A Summary of Final Set of Criteria for Optimal Management.”)</i>

V.D. Policy and Program Issues in Safe Motherhood: Ensuring Quality Care

Intervention	Supporting research
<p>➤ Introducing confidential inquiries and the concept of avoidable maternal deaths can lower rates of maternal mortality and improve the quality of obstetric care, <i>continued</i>.</p>	<ul style="list-style-type: none"> • In Indonesia, a maternal and perinatal audit was developed in 1994 to reduce maternal mortality. One hundred thirty maternal deaths were analyzed from 1995–1999. Village midwives were responsible for reporting all maternal and perinatal deaths in the community to the health center. When a village midwife was notified of a maternal or perinatal death, she visited the family of the deceased and conducted a home interview within a week. At intervals of one-to-two months, a meeting was held at the community health center to discuss maternal and prenatal deaths with the staff of the center, midwives, district, and perinatal audit team, health administrators, and hospital physicians. The purpose of the meeting was not to assign blame but to uncover the root causes of death while engaging in constructive peer review. Of the maternal deaths, a midwife of a doctor saw only 41.5 percent of the women before death and 69.2 percent of deaths occurred elsewhere than in a health facility. Delays in decision making contributed to 77 percent of maternal deaths. In addition, poor quality of care, including care that did not conform to protocols at the health facility, contributed to maternal deaths. Audits have resulted in magnesium sulphate being supplied to village midwives and distribution of a standard protocol for handling obstetric emergencies (Supratikto et al., 2002).

VI. Safe Motherhood Interventions That Have Not Been Shown to Be Effective

VI. Safe Motherhood Interventions That Have Not Been Shown to Be Effective

The following are safe motherhood interventions that are quite commonly practiced in various parts of the world. These practices have been the subject of rigorous clinical trials or other studies, and despite their inclusion in the norms and protocols of some countries, these interventions have not been proven effective in improving maternal health or birth outcomes. For example, assessing

pregnant women during ANC for risk of developing obstetric emergencies is not effective. However, women, their families, and communities must be made aware of any danger signals requiring immediate access to EOCs. Other interventions that have not been shown to be effective are bed rest to improve pregnancy outcomes, weight monitoring and using fish oil, or aspirin or magnesium sulfate to reduce pre-eclampsia.

VI. Safe Motherhood Interventions That Have Not Been Shown to Be Effective

Intervention	Supporting research
<p>➤ Most maternal complications are not detected through ANC services.</p>	<ul style="list-style-type: none"> • Numerous studies from around the world found that only 10–30 percent of the women allocated to the high-risk groups actually experienced the adverse outcome for which the formal risk-scoring system predicted them to be at risk (Hall, 1990; Chard et al., 1992; and Sfuono and Klebanoff, 1993, cited in Carroli et al., 2001). • A study in India found that 88 percent of women designated as high risk went on to deliver normally (Abraham and Joseph, 1985, cited in McDonagh, 1996).
<p>➤ “Training of TBAs alone, in the absence of back-up from a functioning referral system and support from professionally trained health workers, is not effective in reducing maternal mortality” (WHO et al., 1999; Greenwood et al., 1990, cited in Morrissey and Rionda, 1999).</p>	<ul style="list-style-type: none"> • Ghana (Eades et al., 1993) and Indonesia (Tsui et al., 1997) experienced a lack of success with respect to appropriate referrals generated by TBAs. • In Bangladesh, a study of 28-trained TBAs, 27-untrained TBAs, and 276 mothers cared for by TBAs and untrained TBAs found that TBAs provided significantly more correct advice than untrained TBAs in feeding of infants, colostrom advice, and immunizations. However, there was no significant relationship between the mothers’ adherence to these health practices and the advice given by TBAs (Rashid et al., 1999). • A study in Bangladesh found no significant difference in the levels of postpartum infection in which deliveries by trained and untrained TBAs were compared (Goodburn et al., 2000, cited in Bergstrom and Goodburn, 2001). • A survey in Gambia of maternal deaths between 1993–1998 found no significant differences between villages with trained TBAs and villages without trained TBAs (Walraven et al., 2000).

VI. Safe Motherhood Interventions That Have Not Been Shown to Be Effective

Intervention	Supporting research
➤ Training TBAs in clean delivery may not prevent postpartum infection.	<ul style="list-style-type: none"> A study in rural Bangladesh found that trained TBAs were more likely to practice hygienic delivery than untrained TBAs; however, no significant differences in levels of postpartum infection were found when deliveries by trained and untrained TBAs were compared. The practice of hygienic delivery itself had no significant effect on postpartum infection; instead, preexisting infection, long labor, and insertion of hands into the vagina were associated with postpartum infection (Goodburn et al., 2000).
➤ Training TBAs in recognition of complications and referrals may not increase referrals.	<ul style="list-style-type: none"> Data from a random sample of 1,961 clients of TBAs in Ghana found that a training program for TBAs conducted during 1996 was not associated with increased referrals. The two-week curriculum consisted of instruction in care/management of normal pregnancy, recognition of complications and referral, care of the newborn, family planning, infant feeding, growth monitoring, immunization, and control of diarrheal disease, with a post-training mechanisms linking trained TBAs with local TBA trainers for guidance, supplies, and assistance in relation to the wider health system (Smith et al., 2000).
➤ Monitoring weight gain during pregnancy has not been proven to improve maternal or fetal outcomes.	<ul style="list-style-type: none"> Monitoring weight gain during pregnancy to reduce low birthweight of the infant does not improve maternal or fetal outcomes (WHO, 1999). Routine use of fish oil supplementation to prevent pre-eclampsia during pregnancy failed to show any improvement on the incidence of pregnancy-induced hypertension (Olsen et al., 2000, cited in Carroli et al., 2001).

VI. Safe Motherhood Interventions That Have Not Been Shown to Be Effective

Intervention	Supporting research
<p>➤ Fish oil has not been proven to reduce hypertension.</p>	<ul style="list-style-type: none"> • Routine use of fish oil supplementation to prevent pre-eclampsia during pregnancy failed to show any improvement in the incidence of pregnancy-induced hypertension (Olsen et al., 2000, cited in Carroli et al., 2001).
<p>➤ Aspirin has not been proven to prevent pre-eclampsia.</p>	<ul style="list-style-type: none"> • Use of aspirin does not prevent pre-eclampsia (Caritis et al., 1998; Golding, 1998; Rotchell et al., 1998, cited in Carroli et al., 2001).
<p>➤ Prophylactic supplements of magnesium does not prevent pre-eclampsia.</p>	<ul style="list-style-type: none"> • Prophylactic magnesium supplementation does not prevent pre-eclampsia (Spatling and Spatling, 1988, and Sibai et al., 1989, cited in Carroli et al., 2001).

VI. Safe Motherhood Interventions That Have Not Been Shown to Be Effective

Intervention	Supporting research
➤ Bed rest does not improve health outcomes for pregnant women with hypertension.	<ul style="list-style-type: none">• Bed rest does not improve health outcomes of pregnant women with proteinuric or nonproteinuric hypertension during pregnancy (Allen et al., 1999, cited in Carroli et al., 2001).

VI. Safe Motherhood Interventions That Have Not Been Shown to Be Effective

Intervention	Supporting research
➤ Ketanserin or diazoxide are not effective in reducing hypertension.	<ul style="list-style-type: none"> • Ketanserin or diazoxide are not effective antihypertensive medications (Carroli et al., 2001).
➤ Routine use of ultrasound by health professionals may increase the risk of miscarriage and undermine the quality of ANC without any health benefits for mother or infants.	<ul style="list-style-type: none"> • From a Botswana district hospital study that contains 41 interviews with pregnant women and systematic observation of doctor–client interaction in 18 cases, all the doctors expressed the negative effect of easy access to ultrasound scanning on the thoroughness of history taking and physical examination. Clients criticized the lack of explanation when given ultrasounds, the lack of traditional history taking, and the decreased opportunity for physician–client communication (Tautz et al., 2000). • A prospective randomized trial in the United States between 1987 and 1991 of routine versus indicated ultrasound exams with 15,530 pregnant women found no difference in perinatal outcome between the group that underwent routine ultrasound at 15–22 weeks and again at 31–35 weeks, and those that underwent ultrasound only if a specific indication arose (Ewigman et al., 1993). • A study in Finland that randomly divided more than 9,000 women into a group were scanned at 16–20 weeks, and those who were not found 20 miscarriages after 16–20 weeks in the group that received ultrasound and none in the controls (Saari-Kemppainen et al., 1990, cited in Beech, 1999).
➤ “We have little evidence that gestational diabetes (GD) management succeeds” (Goer, 1996: 2).	<ul style="list-style-type: none"> • Test results for the oral glucose tolerance test (OGTT), the standard diagnostic test for gestational diabetes, disagree 22 to 24 percent of the time with the same pregnant woman two weeks apart (Catalano et al., 1993, cited in Goer, 1996). • Glucose levels are poor predictors of excessive infant growth (Hunter and Keirse, 1989, cited in Goer, 1996).

VI. Safe Motherhood Interventions That Have Not Been Shown to Be Effective

Intervention	Supporting research
<p>➤ A Cochrane Collaboration review found that “there is insufficient evidence to justify the use of misoprostol prophylactically when other uterotonics are not available” (Gulmezoglu et al., 2002: 12).</p>	<ul style="list-style-type: none"> • A Cochrane Collaboration review found that “Misoprostol is either equal or less effective than placebo/no treatment for blood loss of 1,000 ml or more” (Gulmezoglu et al., 2002: 8). The study included 17 misoprostol trials and eight intramuscular prostaglandin trials with data comparing oral misoprostol to no uterotonics. Misoprostol is a kind of prostaglandin. Oral misoprostol showed clinically and statistically significantly more blood loss compared with conventional injectable uterotonics in trials involving 21,099 women. Shivering and elevated body temperature was increased with misoprostol, as was nausea, vomiting, and diarrhea (Gulmezoglu et al., 2002). • A multicenter, double-blind randomized controlled trial with hospitals in Argentina, China, Egypt, Nigeria, South Africa, Thailand, Vietnam, and Europe, with 9,264 women assigned to misoprostol and 9,266 to oxytocin, found that 4 percent of women on misoprostol had a measured blood loss of 1,000ml or more compared with 3 percent of those on oxytocin. Misoprostol was associated with more shivering and elevated body temperature in the first hour after delivery (Gulmezoglu et al., 2001).

VII. Common Practices That Are Unnecessary or Can Be Harmful to Safe Motherhood

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These common practices do not improve maternal health and can in fact increase maternal morbidity and mortality. While EmOC is necessary to save mothers' lives in case of obstetric emergency, there are also dangers to overmedicalization of births. "In many countries women who have straightforward pregnancies are subjected to routine intravenous infusions and oxytocin in labour. Women without obstetric complications are encouraged to have electronic fetal monitoring and epidural analgesia. Frequently labour will be in the

dorsal position and delivery in lithotomy" (Johanson et al., 2002). Many of the practices listed here are not harmful per se—they are harmful when used indiscriminately even when not medically indicated. Quality of care is severely compromised when medical interventions are routinely used when no obstetric emergency exists. Some procedures commonly practiced in hospitals, such as enemas or pubic shaving, are completely unnecessary and waste resources that are urgently needed for true obstetric emergencies.

VII. Common Practices That Are Unnecessary or Can Be Harmful to Safe Motherhood

Intervention	Supporting research
➤ Policies that prevent trained nurses and midwives from performing EOC can result in delayed or no EOC treatment.	<ul style="list-style-type: none"> In India, 200 to 400 auxiliary nurse midwives (ANMs) who have 18 months of training are prevented from managing basic obstetric emergencies, such as injectable antibiotics for postpartum infection or giving antihypertensive medication for severe pre-eclampsia or anticonvulsants for eclampsia. Such cases must be treated by doctors, which results in delayed or no treatment, leading to death and disability (Mavalankar, 2002).
➤ In some situations, training TBAs has resulted in harmful outcomes for mothers.	<ul style="list-style-type: none"> The extra confidence gained from training TBAs in Ghana led to a higher incidence of dangerous procedures and sometimes delays in referral (Eades et al., 1993, cited in Bergstrom and Goodburn, 2001).
➤ Adverse outcomes have been associated with use of epidurals in non-emergency settings.	<ul style="list-style-type: none"> Meta-analyses of the outcomes associated with epidurals in developed countries have found that they are associated with an increased length of first and second stages, an increased incidence of fetal malposition, an increased use of oxytocin and instrumental deliveries, and an increased risk of maternal fever (Howell, 2001, and Lieberman, 1999, cited in Roberts, 2002).
➤ Denying food and water to women during labor is unnecessary.	<ul style="list-style-type: none"> During labor and delivery, denying the woman giving birth water and food is unnecessary (Enkin et al., 1995, cited in Khayat and Campbell, 2000; Hulton et al., 2000).
➤ Routine perineal shaving (Enkin et al., 1995, cited in Khayat and Campbell, 2000) and pubic shaving (Qian et al., 2001) are unnecessary.	<ul style="list-style-type: none"> A randomized controlled trial was unable to detect any lowering of morbidity by public shaving (Kantor et al., 1965, cited in Hulton et al., 2000).

VII. Common Practices That Are Unnecessary or Can Be Harmful to Safe Motherhood

Intervention	Supporting research
➤ Routine enemas are unnecessary (Enkin et al., 1995, cited in Khayat and Campbell, 2000).	<ul style="list-style-type: none"> Two randomized controlled trials have found that routine enemas have no effect on the duration of labor or infection rates and carry some risks (Drayton and Rees, 1984; Romney and Gordon, 1981, cited in Hulton et al., 2000).
➤ Forcing women to lie on their backs for labor and delivery compromises maternal and infant outcomes.	<ul style="list-style-type: none"> Adoption of supine position compromises effective uterine activity, prolongs labor, and leads to the increased use of drugs (Roberts, 1989, cited in Khayat and Campbell, 2000).
➤ Routine intravenous infusions during labor can be harmful.	<ul style="list-style-type: none"> Routine intravenous infusions during labor can be harmful as they restrict mobility (Khayat and Campbell, 2000).
➤ Routine continuous fetal monitoring is correlated with adverse health outcomes.	<ul style="list-style-type: none"> Routine continuous fetal monitoring can be harmful as it increases the risks for cesarean-section deliveries (Khayat and Campbell, 2000). Infants may be at risk of contracting HIV from scalp electrodes.
➤ Routine episiotomies cause harm and rates above 10 percent may indicate an excess of episiotomies (Argentine Episiotomy Trial Collaborative Group, 1993, cited in Khayat and Campbell, 2000; Qian et al., 2001).	<ul style="list-style-type: none"> “Aiming surgically to cut all women delivering vaginally has no demonstrable benefit for the infant or the mother, but causes the woman unnecessary pain and adverse psychological effects and may cause death” (Maduma-Butshe et al., 1998). Yet routine episiotomies are performed in many developing countries. Often, when episiotomies are conducted routinely, it is a “premeditated surgical procedure carried out without the consent from the woman” (Maduma-Butshe et al., 1998). “A study in Burkina Faso showed that in primary care facilities, 43% of primigravidas received episiotomies—in a health system that frequently ran out of sutures and antibiotics” (Maduma-Butshe et al., 1998). A British trial found that the rate of episiotomy without harm to the mother was 10 percent (Sleep et al., 1984, cited in Hulton et al., 2000).

VII. Common Practices That Are Unnecessary or Can Be Harmful to Safe Motherhood

Intervention	Supporting research
➤ Rectal examinations during vaginal delivery should not be performed.	<ul style="list-style-type: none"> • Rectal examinations during vaginal delivery should be avoided (Qian et al., 2001).
➤ Medically unnecessary cesarean sections can cause increased maternal morbidity.	<ul style="list-style-type: none"> • “Unnecessary cesarean section is associated with increased postpartum infection...higher incidence of neonatal illness, longer duration of hospitalization and higher costs of care” (Starling et al., 1997; Bobadilla and Walker, 1991; Gibbs, 1997, cited in Sloan et al., 2000).

VIII. Selected Interventions for Which Evidence (or More Evidence) Is Needed

VIII. Selected Interventions for Which Evidence (or More Evidence) Is Needed

This section lists research questions that have not yet been answered concerning various components of improving maternal health as well as some promising interventions that could improve maternal health but for which the scientific studies have yet to be conducted. Although not listed, the most critical research topics are operations research on how to

increase geographic coverage for EmOC, how to install and maintain infection prevention in EmOC facilities, and how to ensure safe blood supplies. Other critical operations research needed concerns how to effectively improve the quality of care in maternal health, particularly in the hospital setting and motivate EOC providers.

VIII. Selected Interventions for Which Evidence (or More Evidence) Is Needed

Intervention	Supporting research
➤ Immunizing all women of reproductive age against tetanus.	<ul style="list-style-type: none"> Immunizing all women of reproductive age against tetanus, rather than waiting until women become pregnant can be effective (Maine, 1999).
➤ Training and methodology for each level of maternity care providers.	<ul style="list-style-type: none"> Effective training content and methodology for each level of maternity care providers (Penny and Murray, 2000).
➤ Improving nutrition in pregnancy to reduce maternal mortality from toxemia.	<ul style="list-style-type: none"> “...Available evidence does not show that nutrition makes a major difference in maternal mortality from toxemia in pregnancy” (Maine, 2000).
➤ Predicting eclampsia based on edema.	<ul style="list-style-type: none"> Predicting eclampsia based on edema of face and hands or proteinuria (Carroli et al., 2001).
➤ Routine antibiotics for premature rupture of the membrane.	<ul style="list-style-type: none"> “...There is insufficient evidence to recommend routine antibiotics for preterm rupture of membranes” (Carroli et al., 2001).

VIII. Selected Interventions for Which Evidence (or More Evidence) Is Needed

Intervention	Supporting research
➤ Health education for women to seek care after membrane rupture.	<ul style="list-style-type: none"> There has been no assessment of health education for pregnant women on the importance of seeking care promptly after membrane rupture (Carroli et al., 2001).
➤ Performing cesarean sections improves outcomes with signs of fetal distress.	<ul style="list-style-type: none"> There are no trials confirming that cesarean section improves outcomes during fetal distress (Campbell and Pittrof, 2000).
➤ Screen and refer for gender-based violence during ANC.	<ul style="list-style-type: none"> In the United States, “abuse during pregnancy occurs in about 4% to 8% of all pregnancies, and violence during pregnancy may be more common than other conditions for which health care professionals routinely screen” (Gazmararian et al., 1996, cited in McFarlane et al., 2002). “Pregnancy offers a ‘window of opportunity’ wherein abused women are usually seen often by health care professionals and can receive a thorough abuse assessment and prolonged intervention protocol” (McFarlane et al., 2002: 28). Pregnancy provides a unique opportunity to screen for domestic violence and this opportunity should be used because less than 5 percent of abused women will disclose the information voluntarily (Stewart and Cecutti, 1993, cited in Muthal-Rathore et al., 2002). A study in India of 820 women found that 21 percent reported abuse during pregnancy. Of these, 23.8 percent experienced abuse for the first time during pregnancy. There was a statistically significant rate of complications (30.95%) in the abused group compared to the control group (1.42%) (Muthal-Rathore et al., 2002).

VIII. Selected Interventions for Which Evidence (or More Evidence) Is Needed

Intervention	Supporting research
<p>➤ Screen and refer for gender-based violence during ANC, <i>continued</i>.</p>	<ul style="list-style-type: none"> Domestic violence accounted for 15.7 percent of all deaths in pregnancy in a review of 121 maternal deaths in rural west Maharashtra, India. Thus, domestic violence was the second largest cause of pregnancy-related mortality, exceeded only by postpartum hemorrhage. Maternal deaths were identified through multiple-source surveillance in 400 villages with a total population of 686,000 prospectively enrolled in a population-control study that compared deaths with the survivors of similar pregnancy outcomes (Ganatra et al., 1998). A study in the US found that murder is an important but often unreported cause of maternal mortality, suggesting an “immediate need for universal abuse assessment of all pregnant women.” A case-control design was used with 437 attempted and completed murders, correlating the outcome of murder for those women who were also abused and for those women who were not abused. Five percent of women who were murder victims were murdered while pregnant. Women abused during pregnancy were at a three-fold risk of murder (McFarlane et al., 2002). Studies in the United States concur that complications of pregnancy, including low birthweight, low weight gain, anemia, infections, and first and second trimester bleeding are positively associated with abuse, as are higher maternal rates of depression, suicide attempts, tobacco, alcohol, and illicit drug use (McFarlane et al., 1996; Campbell et al., 1999; Cokkides et al., 1999; Murphy et al., 2001, cited in McFarlane et al., 2002).
<p>➤ Address the special needs of pregnant refugees, especially victims of rape (Save the Children, 2002).</p>	<ul style="list-style-type: none"> “The use of rape against women and girls is an increasingly common tactic in modern war” (Save the Children, 2002: 9). In Rwanda, researchers estimate that more than 5,000 women were impregnated through rape. Many are now raising children fathered by men who killed the woman’s spouse or family members (Women’s Commission of Refugee Women and Children, 2001).

VIII. Selected Interventions for Which Evidence (or More Evidence) Is Needed

Intervention	Supporting research
➤ Training midwives and physicians collaboratively improves referral systems.	<ul style="list-style-type: none">• Training teams of providers—physicians and midwives together—strengthens referral systems (MacDonald and Starrs, 2002).

Appendices

Appendix 1: Process Indicators for Monitoring and Evaluating Emergency Obstetric Care
(Goodburn, 2002: 146)

Indicator	Definition	Minimum Level	Numerator	Denominator	Data Source
Availability of basic and comprehensive emergency obstetric care (BemOC and CemOC).	Number of health facilities providing BemOC and CemOC functions per unit of population.	At least 4 BemOC and 1 CemOC facility for every 500,000 population.	Number of facilities providing all standardized BemOC functions.	Population of catchment area 500,000.	Checklist of functions.
Geographical distribution of BemOC and CemOC facilities.	Distribution of EmOC facilities at subnational level.	EmOC facilities should be adequately distributed in all subnational geographic areas.			Maps.
Institutional deliveries.	Proportion of all deliveries taking place in health facilities.	At least 15% of all births should take place in health facilities.	Number of deliveries occurring in health facilities in time period.	Total expected deliveries in catchment population in time period.	Maternity registers.
Met need for emergency obstetric care (EmOC).	Proportion of women with obstetric emergencies treated in EmOC facilities.	100% of all women with obstetric emergencies should be treated in EmOC facilities.	Number of women with obstetric emergencies who were treated at EmOC facilities in time period.	Number of women expected to experience obstetric emergencies in time period. Expected deliveries x 15%.	Maternity and gynecology registers.
Cesarean section rate.	Proportion of cesarean sections to all births.	Cesarean sections should be no less than 5% and no more than 15% of all births.	Number of cesarean sections in time period.	Total expected deliveries in catchment population in time period.	Operating theater register.
Case fatality rate in facilities.	Proportion of women admitted to EmOC facilities who die.	Case fatality rate should be less than 1%.	Number of direct obstetric deaths in the facility in time period.	Number of admissions for EmOC in time period.	Maternity and gynecology registers.

Appendix 2: Minimum and Additional Skills Required of Skilled Birth Attendants

(Sources: MacDonald and Starrs, 2002; International Confederation of Midwives, 2002; WHO, 2000).

Skilled care or attendance refers to the process by which a pregnant woman and her infant are provided with adequate care during pregnancy, labor, birth, and the postpartum and immediate newborn periods, whether the place of delivery is the home, health center, or hospital. In order for this process to take place, the attendant must have the necessary skills and must be supported by an enabling environment at various levels of the health system, including a supportive policy and regulatory framework; adequate supplies, equipment, and infrastructure, including electrical power, clean water, and sanitation facilities; and an efficient and effective system of communication and referral/transport. Skilled care, therefore, includes care for women with life-threatening complications; however, it is not limited to that care. The skilled care approach is based on the premise that all women are entitled to good quality care during childbirth. It assumes that such care can prevent some complications (e.g., through hygienic practices and active management of the third stage of labor); increase the likelihood of immediate, appropriate treatment when complications do develop; and encourage timely referral as necessary.

The skilled attendant at *delivery* will have the following minimum set of skills:

During pregnancy:

- Monitor the health of the women and fetus.
- Take a detailed history, ask relevant questions, demonstrate cultural sensitivity, and use good interpersonal skills.
- Provide ANC throughout pregnancy; provide continuity of care throughout the perinatal period.
- Perform a general examination, identify deviations from normal, and screen for conditions that are prevalent or endemic in the area.
- Take vital signs (temperature, pulse, respiration, blood pressure).
- Auscultate the fetal heart rate.
- Calculate the estimated date of delivery.
- Educate women and family about danger signs during pregnancy, when and how to seek emergency care, and offer guidance in planning for delivery.
- Provide appropriate interventions (including referral) for
 - Infection
 - Intrauterine fetal death
 - Malpresentations and abnormal lies at term
 - Multiple gestation
 - Poor nutrition and anemia
 - Pre-eclampsia and eclampsia
 - Rupture of membranes prior to term
 - Severe vaginal bleeding (suggesting abruptio placenta)
 - Sexually transmitted diseases
 - Urinary tract infections
 - Malaria

- Tetanus toxoid immunization
 - Other problems significantly affecting health (e.g., not limited to polyhydramnios, diabetes, inadequate fetal growth, preterm labor)
- Perform an abdominal examination identifying abnormalities and factors that place the woman at risk.
- Prepare the woman and her family for the birth by providing information and support.
- Time and assess the effectiveness of uterine contractions, monitoring the woman's response to pain and increasing pressure on the pelvic floor.
- Perform a vaginal examination, noting the vulva, status of the membranes and color of amniotic fluid, cervical dilation, and presenting part.
- Provide support and psychological care for the woman and her family.
- Ensure hydration, nutrition, comfort, cleanliness, elimination, and mobility, appreciating and explaining the advantages of these approaches and the risks associated with their omission.
- Recognize delay in labor, prioritize care, take appropriate action, and evaluate the results of the intervention.
- Use the partograph or modified form.
- Recognize the presence of meconium in amniotic fluid.
- Make appropriate referrals in response to the level of indicated risk.
- Recognize fetal distress and take appropriate action.
- Conduct vertex deliveries, using appropriate hand maneuvers and aseptic precautions.
- Perform and repair episiotomy to save the life or protect the mother or baby from serious injury.
- Take appropriate care of the cord at birth.
- Manage a cord around the baby's neck at delivery.
- Clamp and cut the cord using aseptic technique.
- Perform physiologic or active management of the third stage of labor.
- Perform controlled cord traction.
- Administer oxytocic agents.
- Check the placenta and membranes for completeness.
- Check that the uterus is well contracted and estimate total.
- Manage postpartum hemorrhage.
- Perform aortic compressions or internal bimanual compression, depending on country norms.
- Perform life-saving skills in case of
 - Convulsions
 - Obstructed airway
 - Serious infection
 - Shock
 - Unconsciousness
 - Vaginal bleeding (during pregnancy or postpartum)
 - Shoulder dystocia
 - Cord presentation and cord prolapse
- Provide a safe and warm environment for mother and infant.
- Dry the infant.
- Ensure that respiration is established.

- Initiate newborn resuscitative measures when indicated.
- Encourage early and exclusive breastfeeding when health status of mother and baby are appropriate.
- Examine the newborn baby, noting risk factors from the pregnancy and labor history.
- Assess and monitor the infant in the immediate post-birth period for evidence of normal transition to newborn status; refer sick newborns to next level of care, where appropriate.
- Correlate all available information; record all relevant findings on maternal and newborn records; advise when to return for care.
- Perform immediate and periodic assessments of the woman during the postpartum period, assessing all parameters relevant to normal recovery from childbirth and evidence of deviation from normal (including haematoma and infection).
- Educate women and family regarding postpartum and newborn care (including care of the umbilical stump).
- Insert intravenous (IV) line and administer IV fluids.
- Prescribe and/or administer, as appropriate,
 - Analgesics
 - Antibiotics
 - Anticonvulsants
 - Antimalarials
 - Antipyretics
 - Contraceptive drugs and devices
 - Immunization agents
 - Iron supplements
 - Oxytocics (postdelivery or postabortion)
 - Sedatives
 - Tetanus toxoid
- Make appropriate and timely referrals for additional and emergency care, arranging for transportation and care during transport.
- Identify breech and other malpresentations and make timely referrals in early labor.
- Facilitate linkages between the community health facility, referral settings, and the traditional care providers in the community.
- Use appropriate interpersonal communication and counseling skills.
- Employ critical thinking skills (including self-assessment on and reflection of own practice).
- Respect diverse cultures and traditions.
- Utilize management skills and organize the practice environment to evaluate the effectiveness of service delivery.

The skilled attendant at *delivery* may have the additional skills to

- Perform general and abdominal examinations.
- Observe and monitor the woman's physical status.
- Conduct a normal delivery.
- Recognize and respond to signs of distress in the woman or fetus.
- Provide supportive care, including encouraging a woman to move about during labor, appropriate methods of pain relief, and the provision of fluid and food intake during labor.

- Anticipate the need for forceps delivery or vacuum extraction; perform vacuum extraction.
- Manage complications of late labor using appropriate interventions and hand maneuvers.
- Identify and manage fetal distress.
- Identify and manage multiple births.
- Perform manual removal of retained placenta.
- Identify and repair cervical lacerations.
- Use managerial skills to improve service delivery.

During the immediate postpartum period:

- Perform care of the umbilical cord.
- Appropriately manage the third stage of labor.
- Provide a safe and warm environment for the mother and infant.
- Encourage early and exclusive breastfeeding.
- Counsel about appropriate family planning methods.

Skills for the management of complications at domiciliary/primary levels:

- Diagnose antepartum and postpartum bleeding, including abortion, and recognize internal hemorrhaging due to ectopic pregnancy. For antepartum and internal hemorrhage, the skilled attendant should stabilize and transfer the woman immediately. Skilled attendants can reduce the likelihood of postpartum hemorrhage by promoting the normal mechanisms of placental delivery and by using active management when appropriate, including administering a prophylactic oxytocic with or immediately after delivery of the infant, early cord clamping and cutting, and controlled cord traction. Manual removal of placenta, uterine massage, and aortic or bimanual compression are also options. When the bleeding requires emergency care, skilled attendants can stabilize the woman by giving IV fluids and transferring her to a referral facility.
- Prevent infection by ensuring that the woman gives birth in a safe, clean environment, maintaining the highest possible standards of hygiene and infection control, and using clean or sterile equipment, including gloves. For women with increased risk of sepsis during delivery, antibiotics can be administered. Skilled attendants can monitor women after delivery, educate women and their families of the signs of infection, and if sepsis develops, administer antibiotics. Skilled attendants can also recognize sepsis due to unsafe abortion.
- Recognize elevated blood pressure and proteinuria as signs of pre-eclampsia to be referred for higher-level emergency care. If eclampsia occurs during delivery, provide life-saving care: administer anticonvulsant drugs, induce labor, and correctly position an unconscious woman. Refer for higher care.
- Use a partograph to monitor the progress of labor, identify prolonged or obstructed labor, and take appropriate and timely action, referring severe cases promptly to higher-level care.
- Treating or referring women with unsafe abortions. Provide family planning and other reproductive health counseling postabortion.
- Prevent neonatal deaths with tetanus toxoid immunization during pregnancy, assessing the infant's condition at birth, resuscitating if necessary, prevent neonatal hypothermia, prevent nosocomial infection, and support early and exclusive breastfeeding. Refer sick and/or low birthweight babies.
- Diagnose, prevent, and treat conditions that can complicate pregnancy and childbirth; thus, provide routine iron and vitamin supplementation, prophylactic malaria treatment and anthelmintic drugs (to treat parasites), and nutrition education. Skilled attendants with access

to laboratory facilities can diagnose and treat anemia, malaria, and STIs; encourage women for voluntary testing and counseling for HIV; advise mothers with HIV/AIDS on infant feeding options; administer antiretroviral therapy to women with HIV during pregnancy, birth, and postpartum.

Additional skills at first referral level:

- Induction of labor.
- Surgical intervention (cesarean section, laparotomy in case of ectopic pregnancy; emergency hysterectomy; dilation, and curettage).
- Destructive operations (e.g., craniotomy).
- Diagnosis and management of diabetes, chronic hypertension, cardiac disease, kidney disease, and other common chronic conditions during labor and birth.

Appendix 3: Maintaining a Blood Supply that Reduces the Risk of Transmission of HIV

While women giving birth are at particular risk for the need for blood transfusions, in case of such obstetric emergencies as postpartum hemorrhage or the need for a cesarean section, access to a safe blood supply that minimizes the risk of transmitting HIV is a critical underpinning of public health for the general population. More details and data are provided in the forthcoming module on STI/HIV/AIDS.

Effective interventions to reduce the risk of transmitting HIV through the blood supply include:

- **Reducing the need for treatment with blood.** Women are more likely than men to receive blood transfusions, particularly in the course of childbirth (Pape et al., 1986, cited in Farmer, 2001). Women in Mexico have been at much higher risk of HIV through blood transfusions, constituting all of those who acquired HIV through transfusions in 1985 to 41.9 percent of those who acquired HIV through transfusions in 1997 (Saavedra Lopez and Magis Rodriguez, 1998). A study in Kenya found that 61 percent of blood transfusions in a rural district hospital in Kenya were considered to be clinically inappropriate and the need for transfusion could have been eliminated through proper education (Lakritz et al., 1993, cited in Constantine et al., 1999).
- **HIV antibody screening of all blood and plasma donations.** In 1985 in the United States, a national plan to screen all blood and plasma donations for HIV “virtually eliminated HIV transmission through transfusion” (Ward et al., 1988, cited in Kamb and Wortley, 2000). Transfusion-associated HIV infection and AIDS have drastically declined in Mexico because of effective blood screening (Tarantola et al., 1999).
- **Applying selective standards for recruitment of blood donors, such as recruiting repeat donors who have been previously tested and found to be HIV-negative, can increase the safety of the blood supply.** In Myanmar, a system of recruiting repeat donors who have been previously tested and found to be HIV-negative has resulted in a decrease of HIV infection in blood donors from 13 percent in 1993 (of which 50% were repeat donors) to 1 percent in 1996 (with 90% being repeat donors) (Goodwin, 1997, cited in Constantine et al., 1999). HIV infection among blood donors in Rwanda decreased from more than 13 percent in 1985 to about 2 percent in 1990, while infection rates rose in the general population (Stanecki and Way, 1996, cited in Constantine et al., 1999).
- **Use of voluntary blood donors decreases the risk of HIV-positive blood.** Rates of infection in voluntary donors were less than one-half of that from blood donors recruited among patients in hospitals in Kenya (Lakritz et al., 1993). Volunteer donors have five to six times less infection than paid donors in Mexico and New Delhi (Avila et al., 1989, and Singh et al., 1990, cited in Constantine et al., 1999). Paid blood donors in China have a high rate of HIV prevalence. A study interviewed 730 subjects, of whom 210 were paid blood donors. HIV prevalence was 25.9 percent among blood donors. Those who donated blood more than 10 times each year had a higher prevalence rate (13.5%) than those who donated less than 10 times each year (2.8%). Surveys showed that blood donors had little knowledge of AIDS (Yan et al., 2000).

Different screening mechanisms for blood donors should be used depending on the incidence of HIV. In countries and areas where there are a high number of new infections, the new third generation ELISA screening assays, while the most expensive, possess the best analytical sensitivity for detecting low amounts of antibody, such that occur during seroconversion. Conversely, in a low-incidence population of blood donors, the chances of having a seroconverting individual are low and the increase in cost may not be justified (Constantine et al., 1999). Studies estimate that repeat testing with a second screening assay following repeatedly reactive results in the first screening assay can result in cost savings of 48 percent without jeopardizing predictive values (Tamashiro et al., 1993, cited in Constantine et al., 1999).

Appendix 4: Requirements of an Effective Referral System

(Murray et al., 2001)

The requirements of an effective referral system are the following:

- An adequately resourced referral center (UNICEF, 1994; WHO, 1992).
- Communications and feedback systems (Campbell et al., 1997; Aspara et al., 1994; Williams, 1961).
- Designated transport (UNICEF, 1994; Campbell et al., 1997).
- Agreed setting-specific protocols for the identification of complications (Sauerborn et al., 1989).
- Personnel trained in the use of agreed setting-specific protocols for the identification of complications (Aspara et al., 1994; McGuire et al., 1996).
- Teamwork between referral levels (Van Lerberghe et al., 1997; Stefanini, 1999).
- A unified records system (Stefanini, 1999).
- Mechanisms to ensure that patients do not bypass a level of the referral system (i.e. good patient information and structured fee and exemption systems) (Mwabu, 1989).

Appendix 5: Basic Antenatal Care Checklist from the WHO Multicenter Trial of New Antenatal Care Model

(replicated from Villar, Ba'aqueel, et al., 2001)

Patient's name _____

Clinic record number _____

Study subject number ____/____/____/____

FIRST VISIT for all women at first contact with clinics, regardless of gestational age. If first visit later than recommended, carry out all activities up to the time. Date: / /	Visit			
	1 st <12 weeks	2 nd	3 rd	4 th
<i>Classifying Form</i> indicates eligibility for the basic component				
Clinical examination				
Clinically severe anaemia: haemoglobin test				
Obstetric examination: gestational-age estimation, uterine height				
Gynaecological examination (can be postponed until second visit)				
Blood pressure				
Maternal weight/height				
Rapid syphilis test, detection of symptomatic sexually transmitted diseases - treatment				
Urine test (multiple dipstick)				
Blood type and rhesus status				
Tetanus toxoid				
Provide iron/folic acid supplementation				
Recommendation for emergencies/hotline for emergencies				
Complete antenatal card				
SECOND and SUBSEQUENT VISITS Date: / /	Gestational age- approximate number of weeks 26 32 38			
Clinical examination for anaemia				
Obstetric examination: gestational-age estimation, uterine height, fetal heart rate				
Blood pressure				
Maternal weight (only women with low weight at first visit)				
Urine test for protein (only nulliparous/women with previous eclampsia)				
Provide iron/folic acid supplementation				
Recommendation for emergencies				
Complete antenatal card				
THIRD VISIT: add Date: / /				
Haemoglobin test				
Tetanus toxoid (second dose)				
Instructions for delivery				
Recommendations for lactation/contraception				
FOURTH VISIT: add Date: / /				
Detection of breech presentation and referral for external version				
Complete ANC card, recommend it to be brought to hospital				

Staff responsible for antenatal care: Name _____

Signature _____

Appendix 6: Preventing, Detecting, and Treating Malaria in the General Population

Pregnant women are at particular risk from malaria. During pregnancy, immunity status is altered and there is an increased susceptibility to malaria. Mortality due to cerebral malaria in pregnancy is 40 percent, which is twice the mortality of all other patients. Malaria during pregnancy causes an increase in spontaneous abortions, stillbirths, and delivery of low birthweight infants (Reubin, 1992; IOM, 1996). However, malaria is a disease with adverse effects for the entire population.

Effective interventions to prevent the number of disease episodes of malaria that are applicable to entire populations are the following:

- **Intermittent irrigation to remove standing water; improved maintenance of canals and drainage to avoid water stagnation; shifting of planting schedules to avoid optimal mosquito breeding conditions and introducing aquatic plants can reduce the incidence of malaria. Introduction of fish that eat mosquito larvae have helped eliminate malaria.** One study illustrating the effectiveness of this approach is an Integrated Disease Vector Control (IDVC) pilot project in India that was carried out from 1983–1989, covering 700,000 people. Reduction of malaria was achieved through teaching women how to store and manage water to reduce the incidence of malaria. Mosquito eating guppy hatcheries were established. Presumptive malaria treatment was given. “The malaria control achieved by these nonchemical methods appears to be at least as good as that achieved in the rest of the district with insecticides during the same period.” IDVC reduced the annual population incidence of malaria from 5.6 in 1983 to 4.1 in 1989 (Matteson, 1999).
- **Insecticide treated bednets (ITNs) are comparable in epidemiological effect with DDT spraying, but simple and safe enough for application by nonspecialists** (Lengeler et al., 1996; USAID, 1998, cited in Matteson, 1999). *(See section III.A.3. Addressing Diseases during Pregnancy: Averting Exposure to Toxins).* **However, ITNs have not been shown to be effective for preventing malaria among pregnant women.** A Cochrane Collaboration review meta-analysis of randomized controlled trials found that insecticide-treated bednets reduced overall child mortality by 19 percent (Lengeler, 2001, cited in Schellenberg et al., 2001). A community cross sectional study in Tanzania found that treated nets had a protective efficacy of 62 percent on the prevalence of parasitaemia on children under the age of two (Abdulla et al., 2001). Evaluations of ITNs in 84 communities in Ecuador, Peru, and Colombia from 1991–1994 showed an average 41 percent reduction in malaria reduction (Kroeger et al., 1995, cited in Matteson, 1999). A randomized study in Thailand comparing 341 pregnant women in three adjacent study sites were randomized to receive a single size, permethrin-impregnated bednet (PIB), a nonimpregnated bednet (NIB), or to a control group, which used either its own family size nonimpregnated bednet (FNIB), or none. In one study site, but not the other two, PIB significantly reduced the incidence of malaria in pregnancy from 56 to 33 percent (Dolan et al., 1993). A randomized controlled study of 1,961 pregnant women in Ghana found no benefit for treated bednet use, in spite of free nets and insecticide impregnation. “Treated bednet use in primigravidae will offer little or no protection because even a single infective bite is sufficient for placental parasite proliferation and resulting adverse consequences (Browne et al., 2001). Six recent side-by-side comparisons of ITNs treated with a pyrethroid and house spraying with pyrethroids, DDT, or Malathion all showed that insecticide-treated nets were at least as

efficacious as spraying. “In projects with free, organized provision of insecticide-treated nets and pyrethroids for impregnation high population coverage can be achieved, apparently comparable to that in the best house spraying projects of 25-40 years ago” (Curtis and Mnzava, 2000).

- **Social marketing can increase the use of ITNs.** Socially marketed ITNs in two rural districts in Tanzania increased their use of ITNs from less than 10 percent at baseline to more than 50 percent three years later. Use of ITNs was associated with a 27 percent increase in child survival in children aged one month to four years. The 18 percent coverage rate in children younger than age five suggests that ITNs prevented one in 20 child deaths (Schellenberg et al., 2001).

Effective detection methods for malaria that are applicable to entire populations are the following:

- **Using geographic information systems, when combined with traditional forms of collection of data on malaria, to target interventions where they are most needed** (Carter et al., 2000). A study in South Africa found that GIS, along with a simplified malaria notification form to unmask malaria risk at the town and village level was used to spray only in settlements with a mean annual incidence exceeding eight malaria cases per 1,000 local inhabitants (Booman et al., 2000).
- **Immunochromatographic (IC) Strip Tests.** IC Strip Tests use relatively inexpensive, off-the-shelf components, can identify malaria in the blood in 20 minutes and can be completed by technicians with minimum training (PATH, 2002; Tjitra et al., 1999, cited in Bell et al., 2001). A community study in the Philippines found that malarial parasitology cannot be easily identified by symptoms alone and microscopy is unreliable in remote areas. Community volunteers performed the rapid diagnostic test accurately after training, meeting community needs for rapid diagnosis (Bell et al., 2001).

Effective treatment methods for malaria that are applicable to entire populations are the following:

- **Artemisinin drugs.** Artemisinin has been shown to be equivalent to quinine in preventing death in severe or complicated malaria, especially for multidrug resistant malaria. However, with artemisinin, the disease frequently recurs following treatment. A Cochrane Collaboration review of 16 randomized trials comparing artemisinin drugs (rectal, intramuscular, or intravenous) with quinine in 2,553 patients found that artemisinin drugs were associated with better survival rates. Compared with quinine, artemisinin drugs showed faster parasite clearance from the blood (McIntosh and Olliaro, 2002). The efficacy of artemisinin monotherapy given for five days was studied in 227 patients in Vietnam with malaria, leading to an 86 percent cure rate. Twenty-four percent of patients had a resurgence of malaria after the five-day treatment with artemisinin (Giao et al., 2001).
- **Prepackaged antimalarial drugs increases compliance with treatment.** A study in Ghana with six health facilities involved 654 patients, 314 of whom were randomly allocated to an intervention group of three health facilities and a control group of 340 patients in three different health facilities. In the intervention group, where antimalarial drugs were prepackaged, compliance was 20 percent higher than in the control group. “The patients

approved because prepackaging made it easier for them to remember how to take the prescribed medicine. Some women commented that they no longer needed anybody to read instructions for them because looking at the packs was enough.” Mean waiting time at dispensaries was 5.3 minutes in the intervention facilities and 13.8 minutes in the control facilities. Prescribing was more often correct in the intervention facilities (Yeboah-Antwi et al., 2001). A study in China’s Hunan Province showed that blister packaging of antimalarials improved compliance by approximately 20 percent (Qingjun et al., 1998, cited in Yeboah-Antwi et al., 2001).

Appendix 7: Protocols for Screening for Abuse of Pregnant Women

(Box 1 is from Guedes et al., 2002)

Box 1. Abridged screening form for victims of gender violence

Case number:

Date:

Name of counselor:

Introduction. You know, at PLAFAM we offer education and services about domestic violence, violence in the workplace, and violence in childhood. There are many types of violence that affect a great number of women, and many women living in violent situations have found it helpful to receive assistance for themselves and their children. We at PLAFAM are concerned about the well-being of our clients and we always ask these questions in a confidential manner.

1. Psychological/emotional violence in the family. Have you ever felt hurt emotionally or psychologically by your partner or another person important to you? (For example, constant insults, humiliation at home or in public, destruction of objects you felt close to, ridicule, rejection, manipulation, threats, isolation from friends or family members, and so forth.)

☐ Yes ☐ No Who _____

When _____ How _____

2. Physical violence. Has your partner or another person important to you ever caused you physical harm? (For example, hitting, cutting, or burning you?)

☐ Yes ☐ No Who _____

When _____ How _____

3. Sexual violence. Were you ever forced to have sexual contact or intercourse?

☐ Yes ☐ No Who _____

When _____ How _____

4. Sexual violence in childhood. When you were a child, were you ever touched in a way that made you feel uncomfortable?

☐ Yes ☐ No Who _____

When _____ How _____

(Box 2 is from McFarlane et al., 1997)

Box 2

(CIRCLE YES OR NO FOR EACH QUESTION)

1. Have you EVER been emotionally or physically abused by your partner or someone important to you?YES NO
2. IN THE YEAR BEFORE YOU WERE PREGNANT, were you pushed, shoved, slapped, hit, kicked or otherwise physically hurt by someone?.....YES NO
3. SINCE THE PREGNANCY BEGAN have you been pushed, shoved, slapped, hit, kicked or otherwise physically hurt by someone?.....YES NO
4. IN THE YEAR BEFORE YOU WERE PREGNANT, did anyone force you to have sexual activities?.....YES NO
5. SINCE THE PREGNANCY BEGAN has anyone forced you to have sexual activities?.....YES NO
6. Are you afraid of your partner or anyone you listed above?.....YES NO

**Appendix 8. Changing Obstetric Practice Through Criterion-based Clinical Audit:
A Summary of Final Set of Criteria for Optimal Management**
(Wagaarachchi et al., 2001: 121).

Summary of final set of criteria for optimal management

Complication	Criteria
Any	<ol style="list-style-type: none"> 1. Patient's history should be documented in case notes on admission (age, parity, complications in current and/or previous pregnancies) 2. General clinical state on admission should be recorded (pulse, blood pressure)
Obstetric hemorrhage	<ol style="list-style-type: none"> 3. Intravenous access should be achieved 4. Crystalloids and/or colloids should be infused until cross-matched blood is available 5. Patient's hematocrit or hemoglobin should be established 6. Typing and cross-matching of blood should be performed 7. Coagulation tests should be performed if indicated (clotting time, bleeding time, platelet count) 8. Clinical monitoring to detect early deterioration should be done at least quarter hourly for 2 hours (pulse, blood pressure) 9. Urine output should be measured hourly 10. Oxytocics should be used in the treatment of primary postpartum hemorrhage
Eclampsia	<ol style="list-style-type: none"> 11. Senior medical staff should take responsibility for formulating a management plan for the patient 12. Antihypertensive treatment should be given to patients with severe hypertension 13. The treatment and prophylaxis of seizures should be by magnesium sulfate 14. Respiratory rate and tendon reflexes should be monitored when magnesium sulfate is used 15. Ante/intrapartum fluid balance chart should be maintained 16. Hematological and renal investigation should be done at least once (bleeding time, clotting time, platelet count, urine albumin test) 17. Monitoring of blood pressure and urine output should continue for at least 48 hours after delivery
Uterine rupture	<ol style="list-style-type: none"> 18. In suspected or diagnosed uterine rupture, emergency surgery should be performed 19. Urinary bladder should be drained 20. An observation chart should be maintained (urine output, pulse, blood pressure)
Obstructed labor	<ol style="list-style-type: none"> 21. Prompt delivery of the fetus should occur within 2 hours of diagnosis 22. Urinary bladder should be drained 23. An observation chart should be maintained (urine output, pulse, blood pressure, temperature) 24. Intravenous access and hydration should be achieved 25. Broad spectrum antibiotics should be given 26. Typing and cross-matching of blood should be carried out
Genital tract sepsis	<ol style="list-style-type: none"> 27. Blood should be taken for culture 28. Treatment of genital tract sepsis should be with broad spectrum antibiotics 29. Metronidazole should be included in the antibiotic regimen 30. An observation chart should be maintained (urine output, pulse, blood pressure, temperature) 31. Exploration and evacuation of the uterus should be performed if retained products of conception are suspected

Glossary of Terms and Definitions

Glossary of Terms and Definitions

Active Management of the Third Stage (AMTS): This approach consists of a package of interventions including administration of prophylactic uterotonic agents with or immediately after delivery of the baby to ensure complete expulsion of the placenta, early cord clamping and cutting, and controlled traction to deliver the placenta (Prendiville et al., 1999, cited in Fraser and Kramer, 2000).

Cephalopelvic Disproportion is a disparity between the size of the maternal pelvis and the fetal head that precludes vaginal delivery.

Client–Provider Interaction is the verbal and nonverbal communication that occurs between a health care program staff and individuals seeking information or services (Ringheim, 2002). Essential elements of good client–provider interaction are respectful treatment (including respect for a client’s right to confidentiality and privacy), respect for a woman’s right to make decisions about her body, voluntary and informed choice, and incorporation of a gender perspective (Murphy and Steele, 2000).

Doulas are women who provide continuous support to women during labor, delivery, and the immediate postpartum period.

Eclampsia is a disease occurring during the latter half of pregnancy and characterized by an acute elevation of blood pressure and convulsions or coma.

Emergency Obstetric Care (EmOC): EmOC includes parenteral (administered by IV) antibiotics; parenteral oxytocic drugs; parenteral sedatives for eclampsia; manual removal of placenta; manual removal of retained products plus surgery (including cesarean section); anesthesia; and blood transfusion (Maine et al., 1997).

Essential Obstetric Care (EOC): EOC facilities administers parenteral antibiotics, parenteral oxytocic drugs, parenteral anticonvulsants for pre-eclampsia and eclampsia, and performs manual removal of the placenta, removal of retained products (e.g., manual vacuum aspiration), and assisted vaginal delivery (Maine et al., 1997).

Epidural: Anesthesia used in childbirth that significantly diminishes the sensations of labor and the pain associated with labor.

Episiotomy: Incision of the vulva during childbirth to avoid laceration.

Expectant Management of the third stage of labor consists of no prophylactic oxytocic and no cord clamping until pulsation has ceased and delivery of placenta by maternal effort (Rogers et al., 1998).

Female Genital Cutting (FGC) refers to the practice of removing parts of the woman’s genitalia. Type 1 refers to partial or total removal of the clitoris along with the clitoral prepuce. Type 2 includes partial or total removal of the clitoris and part or all of the labia minora. Type 3 contains total removal of the clitoris and labia minora, partial or total removal of the labia majora and stitching of the cut edges to cover the urethra and vaginal opening leaving only a small opening for the passage of urine and menstrual blood. Type 4 includes other forms of genital cutting, such as pricking or piercing of the

clitoris and/or labia, and cutting of the vaginal wall or cervix (Toubia, 1994; WHO et al., 1997, cited in Larsen and Okonofua, 2002).

Lithotomy is a supine position for a woman in labor and delivery with her hips and knees flexed with feet strapped into position.

Kangaroo Care Method refers to keeping babies with their mothers in the same room (“rooming in”) or the same bed from birth.

Midwife: Refer to the definition for “Skilled Attendant”; see Appendix 2 for a list of the minimum skills necessary for a skilled attendant at birth.

Micronutrients refer to vitamins or minerals occurring in traces essential for growth, development, or health.

Neural Tube Defects are defects in the embryonic tube that differentiates into the brain and spinal cord:

- **Anencephaly** is when an infant is born without a brain.
- **Spina Bifida** is a congenital defect involving the vertebra.
- **Craniorachischisis** is a congenital defect involving fissure of the cranium and the vertebrae.
- **Encephalocele** is a congenital defect involving an opening in the brain.
- **Hydrocephalus** is an abnormal condition caused by an increase in the volume of fluid within the skull.
- **Iniencephaly** is a congenital malformation that leaves the brain exposed without the cranium to cover the brain.

Oxytocin is a drug that hastens the process of childbirth by inducing labor.

Parasitemia: Presence of parasites, especially malarial forms, in circulating blood.

Partograph is a tool that can be used by midwifery personnel to assess the progress of labor and identify when intervention is necessary.

Postpartum Hemorrhage (PPH): “PPH is any blood loss that causes a physiological change (e.g. low blood pressure) that threatens the women’s life. This definition...reflects the fact that anemic women in developing countries are more susceptible to blood loss after giving birth” (McCormick et al., 2002).

Pre-eclampsia is a medical condition occurring in the latter half of pregnancy characterized by an acute elevation of blood pressure, but without the convulsions or coma seen in eclampsia.

Primagravida refers to a woman who is pregnant for the first time.

Prophylactic is any drug or device that prevents or helps to prevent the development of disease.

Puerperal Sepsis is a toxic, febrile state resulting from infection related to childbirth.

Reproductive Age Mortality Survey (RAMOS) Methodology is a methodology whereby each death is investigated by reviewing medical records and conducting a verbal autopsy with relatives and health workers (Hieu et al., 1999).

Sepsis is a toxic, febrile state resulting from infection.

Social Marketing includes motivation of healthy behavior through information campaigns and education and marketing of health products through the private sector. Social marketing campaigns are generally targeted to low-income and vulnerable groups.

Skilled Attendant: “The term ‘skilled attendant’ or provider refers exclusively to people with midwifery skills (for example, doctors, midwives, nurses) who have been trained to proficiency in the skills necessary to provide competent care during pregnancy and childbirth....Skilled attendants must be able to manage normal labor and delivery, recognize the onset of complications, perform essential interventions, start treatment, and supervise the referral of mother and baby for interventions that are beyond their competence or not possible in the particular setting” (WHO et al., 1999). The *minimum* training period required is generally considered to be six months. Traditional birth attendants (TBAs), trained or untrained, are not included (WHO, 1999, cited in Graham et al., 2001). *See Appendix 2 for a list of the minimum skills necessary for a skilled attendant at birth.*

Skilled Attendance: “Skilled care or attendance refers to the process by which a pregnant woman and her infant are provided with adequate care during labor, birth, and the postpartum and immediate newborn periods, whether the place of delivery is the home, health center or hospital. In order for this process to take place, the attendant must have the necessary skills and must be supported by an enabling environment at various levels of the health system, including a supportive policy and regulatory framework; adequate supplies, equipment and infrastructure; and an efficient and effective system of communication and referral transport. Skilled care therefore includes care for women with life-threatening complications, but it is not limited to that care. The skilled care approach is based on the premise that all women are entitled to good quality care during childbirth. It assumes that such care can prevent some complications (e.g., through hygienic practices and active management of the third stage of labor); increase the likelihood of immediate, appropriate treatment when complications do develop; and encourage prompt, timely referral as necessary” (MacDonald and Starrs, 2002).

Skilled attendance has also been defined as “encompassing (1) a partnership of skilled attendants (health professionals with the skills to provide care for normal and/or complicated deliveries), and (2) an enabling environment of equipment, supplies, drugs, and transport for referral” (Graham et al., 2001: 97).

Symphysiotomy is the dividing of the symphysis pubis to gain access to or to increase the diameters of the pelvic canal.

Traditional Birth Attendant (TBA) is a person who assists the mother during childbirth and who initially acquired her skills by delivering babies herself or through an apprenticeship to other TBAs (WHO, 1992, cited in Sibley et al. 2002). TBAs are not considered skilled attendants at birth, even if trained. *See Appendix 2 for a list of minimum skills necessary for a skilled attendant at birth.*

Trained TBA is a TBA who has received a short course of training through the modern health sector to upgrade her skills (Sibley et al., 2002).

Uterotonic is an agent that overcomes relaxation of the muscular wall of the uterus.

Vesico-vaginal Fistula (VVF); Obstetric Fistula: VVF is a severely disabling childbirth injury. A fistula is a tearing of the rectum, urethra, and vagina (Kristof, 2002), resulting from prolonged labor. VVF and rectal vaginal fistula result in permanent urinary or rectal incontinence (Rosenfield and Figdor, 2001).

Verbal autopsy is a process designed to facilitate the identification of maternal deaths where medical certification is inadequate through a reconstruction of the events surrounding deaths in the community by interviewing family and community members (Sloan et al., 2001).

Summary List of Safe Motherhood Interventions

Summary List of Safe Motherhood Interventions

I. Labor and Delivery

A. EmOC, Skilled Attendants and Referral

1. *Emergency Obstetric Care (EmOC)*

- Geographic access to and appropriate use of EmOC, trained responsive personnel, essential equipment, supplies, and drugs are correlated with improved maternal and infant outcomes.

2. *Skilled Attendance at Birth*

- “Providing skilled attendants able to prevent, detect, and manage the major obstetric complications, together with the equipment, drugs, and other supplies essential for their effective management, is the single most important factor in preventing maternal deaths.”
- Ensuring adequate blood supplies that have been screened for HIV can avert maternal deaths.

3. *Referral System Linking Skilled Attendants at Birth with EmOC*

- Linking skilled attendants at birth with EmOC through a referral system with adequate transport can reduce maternal mortality.

B. Transport

- Successful transportation systems linked to EmOC have decreased the number of maternal deaths.
- Transportation networks for maternal health can be arranged.

C. Support During Labor

- Supportive care in labor can reduce the need for clinical interventions.
- Adequate explanations and encouragement increase women’s sense of control over their labor.

D. Food During Labor

- Adequate food and drink during labor is advised to improve fetal outcomes and maternal well-being.

E. Position During Labor

- Allowing women to choose the position in which they want to deliver and increased mobility for women during labor leads to decreased use of analgesia and reduces time in labor.
- An upright position during labor increases positive health outcomes for the mother.

F. Treatment of Complications from Labor and Delivery

- Eclampsia is most effectively treated by magnesium sulphate with an appropriate enabled environment
- One-half of the standard dose of magnesium sulphate can control convulsions effectively.

- In selected cases and with close supervision, conservative management can be attempted in cases of severe pre-eclampsia and eclampsia after 30 weeks of gestation to gain fetal maturity without increased risk to the mother.
- Ventouse delivery (vacuum extraction rather than forceps delivery) is the first choice for low-cavity operative vaginal delivery.

G. Cesarean Sections

- Access to timely and necessary cesarean sections is critical to reducing maternal mortality.
- Use of prophylactic antibiotics at the time of cesarean sections decreases the incidence of postoperative infectious morbidity.
- Use of a partogram can decrease rates of cesarean sections.
- In some cases, symphysiotomy can be reasonably performed where cesarean sections are not available.
- A subhypnotic dose of 1–2 mg/kg per hour of propofol effectively controls the nausea and vomiting associated with regional anesthesia during cesarean section.

H. Vesico-vaginal Fistula (VVF)

- VVF can be completely averted through timely cesarean section when a woman has a prolonged labor.

I. Immediate Postpartum Care and Prevention and Treatment of Postpartum Hemorrhage (PPH)

- Counseling women on choosing an intervention-free third stage of labor as compared to the benefits of active management of the third stage of labor, which is associated with clinically significant reductions in blood loss, can result in lower rates of PPH.
- Single-use injection device pre-filled with 10IU of oxytocin improved dose accuracy and injection sterility.
- Controlled cord traction technique lowers the incidence of PPH compared to minimal intervention when sonography can detect twins.

J. Episiotomies

- Selective use of episiotomy rather than routine episiotomy leads to a lower risk of morbidity.

II. Postnatal Care

A. Length of Postnatal Care

- Women should be monitored postnatally for at least 24 hours and preferably for one week following delivery
- Training midwives to conduct postpartum visits can increase skilled attendance postpartum.

B. Treating Hemorrhage

- Training women postpartum in pelvic floor exercises can promote urinary continence.

C. Breastfeeding

- Successful breastfeeding combined with adequate maternal nutrition, unless a woman is HIV-positive, is correlated with improved maternal health outcomes.

- Keeping babies with their mothers in the same room (“rooming in”) or the same bed from birth (Kangaroo Care Method) prevents infections and increases the success of breastfeeding, especially when it is combined with breastfeeding guidance.
- On demand breastfeeding is associated with fewer complications and longer duration of breastfeeding.
- Ongoing support from nurses for breastfeeding can result in increased duration of exclusive breastfeeding.

D. Postnatal Counseling for Intrauterine Death

- In the event of a stillbirth, both parents benefit from providers allowing parents to choose time with their dead infant and tokens of remembrance.
- In the event of a diagnosis of intrauterine death, women benefit from a lapse of no more than 24 hours until induction of labor.

E. Postnatal Contraception

- Postpartum provision of contraception is effective at increasing knowledge of contraception, desired contraceptive use, potentially increasing the use of ANC, and potentially decreasing maternal and infant mortality.
- *(Please refer to forthcoming module on Reducing Unintended Pregnancy).*

III. Care During Pregnancy

A. Antenatal Care (ANC)

1. Number of Visits

- Providing four ANC visits in the following order: (1) by the end of 16 weeks; (2) between 24 and 28 weeks; (3) at 32 weeks; and (4) at 36 weeks results in no significant additional health risks compared to a greater number of ANC visits.
- Even one antenatal visit late in pregnancy can confer health benefits.

2. Evidence-Based Content of ANC: Immunizations

- Immunizing pregnant women against tetanus is one of the simplest and most cost-effective means to reduce the neonatal mortality rate as well as reducing the incidence of maternal tetanus, which is responsible for at least 5 percent of maternal deaths in developing countries.

3. Addressing Diseases During Pregnancy

➤ Preventing Malaria

➤ Treating Malaria

- Administering drugs locally effective for malaria to pregnant women may reduce the incidence of low birth weight and anemia among low parity women.
- Sulphadoxine-pyrimethamine is an effective prophylaxis for malaria among pregnant women, including for those women who are HIV-positive.
- *(See forthcoming module on STIs, HIV and AIDS).*
- Artemisinin drugs can be superior to quinine in preventing death in severe or complicated malaria, especially for multidrug resistant malaria, but recurrence of malaria after treatment is frequent.

- Combining artemisinin with other agents, such as mefloquine or lumofantrine, while expensive, provide effective treatment for malaria and less likelihood of recurrence of the disease.
- *Treating Parasitic Infections other than Malaria*
- Treating parasitic infections in pregnant women can improve maternal health, reduce maternal anemia, and increase birthweight by of infants.
- *Treating TB*
- Preventing, detecting, diagnosing, and treating TB can reduce the numbers of maternal deaths among pregnant women, including those with HIV.
- *Preventing Eclampsia/ Cardiovascular Disease*
- Once identified, there is still no clearly defined treatment or effective intervention to prevent pre-eclampsia from becoming eclampsia.
- *Averting Exposure to Toxins*
- Averting exposure by women of reproductive age to high-level polychlorinated biphenyls (PCBs) may reduce the numbers of stillbirths.
- Averting exposure to DDT may decrease preterm births and women’s abilities to lactate. “DDT is reasonably anticipated to be a human carcinogen” (IARC, 1982).
- Decreasing exposure to pesticides may reduce the numbers of spontaneous abortions.
- *Gender-based Violence*
- Clinical interventions can increase abused women’s safety-seeking behavior.
- A simple abuse assessment protocol during ANC can lead to increased detection of abuse and referral.
- *STDs, HIV, and AIDS*
- (Refer to module on STDs, HIV, and AIDS, including HIV in pregnancy and MTCT.)

B. Health Providers for ANC

- Routine ANC provided by midwives or general practitioners can have similar outcomes as when ANC is provided by Ob–Gyns.
- Midwives can be trained to provide EmOC.
- Midwives, particularly with training, can become sources of health information for pregnant women.
- TBAs and community volunteers can be effective in distributing iron-tablet supplements.

C. Health Promotion for Mothers, Partners, and Communities

1. Health Education to Increase Hospital Deliveries When Needed

- Health education is effective in improving the numbers of women who seek skilled attendance with lower rates of stillbirths and neonatal deaths.

2. Providing Women and Men with Adequate Information

- Women and men desire more information on birth, breastfeeding, family planning, and couple communications.

3. Involving Men in Maternity Care

- Training providers to involve men in maternity care and provide STI counseling and services can increase the numbers of men accompanying their wives to ANC clinics.

- Educating male partners and family members concerning safe motherhood improves ANC attendance.
- Educating male partners concerning safe motherhood improves maternal health outcomes.

4. Education about Danger Signs and Need for EmOC

- Community education programs as well as individual counseling programs about danger signals requiring EmOC can increase knowledge of and use of EmOC.

5. Breastfeeding Promotion

- Women, families, and communities should be counseled on the positive effects of breastfeeding for the health of the newborn and the woman, and the need and/or provision of adequate nutrition for the breastfeeding woman.
- (*Refer to the module in the guide on MTCT for breastfeeding by women who are HIV-positive.*)

6. Cigarette Smoke Prevention

- Providers can successfully encourage pregnant women to stop smoking as well as other family members who live with the woman.
- Education efforts should encourage pregnant women to stop smoking as well as other family members who live with the woman.

D. Nutrition to Support Safe Motherhood

- Universal or targeted food fortification of can reduce nutritional deficits. In most societies, women are more likely to be malnourished.
- Increasing food intakes for girls until three years of age may increase their adult height and decrease risk of maternal mortality.
- Treating severe iron-deficiency during pregnancy may reduce the risk of maternal mortality.
- Treating iron-deficiency anemia with iron during pregnancy has been shown to reduce the prevalence of anemia and maternal morbidity; in the second trimester, providing iron together with folate, B12, riboflavin, and treatment for parasitic infections reduces the risk of maternal morbidity.
- Training, IEC campaigns, and distribution of iron tablets can reduce anemia.
- Treating hookworm reduces the prevalence of anemia.
- Periconceptual intake of 400ug of folic acid daily can reduce the risk of neural tube defects, including anencephaly, spina bifida, iniencephaly, craniorachischisis, and encephalocele, but not isolated hydrocephalus.
- Adequate amounts of calcium and magnesium reduce the risk of eclampsia and prematurity.
- Adequate maternal iodine can halve infant mortality rates and improve infant health.
- A weekly supplement of vitamin-A 7,000ug retinol prior to conception, through pregnancy and lactation can reduce maternal mortality and morbidity.
- Daily low dose of vitamin A given during the second and third trimesters of pregnancy substantially reduces the risk of maternal postpartum infections in women who are deficient in vitamin A.
- Increasing women's access to microcredit, nutritional information, and technical assistance, may improve the effectiveness of micronutrient interventions.

IV. Pre-pregnancy Care

A. Education for Girls

- Higher levels of schooling for girls and women are correlated with increased obstetric survival.

B. Reducing Prevalence of Female Genital Cutting (FGC)

- Conducting community wide education and creating alternative rituals for FGC can reduce the risks of maternal morbidity and stillbirths.

C. Deliver Micronutrient Supplementation Through Schools

- Iron supplementation delivered through the school and targeted to at-risk adolescents is an effective way to prevent anemia and iron deficiency.

D. Providing Multivitamins Prior to Conception Can Improve Maternal Health

- Combined supplements prior to conception are more effective than single supplements.

E. Start Smoking Cessation Programs in Adolescence

- Smoking cessation education programs for adolescents can be effective in preventing tobacco use.

F. Provide Family Planning

- Access to a choice of safe, affordable, and appropriate family planning knowledge and methods, especially for adolescents, is essential to ensuring safe motherhood by reducing unwanted pregnancies.
- *(Also refer to the forthcoming module on Reducing Unintended Pregnancy.)*

V. Policy and Program Issues in Safe Motherhood

A. Increasing Access to Care

- Policies explicitly targeting maternal mortality reduction can be successful.
- Projects that reduce financial barriers and loan funds can reduce maternal mortality and increase access for needed maternal health services.
- Increasing the numbers of midwives and deploying a midwife for each village has increased skilled attendance at birth.
- Maternity care provided at no cost has considerable hidden costs for users and their families and may be a major contributor to low use of maternity services.
- Providing refugee assistance by subsidizing host-country health systems can improve the rates of major obstetric interventions for the host population as well as improve host-country health and transportation systems.

B. Provider Training

- Increasing stakeholder participation resulted in increased levels of use of EmOC and immunizations.

1. Provider Training to Support EOC

- In-service training for health providers can improve providers' skills.

- In-service training for health providers can improve health services for mothers and newborns.
- Trained medical assistants can also administer EmOC.
- Training clinic staff and creating adolescent-friendly sexual and reproductive health services *can increase the numbers of adolescents who receive ANC.*

2. Traditional Birth Attendants (TBAs)

- Where TBAs deliver more than half of all births, receive training to conduct case management of complications, backed by transport and EmOC, and hospital staff are trained to accept TBAs training TBAs may lead to increased referrals for EOC, reduced neonatal mortality, and improved maternal knowledge and behavior. *However, TBA training has not been found to decrease maternal mortality.*
- Hospital staff training can increase referrals from TBAs.

C. Providers of EOC

- Midwives can effectively provide care and can be less likely to overmedicalize normal births.

D. Ensuring Quality Care

- Improving the quality of care can increase the likelihood that pregnant women will go to health facilities in case of obstetric emergencies and can avert maternal deaths.
- Birth centers in some developed countries are as safe as standard maternity care.
- Involving women in decision making concerning their pregnancy and birth increases women's satisfaction with childbirth.
- Continuity of care during pregnancy, labor, and delivery leads to better health outcomes and increased satisfaction.
- Training providers can improve quality of care.
- Low maternal mortality ratios are not guaranteed merely by having all births attended by professionals in hospitals.
- Introducing confidential inquiries and the concept of avoidable maternal deaths can lower rates of maternal mortality and improve the quality of obstetric care.

VI. Safe Motherhood Interventions That Have Not Been Shown to Be Effective

- Most maternal complications are not detected through ANC services.
- "Training of TBAs alone, in the absence of back-up from a functioning referral system and support from professionally trained health workers, is not effective in reducing maternal mortality."
- Training TBAs in clean delivery does not prevent postpartum infection.
- Training TBAs in recognition of complications and referrals may not increase referrals.
- Monitoring weight gain during pregnancy has not been proven to improve maternal or fetal outcomes.
- Fish oil has not been proven to reduce hypertension.
- Aspirin has not been proven to prevent pre-eclampsia.
- Prophylactic supplements of magnesium does not prevent pre-eclampsia.

- Bed rest does not improve health outcomes for pregnant women with hypertension.
- Ketanserin or diazoxide are not effective in reducing hypertension.
- Routine use of ultrasound by health professionals may increase the risk of miscarriage and undermine the quality of ANC without any health benefits for mother or infants.
- “We have little evidence that gestational diabetes (GD) management succeeds.”
- A Cochrane Collaboration review found that “there is insufficient evidence to justify the use of misoprostol prophylactically when other uterotonics are not available.”

VII. Common Practices That Can Be Harmful to Safe Motherhood

- Policies that prevent trained nurses and midwives from performing EOC can result in delayed or no EOC treatment.
- In some situations, training TBAs has resulted in harmful outcomes for mothers.
- Adverse outcomes have been associated with use of epidurals in nonemergency settings.
- Denying food and water to women during labor is unnecessary.
- Routine perineal shaving and pubic shaving are unnecessary.
- Routine enemas are unnecessary.
- Forcing women to lie on their backs for labor and delivery compromises maternal and infant outcomes.
- Routine intravenous infusions during labor can be harmful as they restrict mobility.
- Routine continuous fetal monitoring is correlated with adverse health outcomes.
- Routine episiotomies cause harm and rates more than 10 percent may indicate an excess of episiotomies.
- Rectal examinations during vaginal delivery should not be performed.
- Medically unnecessary cesarean sections can cause increased maternal morbidity.

VII. Selected Interventions for Which Evidence (or More Evidence) Is Needed

- Immunizing all women of reproductive age against tetanus.
- Training and methodology for each level of maternity care providers.
- Improving nutrition in pregnancy to reduce maternal mortality from toxemia.
- Predicting eclampsia based on edema.
- Routine antibiotics for premature rupture of the membrane.
- Health education for women to seek care after membrane rupture.
- Performing cesarean sections improves outcomes with signs of fetal distress.
- Screen and refer for gender-based violence during ANC.
- Address the special needs of pregnant refugees, especially victims of rape.
- Training midwives and physicians collaboratively improves referral systems.

Resources for Program Design

Resources for Program Design

Advance Africa: www.advanceafrica.org

American College of Nurse Midwives: www.acnm.org

Association for Improvements in Maternity Services: www.aims.org.uk

Better Births Initiative: www.liv.ac.lstm/bbimainpage.html

Center for Development and Population Activities (CEDPA): www.cedpa.org

Center for Reproductive Law and Policy: www.crlp.org

Canadian International Development Agency (CIDA): www.acdi-cida.gc.ca

Cochrane Collaboration: www.chochrane.org

Columbia University, Averting Maternal Death and Disability:
www.mailmanhs.columbia.edu/popfam

EngenderHealth: www.engenderhealth.org

Family Care International: www.fci.org

Family Health International: www.familycareint.org

Global Health Council: www.globalhealth.org

Hesperian Foundation: www.heasperian.org

Interagency Group on Safe Motherhood: www.safemotherhood.org

International Center for Research on Women: www.icrw.org

International Confederation of Midwives: www.internationalmidwives.org

International Federation of Gynecologists and Obstetricians: www.figo.org

International Women's Health Coalition: www.iwhc.org

JHPIEGO: www.jhpiego.org

The Linkages Project on Maternal Nutrition: www.linkagesproject.org

Liverpool School of Tropical Medicine (UK): www.liv.ac.uk/lstm

London School of Hygiene and Tropical Medicine: www.lshtm.ac.uk

The Manoff Group: www.manoffgroup.com

Maximizing Access and Quality of Care (MAQ): www.maqweb.org

Our Bodies, Ourselves: www.ourbodiesourselves.org

Pan American Health Organization (PAHO): www.paho.org

PANOS (UK): www.panos.org/uk

Program for Appropriate Technology in Health (PATH): www.path.org

Population Council: www.popcouncil.org

Population Reference Bureau: www.prb.org

Save the Children: www.savethechildren.org

UNFPA: www.unfpa.org

UNICEF: www.unicef.org

University of Aberdeen, Dougald Baird Centre: www.abdn.ac.uk/dougaldbairdcentre

University of Southampton: www.socstats.soton.ac.uk/choices/

UN Standing Committee on Nutrition: www.unsystem.org/scn

USAID: www.usaid.gov/pop-health

USAID Interagency Gender Working Group: www.measurecommunication.org

White Ribbon Alliance: www.whiteribbonalliance.org

World Bank: www.worldbank.org

World Health Organization: www.who.int

For prescribing drugs in pregnancy, check: www.motherisk.org and www.reprotox.org.

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