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PREVENTION OF MATERNAL MORTALITY

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Report of a WHO Interregional Meeting  
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## 1. INTRODUCTION

Maternal mortality is notoriously difficult to measure and monitor. In countries with the highest death rates most maternal deaths are not recorded. As a result the problem of maternal mortality has received much less attention than it deserves. Not only the magnitude but also the reasons why such deaths occur have been long neglected. However, over the last decade it has gradually become clearer that the maternal death rates in developing countries, which can be 200 times higher than those of industrialized countries, represent one of the widest disparities in world health between rich and poor, namely the availability and quality of maternal health and family planning care. It is now known that worldwide at least 500,000 women die each year from causes related to pregnancy and childbirth. The vast majority of these deaths occur in developing countries. There are, for example, more maternal deaths in India in a week than in all Europe in a whole year. Most of the deaths could have been prevented with presently known technology.

As this picture has become clearer, and as some of the interventions to reduce infant and childhood mortality begin to show results, so WHO's concern over the problems of prevention of maternal mortality has deepened and become more acute. This concern over the totally unacceptable levels of maternal mortality was mirrored also at the International Conference on Population held in Mexico City in August 1984; see for example Recommendation 18 which "urges governments to reduce maternal morbidity and mortality and to provide prenatal and perinatal care, with special attention to high-risk pregnancies, and ensure safe delivery by trained attendants"; and at the World Conference to Review and Appraise the Achievements of the UN Decade for Women, Nairobi, July 1985, which clearly recommended that "the reduction of maternal mortality from now to the year 2000 to a minimum level should be a key target for Governments and non-governmental organizations, including professional organizations".

WHO has for several years, with the support of the United Nations Fund for Population Activities (UNFPA), been intensifying its activities in this field. At country level increasing efforts have been made to collaborate with countries in training of traditional birth attendants (TBAs). At intercountry and country levels the development of the risk approach is providing a promising tool for giving priority to those most in need. WHO is also collaborating with countries in studies to measure and analyse the causes of maternal mortality and to define unmet needs in maternal health and family planning. The results of the first of these were presented at the meeting.

It was as one part of the WHO global project on research and development on maternal health and family planning supported by UNFPA, that WHO convened, in November 1985 in Geneva, this Interregional Meeting on the Prevention of Maternal Mortality, bringing together 41 health professionals, researchers and policy makers from 26 countries and agencies. The objectives of the meeting were:

1. To promote awareness of and disseminate knowledge of the magnitude of the problem;
2. To define better the nature of the problem and to analyse the causes of maternal death considered at different levels of causation;
3. To review experiences in preventing maternal mortality and the implications of these experiences in terms of appropriate technology and of needs for training and research;

4. To draw conclusions from the above and about how maternity care and family planning services can be more effectively organized and delivered at tertiary, secondary and primary health care levels;
5. To identify practical approaches for the reduction of maternal mortality and morbidity in the context of WHO's strategy for Health for all by the year 2000 (HFA/2000).

## 2. THE SCOPE OF THE PROBLEM

### 2.1 Overview

In the course of the meeting, 24 papers were presented (see references). While each of these, in its own way, demonstrated the terrible size of the problem and the urgent need for action, perhaps the most succinct illustration was presented by Dr Malcolm Potts:

"Every four hours, day-in, day-out, a jumbo jet crashes and all on board are killed. The 250 passengers are women, most in the prime of life, some still in their teens. They are all either pregnant or have just delivered a baby. Most of them have growing children at home, and families that depend on them."

This shocking scenario highlights both the magnitude of the problem and the extent to which it has been overlooked. If the 500,000 maternal deaths that are estimated to occur each year took place in such a concentrated and visible way there would be an international outcry. But the reality is that maternal deaths take place a few at a time, in poor countries, among poor women, and often in small villages. These deaths do not make headlines, they just leave behind motherless children, bereaved families, and health workers frustrated by their inability to prevent such deaths from happening again and again.

### 2.2 National and local maternal mortality rates

Numerous participants presented information on maternal mortality rates (MMRs) at the national or local level. Table 1 shows the results of their studies.

Overall, Table 1 makes a very important point. Maternal mortality in developing countries is quite high. With the exception of Cuba, Portugal and Shanghai, all the studies found MMRs above 50, and rates over 500 are not uncommon. This means that each time they become pregnant, women in rural Bangladesh, for example, face risks of dying that are at least 55 times higher than those faced by women in Portugal and 400 times higher than women in Scandinavia.

An obvious feature of this table is that national studies of maternal mortality in developing countries are rare. A primary reason for this is that few developing countries have records of all births and deaths that take place, and special studies of a whole country are difficult and expensive to do.

On the other hand, special studies at the local level provide a great deal of important information. In some cases, these studies supply the only data available on maternal deaths in a country, other than official estimates (which are notoriously low, as will be shown later).

As Table 1 shows, there is considerable variation in reported maternal mortality rates. While some of this variation may be due to difference in study design, in general, the patterns are those that one might expect. Countries with very high crude mortality rates (such as Bangladesh, Ethiopia and India) have higher MMRs than do those

with lower crude mortality rates (e.g. China, Colombia, Cuba, Malaysia, Portugal and Turkey). Furthermore, within-country differences conform to other mortality patterns. For example, MMRs are shown to be lower in urban areas, where health services are more accessible, than in rural areas (e.g. China and India). Similarly, the MMR reported for a northern region of Egypt is lower, 190, than that for a region in the southern part of the country, 300, which is less developed.

### 2.3 Hospital maternal mortality rates

A hospital MMR is the number of maternal deaths taking place in the hospital divided by the number of live births taking place in the same institution during the same period of time. Such rates are not good indicators of the risk of maternal death in the population. One reason for this is that most births in developing countries do not occur in hospitals. On the other hand, women who experience serious complications during delivery are likely to try to reach a hospital. Consequently, hospital MMRs in developing countries are sometimes much higher than the population MMR is likely to be.

Nevertheless, there is valuable information to be gained from hospital studies. First of all, they are a major source of information on medical causes of death (see section 3.2 below). Secondly, they tell us something about the functioning of the medical system as a whole. For example, among the hospital MMRs reported at the meeting were the following: Nepal 398 per 100,000 live births; Nigeria 1,050; Pakistan 170; Sudan 305; and Vietnam 576;<sup>1</sup>. In each of these studies, for every thousand women who delivered a live baby in the hospital, at least one woman died. In Nigeria, the ratio was more than one for every 100. These rates tell us that something is wrong, because most women can be saved with prompt and adequate medical care. Usually it is a combination of factors. For example, the woman arrives at the hospital in extremely poor condition, there is a shortage of supplies, and medical care is inadequate. These issues are discussed in section 3.

### 2.4 The problem of underreporting

As distressing as the MMRs in Table 1 are, some of them are probably still underestimates. The reason for this is that experience in both developed and developing countries has shown that maternal deaths are virtually always underreported.

In industrialized countries, almost all deaths come to the attention of medical and civil authorities. Even so, there is considerable underreporting of maternal deaths because the death certificate may not mention the fact that the woman had recently been pregnant. A recent study in the state of Washington, in the United States, found that maternal deaths were underreported by 100 per cent /30/.

Several of the studies presented at the meeting demonstrated the inadequacy of official statistics. In Jamaica, the official MMR was 48, but a national study uncovered a rate of 102. In Egypt, two separate studies found maternal mortality rates of at least double the official rate of 90 /1, 11/. Investigators in Colombia, India, Jamaica and Sudan all discovered substantial underreporting when death certificates were checked against hospital records /22, 5, 23, 4/.

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<sup>1</sup> Throughout this report examples from countries are drawn from the studies presented at the Meeting. They are listed in Appendix 1. To avoid repetition, references in the text are only given when there is a need to distinguish between studies carried out in the same country.

Another major reason for underreporting of maternal deaths in developing countries is that many deaths occur outside hospitals. In a hospital study in Sudan, for example, "the number of cases collected was certainly less than the actual number, as some cases were not reported and some arrived at the outpatient department either dead or about to be ... and were immediately taken back by the relatives." /4, p.5/

Data from Egypt, India, Indonesia, Malaysia and Turkey showed that large proportions of maternal deaths took place either at home or on the way to the hospital /11, 5, 2, 8/. These proportions ranged from 24 per cent of deaths in Turkey to 82 per cent in rural India /5/. In Bangladesh, hospital staff were aware of only four per cent of the maternal deaths discovered by researchers /21/.

In general, the studies presented demonstrated that the larger the number of sources of data employed, the more maternal deaths are discovered. In India it was learned that even school children can be a valuable source of information on deaths that might otherwise be overlooked.

### 3. THE CAUSES OF MATERNAL MORTALITY

#### 3.1 Overview

Dr Fathalla, in the opening address of the meeting, emphasized that the causes of maternal deaths are complex. To do this, he described the case of Mrs X:

Mrs X died in hospital during labour. The attending physician certified that the death was due to haemorrhage due to placenta previa. The consulting obstetrician said that the haemorrhage might not have been fatal if Mrs X had not been anaemic due to parasitic infection and malnutrition. There was also concern because Mrs X had only received 500ml of whole blood, and because she died on the operating table while a caesarean section was being performed by a resident. The hospital administrator noted that Mrs X had not arrived at the hospital until four hours after severe bleeding had begun, and that she had had several episodes of bleeding during the last month, for which she did not seek medical attention. The sociologist observed that Mrs X was 39 years old, with seven previous pregnancies and five living children. She had never used contraceptives and the last pregnancy was unwanted. In addition, she was poor, illiterate and lived in a rural area.

Why did Mrs X die? Dr Fathalla pointed out that there were a number of points at which Mrs X could have been helped off the road to death. In order to identify these, and to design and implement effective programmes, the various kinds of causes need to be understood.

#### 3.2 Medical factors

There is considerable variation in ways of classifying medical causes of death. For example, a woman who dies when her uterus ruptures and she bleeds to death may be listed as dying from either haemorrhage or ruptured uterus. Nevertheless, the final "causes" of maternal deaths - those diagnosed and recorded by medical personnel - are remarkably consistent throughout the developing world.

Maternal deaths - that is, deaths among women who are or have been pregnant during the previous 42 days - are usually divided into three categories: "direct" obstetric deaths; "indirect" obstetric deaths; and unrelated deaths. Direct obstetric deaths are those resulting from complications of pregnancy, delivery or their management. Indirect obstetric deaths are the result of the aggravation of some existing condition (such as hepatitis or heart disease) by pregnancy or delivery.

In developing countries, most maternal deaths are direct obstetric deaths, and the major causes of these deaths are haemorrhage, infection, and toxæmia (also called "pregnancy-induced hypertension"). The studies presented at the meeting amply confirmed these generalizations. Direct deaths constituted 50-98 per cent of all maternal deaths. The median was 75 per cent. Haemorrhage, infection and toxæmia together made up at least half of all maternal deaths in 11 of the 13 countries for which this information was provided /1, 2, 4, 5, 6, 8, 11, 16, 17, 19, 20 23/.

In a few studies, some other condition was listed as one of the three leading causes of death. Most often, this other condition was illegal induced abortion (Colombia, Cuba, Ethiopia and Peru). In two cases - Turkey and urban Shanghai - embolism was one of the three leading causes of death. Both of these places have relatively low rates of maternal mortality, and the data indicated that deaths from infection had been reduced. Ruptured uterus (Egypt), hepatitis (Sudan), anaemia (Tanzania) and obstructed labour (Nepal) were each cited once as one of the three leading causes of maternal deaths.

Taken together, these studies underline the fact that the major medical causes of maternal deaths in developing countries are already known. But these diagnoses are usually just the last step on the road to death.

### 3.3 Health service factors

The fact that medical causes of death are not the whole story was made forcefully at the meeting in discussions of avoidable maternal deaths. The medical records of women who had died were analysed in nine countries in order to identify factors that contributed to their deaths. The investigators found that 63-80 per cent of direct maternal deaths, and 88-98 per cent of all maternal deaths could probably have been avoided with proper handling. In a number of cases, the researchers specifically stated that they had evaluated the avoidability of deaths not by standards of care under the best of circumstances, but by standards realistic under the circumstances prevailing in that country at the time. For example, in Turkey, 51 per cent of maternal deaths were judged to be avoidable within the existing health system, and another 24 per cent avoidable with an improved health system. In most cases, investigators identified more than one avoidable factor that contributed to each death.

Deficient medical treatment of complications was often an important factor. Mistaken or inadequate action by medical personnel was judged to be a contributing factor in 11 per cent of maternal deaths in Colombia; 47 per cent in India; 36 per cent in Tanzania; and 37 per cent in Vietnam; /22, 20, 18, 14/.

Lack of essential supplies and trained personnel in medical facilities was frequently mentioned as contributing to maternal deaths (India, Senegal, Sudan and Vietnam). In Tanzania, lack of blood for transfusions, drugs and equipment was a factor in more than half of the deaths studied. In Jamaica, only 6 of the 18 deaths in hospitals from haemorrhage took place in hospitals that had a blood bank.

Lack of access to maternity services is another crucial step on the road to death. The studies in Cuba, Egypt, Indonesia, Jamaica, Tanzania and Turkey demonstrated that maternal mortality rates are increased in areas where access to a hospital is difficult. The result of this is that women from these areas are likely to arrive at the hospital (if they succeed in doing so) in serious condition. In Nepal, for example, 32 per cent of women who died in the hospital arrived in very poor condition, and another 17 per cent arrived unconscious. In Senegal, it was reported, among women who were admitted to the emergency ward of the hospital, there were four deaths among nine women who lived in the city, compared to 91 deaths among the 96 women who had been brought from outlying areas.

Lack of prenatal care was frequently mentioned as a contributing factor. In general, women who did not receive prenatal care were more likely to die than women who had. For example, in Portugal, more than half of women who died had not received prenatal care, compared to one-third of women in the country as a whole. In Nigeria it was noted that in all age-parity groups, maternal mortality rates were drastically lower among women who had had prenatal care than among those who had not, although "the risks of teenage pregnancy and high parity were still very evident" /12, p.3/.

Several investigators, however, presented data that show that more research is needed on the role of prenatal care. For example, in Vietnam "very few adverse events were found at antenatal visits ..." /14, p.10/. Furthermore, the community-based study of maternal mortality in Addis Ababa illustrates the point that "antenatal care and selection of high-risk women are not an end in themselves ..." /16, p.14/. All three women in the Ethiopian study who died of haemorrhage had had prenatal care, but had delivered at home. This shows that women must be convinced of the benefit of referral, and above all services must be accessible.

Another problem in interpreting data on prenatal care is that educated and wealthier women are more likely than poor women to have prenatal care /4/. In Nepal, only 34 per cent of illiterate women had prenatal care, compared to 91 per cent of women with a college education. Therefore, it is difficult to distinguish the well-known effects of poverty on maternal health from the effects of prenatal care.

#### 3.4 Reproductive factors

For decades it has been known that certain groups of women - very young women, those aged 35 or older, and women who have already borne four or more children - are at especially high risk of dying during pregnancy and delivery. Many of the studies presented at the meeting confirmed this knowledge.

Maternal age: Data showing higher MMRs among women 35 or older were presented for eight countries (Bangladesh, Cuba, Egypt, Ethiopia, Indonesia, Jamaica, Portugal and Vietnam). In the six of these studies that provide the data to make this comparison, when compared to women aged 20-24, women 35-39 were from 85 per cent to 461 per cent more likely to die from a given pregnancy (relative risks, 1.83-5.61). One study, a case/control study in Tanzania, did not show this expected relationship.

The same studies that showed an excess of deaths among older women showed an excess among women younger than 20, with the exception of Cuba. Increased risks of death were especially pronounced in Ethiopia, Indonesia and Portugal. Again, the Tanzania study did not show any differences by age between women who died and those who did not.

Parity: Although information on parity is more difficult to obtain than information on age, several studies also confirmed the increased risk of death associated with having many children. In Jamaica, compared to women having their second child, those having their fifth through ninth births were 43 per cent more likely to die. In Portugal, women having their fifth birth were three times as likely to die than were women having their second, while women having their sixth or later birth were at even greater risk.

The importance of these data is that the use of family planning could prevent a great many deaths of women of unfavourable age or parity.

Unwanted pregnancy: Of course, given the high overall rates of maternal death in poor countries, the impact of family planning would be important if unwanted pregnancies were averted at any age or parity. This point is vividly illustrated by data from the governorate of Menoufia in Egypt and the island of Bali in Indonesia /11/. When

similar studies were done in both places, a striking difference was found in maternal mortality rates: in Bali there were 718 deaths per 100,000 live births, compared to 190 in Menoufia - 278 per cent higher. However, when the risk of childbearing was expressed in another way - as maternal deaths per 100,000 married women aged 15-49 - the difference was greatly reduced. In Bali, there were 69 deaths per 100,000 women, compared to 45 in Menoufia - an excess of only 53 per cent. The reason for this seeming paradox is that fertility rates are much lower in Bali than in Menoufia, largely due to the use of family planning.

Illegal induced abortion is a major killer of women, as the studies presented at the meeting amply demonstrated. It was responsible for 7-50 per cent of maternal deaths, with the median being 15 per cent. As high as these percentages are, many of them are probably too low. The reason for this is that women who have illegal abortions are reluctant to seek formal medical help. In Ethiopia, for example, four of the six women who died on the way to the hospital had had an illegal induced abortion. Reluctance or inability to get medical care results in a selective underreporting of abortion deaths. In India, 11 per cent of hospital deaths were due to abortion, compared to 17 per cent of deaths at home in rural areas /5/.

Clearly, since induced abortions occur in cases of unwanted pregnancy, family planning could substantially reduce the number of deaths from this cause.

Finally, unwanted pregnancy contributes to maternal deaths in ways which are not yet understood. The Ethiopian study found that women who had an unwanted pregnancy were less likely than other women to seek prenatal care. In addition, two deaths of pregnant women by poisoning were attributed to unwanted pregnancy.

### 3.5 Socioeconomic factors

Socioeconomic factors undoubtedly play a large role in maternal deaths, and yet still not very much is known about how or why. What is known is that "clearly, poverty is a high-risk factor" /21, p.4/. It is also known that poor women are less likely to have formal education than wealthy women, they are less likely to be in good health and to seek (or receive) medical care. Which of these factors are causes and which are effects? How can this vicious cycle be broken? Much more research needs to be done in order to answer these questions.

The kinds of questions raised above are also relevant to health problems other than maternal mortality, e.g. infant mortality. But another (and even less well studied) aspect of socioeconomic status has particular importance in maternal deaths, and that is the status of women.

"In almost all societies in the past, and in many societies in the present, women are a socially disadvantaged group ... The status of women affects their nutrition, reproductive behaviour, utilization of health care services, and vulnerability to harmful traditional practices" /10, p.15/. The ramifications of the status of women is so far-reaching that it may be that "nothing will really change in as far as maternal mortality is concerned until attitudes towards women change and people are sufficiently motivated to improve their living conditions" /13, p.6/.

## 4. ACTIONS RECOMMENDED

At the closing session Dr Fathalla, who chaired the meeting, observed that the discussions had shown that the participants believe that a major new initiative should be mounted to prevent maternal deaths in developing countries. As with any new undertaking, three questions need to be addressed: Should it be done? If yes, can it be done? If yes, what is the best way to do it?

The papers presented and the plenary sessions had strongly indicated that such an effort should be undertaken - and is, in fact, overdue. Furthermore, there was agreement that much can be accomplished. The remaining question, then, was how best to begin. Recommendations for actions at a number of levels - policy, programme, training and research - had been prepared during two intensive days of working group sessions, and were discussed in plenary session.

#### 4.1 Policy initiatives

In order for there to be a concerted and effective effort to reduce maternal deaths in developing countries, maternal mortality must be given high priority. As with all areas of action, initiatives need to be taken at a number of levels - starting at the global level, with WHO helping to set policy and coordinate actions and resources.

WHO: It was strongly recommended that Member States of WHO should designate maternal mortality one of the global indicators of Health for All by the Year 2000. Furthermore, WHO should help draw the attention of Member States to the greatly elevated risk of death faced by women in high-risk groups if and when they become pregnant /29/.

National governments: While WHO can lead the global effort to reduce maternal deaths, the effectiveness of this effort depends mostly on national governments. To begin with, governments must make prevention of maternal death a priority health issue, and should review their policies and programmes, with an eye toward preventing maternal deaths. Policy reviews should cover such issues as removing obstacles to family planning, such as taxes on and other difficulties in importation of contraceptives /29/.

Professional societies: In order to prevent substantial numbers of maternal deaths in poor countries, services must spread more widely and innovative programmes must be tried and assessed. This will not be possible without the strong leadership of professional societies (e.g. medical associations), both internationally and nationally /28/.

#### 4.2 Programme initiatives

It is clear from the persistence of high rates of maternal mortality and morbidity that current programmes are not adequate, and that bold and determined new thinking and effort is required /28/. Programmes should be guided by the axiom that all services should be provided at the most peripheral level of the health care system at which this can be done effectively /28/.

The design of services should be guided by what has been learned from studies such as those presented at the meeting. For example, in many countries most deliveries and many maternal deaths take place outside hospitals. Furthermore, a sizeable proportion of serious complications cannot be predicted beforehand. Therefore, while efforts must be made to upgrade hospital care, and to refer high-risk women as early as possible, services need to be designed to reduce distance between pregnant women and the care they require.

A variety of approaches can be used. When complications can be predicted, maternity waiting homes could be established. These are facilities where pregnant women can come in the last week of pregnancy, live while they await delivery, and either have a supervised normal delivery or prompt transfer to a medical facility if complications arise. Experience with waiting homes in Colombia, Chile, Cuba, Uganda and Malawi has shown that they can be successful and need not be expensive, as the community can provide a large part of the labour and supplies /28/.

However, in the large proportion of cases in which complications cannot be predicted, more effective means of treating complications need to be available at the first referral level, and through establishing more basic obstetric facilities /27, 28/. These need not be new facilities. Health centres could be upgraded to provide essential maternal health services: vacuum extraction deliveries; blood transfusions; simple general and/or local anaesthesia; caesarean section; suction curettage for incomplete abortion; intra-uterine device insertion; and tubal ligation and vasectomy /28/.

Suggestions of promising approaches were made, taking the major causes of death separately.

Haemorrhage: Postpartum haemorrhage is difficult to predict and there is often little time or opportunity to transport the woman to a hospital for blood transfusion /28/. Therefore, any trained person who is considered capable of doing a delivery should be trained to handle this life-threatening complication through use of oxytocic drugs (which contract the uterus and its blood vessels) and manual removal of the placenta followed by broad-spectrum antibiotics. In addition, the use of plasma expanders at health centres that cannot provide transfusions should be explored /28/.

Antepartum haemorrhage can be predicted in some cases (i.e. third trimester bleeding with placenta previa). In these cases, early referral to a facility where blood transfusion and caesarean section are available is crucial. However, in many cases antepartum haemorrhage cannot be predicted. Therefore, there is an urgent need to shorten the distance between the place of delivery and a facility where emergency care can be provided /28/. In addition to upgrading peripheral health facilities, attention must be paid to the key role of transportation. An effort should be made to make all kinds of government vehicles available in emergencies, rather than relying on scarce (or non-existent) health department vehicles alone /28/.

Infection: Deaths from infection can be greatly reduced (as they have been in China) through cleanliness during delivery. Provision of TBAs with delivery kits is one way to encourage asepsis. Addition of antibiotics to these kits - for use in cases of prolonged labour or premature rupture of the membranes - could prevent many maternal deaths in areas where physicians are scarce /28/.

Toxaemia: Only good prenatal and medical care can prevent the majority of deaths from this case. However, sedatives for treatment of severe toxaemia should be made available at the primary care level /28/.

Unwanted pregnancy: As the studies presented at the meeting showed, unwanted pregnancy contributes to maternal mortality in a number of ways - e.g. in the number of births to women in high-risk groups, in the number of pregnancies per woman. The most dramatic way in which unwanted pregnancies contribute to maternal deaths is through illegal induced abortion. This is an instance in which primary prevention holds great promise, because these pregnancies are, by definition, unwanted.

Family planning is the first line of defence against illegal abortion, and education about avoiding unwanted pregnancies should be provided in schools, at all levels of the health care system, and during all contacts with pregnant and recently delivered women /28, 29/. Special attention should be paid to counselling women who are being treated for complications of abortion, in order to avoid repeated unwanted pregnancies and abortions /29/. Furthermore, whatever the accepted indications for legal abortion in a country (and there are usually some), this service should be made widely available, rather than being available only to wealthy women in urban areas /28/.

Obstructed labour: While there are certain groups of women who are at especially high risk of obstructed labour (i.e. women of small stature, women having their first birth and women having their sixth or later birth), in many cases this complication is not predictable. So, again, access to emergency services is essential. In the case of obstructed labour, much could be accomplished by educating TBAs to promptly send women who are not making satisfactory progress in labour to a facility where they can get medical care, such as a caesarean section /28/.

Anaemia: Anaemia is often a major contributing factor in maternal deaths. Depending on the cause of anaemia in a particular region, iron and folate supplements, malaria prophylaxis and/or treatment, and treatment of ankylostomiasis and schistosomiasis should be provided to pregnant women at the primary care level /28/.

Tetanus: In addition to being a major killer of newborns, tetanus is a common cause of maternal deaths in some areas (Bangladesh, India, Indonesia). The administration of tetanus toxoid to all women, especially pregnant women, should be a high priority /27/.

#### 4.3 Training initiatives

Of course, the key to programme success is implementation, in which training is a crucial component. Some of the areas in which training needs to take place are the following:

Traditional birth attendants: TBAs are often the first (and, frequently, the only) health care workers with whom pregnant women in poor countries have contact. Therefore, it is essential that they be as effective as possible. It was emphasized that, in addition to training, supervision and support are important factors in the effectiveness of TBAs (as is true of other health personnel).

A major role of TBAs should be referral (assuming, of course, that there are health care facilities to which women can be referred). Topics suggested for TBA training in referral included: recognition of risk factors (e.g. age, parity, poor obstetric history, bleeding during pregnancy); detection of anaemia; recognition of infection, prolonged labour and excessive blood loss; and referral to a source of legal abortion /27/.

TBAs should also be given the training and supplies to prevent or treat complications whenever possible. Preventive measures include the use of antiseptic techniques in delivery and the administration of drugs to reduce anaemia, and provision of contraceptives /27, 29/. Treatment skills could include first aid for treatment of haemorrhage (such as application of pressure, elevation of limbs and use of oxytocic drugs), and safe removal of retained placenta /27/.

Health centres: If health centres are to fulfill their potential in preventing maternal deaths, centre personnel need the training and supplies to be effective. Suggested areas for training include: recognition of blood pressure abnormalities and anaemia; use of antibiotics, intramuscular iron supplements, oxytocic drugs and plasma expanders; and repair of lacerations /27/. In areas where there is no physician available to perform life-saving caesarean sections, the feasibility of teaching trained midwives to do this operation should be explored /27/.

Referral hospitals: As the studies of avoidable deaths demonstrated, hospital personnel need additional training in treatment of serious complications. For example, it was suggested that special teams of health care personnel be established for coping with haemorrhage and eclampsia. Personnel in these facilities need to have banked blood available, and be able to manage such catastrophic events as uterine rupture /27/.

#### 4.4 Research initiatives

Three broad types of research were discussed: research on appropriate technology for preventing maternal deaths; health systems research on innovative programmes; and epidemiologic research on the incidence and causes of maternal deaths.

Appropriate technology research: A wide variety of appropriate technology issues were suggested for future research. These included such topics as: simple, inexpensive methods for detecting and measuring anaemia; durable tubing for vacuum extractors; appropriate plasma expanders for use at health centres; and the content of delivery kits for TBAs /27/.

Health services research: Evaluating service delivery systems, especially innovative ones, is crucial if scarce resources are to be used effectively. Promising topics for health services research include: appropriate therapy for anaemia, such as new iron preparations; the use of prophylactic antibiotics in cases of prolonged labour; the role of maternity villages; and the delegation of basic obstetric functions to a more peripheral level (see section 4.2 above) /28/.

Epidemiologic research: Both for shaping policy and for designing programmes, it is important that more research be done on maternal mortality and morbidity rates, and on their causes. It was recommended that all Member States of WHO should, no later than 1995, be able to provide reliable estimates of their MMRs. Also by 1995, Member States should have begun research on the underlying causes of maternal deaths /26/.

Four types of information on maternal mortality should be sought. First, the number of deaths. As the studies presented at the meeting showed, obtaining this information is not an easy task. Nevertheless, even incomplete counts can sometimes be useful for policy purposes - e.g. when a small developing country is found to have more maternal deaths in a year than a very large developed country /26/.

The second type of information that countries should collect is information on maternal mortality rates. As was shown above, hospital studies are not a good method for determining MMRs in developing countries /26/.

The third type of information countries should gather is data on the characteristics of women who die /26/. These are especially valuable when compared to information on women who did not die. Case/control studies are a relatively inexpensive way to accomplish this. (See, for example, references 14 and 18.)

The fourth kind of information desired are data on the causes of maternal deaths: clinical, health services, reproductive, and socioeconomic factors. Priority should be given to research on those risk factors that have the greatest relevance for improving health services provision and utilization /26/.

It was recommended that WHO develop a document describing research methodologies that can provide these kinds of data, and the circumstances under which each method is most and least useful /see Table 2/. If necessary, WHO should develop new, low-cost methods for doing research on maternal health. WHO should also provide training courses on study design /26/.

Finally, it was recommended that countries begin collecting data on maternal morbidity. Most countries have no idea of the magnitude of this problem, although it can be assumed to be large. For example, a study in India found that for each woman who

died a maternal death, there were 18 who survived with severe (and sometimes permanent) complications. An effort should be made to take advantage of existing opportunities to gather morbidity data, such as contraceptive prevalence surveys /26, 5/.

#### CONCLUSION

In closing the meeting, Dr Angèle Petros-Barvazian, Director of the Division of Family Health, said that this meeting should be seen as "the end of the beginning". The actions that have been recommended now have to be carried out by WHO, as defined in its broadest sense - not just by the Secretariat, but by the Regional Offices, Member States, professional and non-governmental organizations. Only with commitment on the part of all involved can the goal of lower maternal mortality be reached.

Table 1  
Maternal Mortality Rates\*  
Results of studies presented

Continent/Country	Maternal mortality rate		Location	References
	National	Local		
<b>AFRICA</b>				
Egypt		190	Northern Egypt	11
		300	Southern Egypt	1
Ethiopia		566	Addis Ababa	16
Tanzania		370	Four regions	18
<b>ASIA</b>				
Bangladesh		566	Rural area	3
		833	Rural area	3
China		13	Urban Shanghai	6
		22	Rural Shanghai	6
India		545	Urban Anantapur	5
		874	Rural Anantapur	5
Indonesia		718	Bali	11
Malaysia		70	Selangor State	2
Turkey		119	Two rural areas	8
<b>EUROPE</b>				
Portugal	16		National	19
<b>LATIN AMERICA</b>				
Cuba	31		National	9
Colombia		110	Calí	22
Jamaica	106		National	23
Peru		73	Callao Province	25

\*Deaths per 100,000 live births

Table 2

The suitability of data sources and methods to obtain selected information on maternal mortality  
(Legend: 1 = best, 2 = OK, 3 = Poor, 4 = not appropriate)

Data source/method	Information sought				
	No. of deaths	Maternal mortality rates	Characteristics of deceased women	Causes Medical      Other (social, etc)	
<u>Vital statistics</u>					
Routinely classified maternal deaths	2	2	3	3	3
Birth-death record linkage	1	1	2	1	2
Investigate all deaths Women 15-49	1+	1	1	1	1
<u>Hospital records</u>					
Maternal deaths in Ob/Gyn service	2	3	1	2	3
Maternal deaths in all services	2	3	1	2	3
Case-control studies	4	4	1	2	2
Ob/Gyn peer review	4	4	1	1	2
<u>Health worker interviews</u>					
Ob/Gyn	3	3	2	2+	2
All health workers (MCH/FP)	3	3	2	2+	2
<u>Community studies</u>					
Identify/investigate deaths women 15-49	2 1	2 1	1	1-2	1
Prospective monitoring preg. women to 6 wks after preg. ends	1	1	1	1-2	1-2
Household survey	2	2	1	2	1-2
Focus group discussions	UNK	4	UNK		2
Case/control studies	4		1	2	1-2
<u>Confidential inquiry</u>					
Vital statistics	3		1	1	2
Multiple data sources	1		1	1	2
<u>Indirect demographic methods</u>					
	UNK	UNK	4	4	4

NOTE: UNK = Unknown

ANNEX 1

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2. Adeeb, N. Prevention of maternal mortality in Malaysia. WHO document No. FHE/PMM/85.9.11.
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8. Akin-Dervisoglu, A. Maternal mortality in Turkey. WHO document No. FHE/PMM/85.9.19.
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12. Harrison, K.A. A review of maternal mortality in Nigeria with particular reference to the situation in Zaria, Northern Nigeria, 1976-1979. WHO document No. FHE/PMM/85.9.12.
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18. Mtimavalye, L.A.R., Justesen, A. and Ngwalle, E. Survey of institutional maternal deaths in four regions of Tanzania, July 1983-December 1984: preliminary report. WHO document No. FHE/PMM/85.9.20.
19. Purificação Araújo, M. Maternal mortality in Portugal. WHO document No. FHE/PMM/85.9.6.
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21. Rochat, R.W. The Magnitude of maternal mortality: definitions and methods of measurement. WHO document No. FHE/PMM/85.6.1.
22. Rodriguez, J., Quintero, C., Bergonzoli, G. and Salazar, A. Avoidable mortality and maternal mortality in Cali, Colombia. WHO document No. FHE/PMM/85.9.1.
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25. Zamora, R.M. Study of maternal mortality in Peru: preliminary report. WHO document No. FHE/PMM/85.9.3.

#### Working Group Reports

26. Group 1. Methods of measuring maternal mortality and morbidity, and recording, reporting and analysing its causes.
27. Group 2. Appropriate technology: training and research in the prevention of maternal mortality and morbidity.
28. Group 3. Organization of maternal health care at primary, secondary and tertiary levels for the reduction of maternal mortality and morbidity.
29. Group 4. Reducing the risk: family planning and the prevention of maternal mortality and morbidity.

#### Other references

30. Benedetti, T.J., Starzyk, P. and Frost, F. Maternal deaths in Washington State. Obstetrics and Gynaecology, 66: 99-101. 1985.

#### Other relevant documents

- Maternal mortality rates. A tabulation of available information. WHO document No. FHE/85.2.
- Coverage of maternity care. A tabulation of available information. WHO document No. FHE/85.1.

Copies of papers presented at the Meeting, as well as the two documents listed above, can be obtained, on request from: The Division of Family Health, World Health Organization, 1211 Geneva 27, Switzerland.

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ANNEX 3

ANNOTATED AGENDA

Monday, 11 November

Registration

1. Opening by Dr Lu Rushan, Assistant Director-General, WHO
2. Designation of officers
3. Introduction of objectives of the meeting / Adoption of Agenda
4. The causes of maternal deaths. A global overview - Dr M. Fathalla (FHE/PMM/85.7)
5. The magnitude of the problem. A global overview - Dr R. Rochat (FHE/PMM/85.6.1 and 85.6.2)
6. Presentation of results from studies and other data at country level:
  - Jamaica, Dr Deanna Ashley (FHE/PMM/85.9.10)
  - Colombia, Dr Jaime Rodriguez (FHE/PMM/85.9.1)
  - Sudan, Dr M. Baldo (FHE/PMM/85.9.5)
  - India, Dr A. Bhaskar Rao (FHE/PMM/85.9.4)
  - Peru, Dr Rosa M. Zamora (FHE/PMM/85.9.3)
  - Pakistan, Dr Samia Janjua (FHE/PMM/85.9.7)
  - Portugal, Dr Maria da Purificação Araujo (FHE/PMM/85.9.6)

Tuesday, 12 November

6. Presentation of results from studies and other data at country level: (continued)
  - Egypt (RAMOS) & Indonesia , Dr Judith Fortney (FHE/PMM/85.9.13)
  - Malaysia, Dr Nafisah Adeeb (FHE/PMM/85.9.11)
  - Vietnam, Dr Do Trong Hieu (FHE/PMM/85.9.8)
  - Ethiopia, Dr Barbara Kwast (FHE/PMM/85.9.17)
  - Nepal, Dr Ditya Malla (FHE/PMM/85.9.9)
  - Nigeria, Dr Kelsey Harrison (FHE/PMM/85.9.12)
  - Cuba, Dr Ubaldo Farnot (FHE/PMM/85.9.14)

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India (Bangalore), Dr J. C. Bhatia (FHE/PMM/85.9.16)

Egypt, Dr Sayyed A.-H. Abdallah

7. Morbidities resulting from complications of pregnancy and birth: global review -  
Dr K. Harrison (FHE/PMM/85.8)

Wednesday, 13 November and Thursday, 14 November

8. Working groups:

- Group 1. Methods of measuring maternal mortality and morbidity and of recording, reporting and analysing its causes.
- Group 2. Appropriate technology, training and research for the prevention of maternal mortality and morbidity.
- Group 3. Organization of maternal health care at primary, secondary and tertiary levels for the reduction of maternal mortality and morbidity.
- Group 4. How family planning can be made to play a more specific and direct and effective part in the preservation of women's health and the prevention of maternal mortality.

Friday, 15 November

9. Plenary discussion of group reports and recommendations.
10. Panel: Maternal mortality, Family Planning and Maternity Care Recommendations for a programme of action for WHO during the period of the Eighth General Programme of Work (1989-1995). Participants: Dr Deanna Ashley, Dr K. Bhasker Rao, Dr M.F. Fathalla, Dr K.A. Harrison, Ms Barbara Kwast, Dr M. Potts, Professor S.S. Ratnam and Dr J.S. Tomkinson.
11. Closing address by Dr A. Petros-Barvazian.