BRIEFING PAPER

Reaching emergency obstetric care: overcoming the ‘second delay’

PREPARED BY
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Burnet Institute, on behalf of
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The Knowledge Hubs for Health Initiative
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Compass is a partnership between the Centre for International Child Health at University of Melbourne, Menzies School of Health Research and the Centre for International Health at Burnet Institute. Compass draws on regional expertise to enhance the quality and effectiveness of WCH interventions in the Asia and Pacific regions. Our work focuses on supporting equitable progress towards Millennium Development Goals 4 and 5 – improved maternal and child health and universal access to reproductive health.

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### Abbreviations

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<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>ANC</td>
<td>Antenatal care</td>
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<tr>
<td>BPP</td>
<td>Birth preparedness package</td>
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<td>CHW</td>
<td>Community Health Worker</td>
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<td>DFID</td>
<td>Department for International Development (UK)</td>
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<td>EDD</td>
<td>Expected date of delivery</td>
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<td>EmOC</td>
<td>Emergency obstetric care</td>
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<td>FGD</td>
<td>Focus group discussion</td>
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<td>HEF</td>
<td>Health Equity Fund</td>
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<td>MDGs</td>
<td>Millennium Development Goals</td>
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<td>MWH</td>
<td>Maternity waiting home</td>
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<td>MMR</td>
<td>Maternal mortality ratio</td>
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<td>MoH</td>
<td>Ministry of Health</td>
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<td>MPS</td>
<td>Making Pregnancy Safer</td>
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<td>PMMN</td>
<td>Prevention of maternal mortality network</td>
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<td>RCT</td>
<td>Randomised controlled trial</td>
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<td>TBA</td>
<td>Traditional birth attendant</td>
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<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<td>UNFPA</td>
<td>United Nations Population Fund</td>
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<td>WHO</td>
<td>World Health Organization</td>
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National governments and the international community have committed to achieving the Millennium Development Goal of reducing maternal mortality by three-quarters by 2015. New estimates show that there has been progress, with declines in the maternal mortality ratio in many countries. But the current pace of change is too slow to reach the target, and there are major inequities. In 2008, there were an estimated 340,000 maternal deaths. The great majority occur in low and middle income countries. Most maternal deaths could be prevented if unintended pregnancies were prevented; if there were skilled attendants at birth; and if women who experience complications could reach quality emergency obstetric care (EmOC) in a timely way. Ten to 15 per cent of the 210 million pregnancies globally each year have potentially life-threatening complications, most of which are unpredictable. The clinical interventions needed to manage these complications effectively are well known, yet many women fail to receive care.

Three ‘delays’ have been described: delay in deciding to seek care, delay in reaching care (the ‘second delay’), and delay in receiving adequate and appropriate treatment.

In many countries with high maternal mortality, including in the Asia-Pacific regions, long distances, geographical barriers, lack of transport, poor communication infrastructure and associated high costs, lead to often fatal delays in reaching life-saving care once a complication occurs. Despite the ‘second delay’ contributing significantly to preventable maternal and newborn deaths and other adverse outcomes, particularly in rural areas, there has been a lack of guidance to address these barriers.

The barriers and solutions vary greatly with the context and are complex. They need to be addressed in an integrated, systematic way. We have reviewed and synthesised studies, experiences and ideas from a range of countries to overcome the barriers to reaching emergency care for complications in pregnancy and labour.

Limitations in the way that the ‘second delay’ has been conceptualised, and the need to involve a variety of sectors beyond health, have contributed to its relative neglect. Yet the impact of improvements in the ‘first’ and ‘third’ delays will be reduced if the ‘second delay’ remains. The ‘second delay’ is of greatest significance in poor remote populations that tend to have poor health status and access to health care, and therefore makes a disproportionate contribution to inequitable maternal health outcomes.

The first part of this report seeks to clarify the conceptual understanding of the ‘second delay’. District level planners need to look at all the links in the referral chain for the two pathways pregnant women may take to reach EmOC: travelling directly from home to a facility with capacity for comprehensive care of obstetric complications; or seeking care from a first line clinic with onward referral to a comprehensive care facility. This journey might be undertaken during labour, or after a complication occurs.
In some remote areas long distances, and geographical and seasonal barriers, will mean that pregnant women experiencing a complication will not be able to reach care in time despite efforts to strengthen referral systems. For these women moving within easy reach of EmOC before labour may be the only option to ensure timely access in the event of a complication.

In the second part of the report we review barriers related to transport, infrastructure, communications and finances, and the obstacles pregnant women in remote settings face in moving closer to EmOC before labour begins. We explore evidence, experiences and possibilities for addressing these barriers and examine what has been learned about how to encourage and support women to move closer to care near term. This includes a review of experiences with maternity waiting homes. Further qualitative, operations and economics research is required to better understand how pregnant women in remote settings can be encouraged and supported to enable them to move closer to care near term, while minimizing the length of time away from their homes and families.

We also review several models for working with women, families and communities to prepare for birth and associated complications. We found that experiences of addressing the ‘second delay’ have more commonly been documented in sub-Saharan African countries. There are fewer experiences from countries in the Asia-Pacific regions, although there are many countries in these regions where women face high risks of maternal death.

Transport needs to be considered at both the community level and between health facilities. At the community level and at peripheral health centres, maximising the use of locally available means, such as intermediate non-motorised transport, private, or commercial vehicles, is appropriate. At the facility level ideally there will be a dedicated ambulance to provide a link between health facilities and to the community. The choice of transport will depend on existing infrastructure and availability, costs and demand. Careful consideration needs to be given to the management of vehicles to ensure adequate budget allocation, regulations regarding use, attention to maintenance and repair, the provision of trained and supported drivers and costs to women and communities.

The increasing availability and relative affordability of mobile phones holds much promise to overcome communication barriers that contribute to delays in reaching care. There are examples of a number of innovative private-public partnerships to increase access in rural and underserved areas.

Partnerships with NGOs and private organisations to improve access to transport and communication technologies have been successful in a number of settings and further opportunities should be explored.

The costs of reaching EmOC need to be addressed as part of broader approaches to finance maternal health. Particular attention needs to be given to identifying and reaching poor women. Community-based approaches (such as loans and insurance) have shown promise in some settings, but require strong leadership and management and are challenging to scale-up. There
are a number of innovative government schemes that have included financial barriers to reaching EmOC.

Planning for complications has been successfully incorporated into birth preparedness strategies at the individual and community levels, through antenatal care, women’s groups and other community structures. Expectant fathers are often the decision-makers; they need and welcome information that assists them to prepare for their child’s birth. When awareness is raised experience has demonstrated that communities are often willing to pool resources, time and transport to support families affected by an obstetric emergency. Emergency preparedness is also important at the health facility level and can be strengthened through training and the use of emergency triage, stabilisation and referral protocols.

In the third part of the report we suggest the steps needed in gathering information and planning at district level with a range of stakeholders from different sectors. We argue that tackling the ‘second delay’ should be an integral part of a broader district maternal health plan that addresses all ‘three delays’ as well as the underlying structural factors that contribute to poor maternal health. Strengthening emergency referral will also have broader benefits for communities including stronger referral for all medical emergencies.

Mapping is needed to identify the current and planned geographical distribution of health care facilities, availability of roads, transport (including placement of ambulances) and communications, as well as population groups beyond timely reach of EmOC. Responsibilities need to be clarified. We need to seek the perspectives of pregnant women, expectant fathers, older women, traditional birth attendants, health care providers, and village leaders as well as government officials from different sectors, and the private sector. Strategies are needed at family, community, first line health facility, referral facilities and the district levels. The priorities in overcoming the barriers that make up ‘the second delay’ will vary from one setting to another. Support and commitment from national governments and donors is also crucial. Addressing the ‘second delay’ needs to be included in national maternal health policies.

The lessons learned through this review will help to inform the development of normative guidelines (a systematic checklist), in collaboration with WHO WPRO and SEARO, to assist national and district level planners to identify and address the weakest links in the referral chain from the home to a health facility providing EmOC.

It is time to make use of the momentum towards the Millennium Development Goal for maternal health, and the increase in funding, to advocate for greater investment in this weakest link in our efforts to prevent women dying unnecessarily in childbirth.
"Mrs A had delivered a baby after prolonged labour pains. As a result, she suffered heavy bleeding. Since there was no telephone connection in the village the husband was sent off on a bicycle to call for an ambulance while Mrs A was carried on a local stretcher to a hospital. When she had reached half way, the ambulance arrived. They tried to transfer her to the ambulance but she was already dead".

Female community health volunteer, Nepal

Box 1. Maternal death, Nepal

Source: Shrestha SD, Rajendra PK, Shrestha N. 2007. Feasibility study on establishing maternity waiting homes in remote areas of Nepal. Regional Health Forum 11(2); 33-38. WHO-SEARO

Introduction

Slow progress towards maternal health for all

In 2008, an estimated 343,000 women worldwide died from complications related to pregnancy and childbirth, the overwhelming majority in low income countries. Another ten million women a year suffer illness and disability. Around 80% of all maternal deaths occur in just 21 countries, six of which are in Asia*. In high income countries in the Asia-Pacific region the estimated maternal mortality ratio (MMR) was 8 per 100,000 live births compared to 323 in South Asia and 152 in South East Asia. Great variation in MMR was found between countries in these regions, from 1575 in Afghanistan to 240 in Nepal, and from 929 in Timor Leste, to 30 in Sri Lanka.

As well as the terrible impact on women’s lives, these maternal deaths and other adverse outcomes of pregnancy also have an enormous impact on families and communities. New estimates suggest that there has been significant progress in reducing maternal mortality globally, with a reduction in the MMR from 422 deaths per 100,000 live births in 1980 to 251 deaths per 100,000 live births in 2008. However, progress has been variable. Only 23 countries are on track to meet Millennium Development Goal 5 Target A (to reduce MMR by 75% from 1990 to 2015) and gains in maternal health have been unacceptably slow and inequitable in many countries.

Almost three-quarters of maternal deaths are due to direct causes, clustered around the time of labour and delivery, and are preventable with timely access to skilled emergency obstetric care

* India, Pakistan, Afghanistan, Bangladesh, Indonesia and China
(EmOC) An estimated 15% of all pregnancies will encounter complications; 7% will be serious enough to require referral to a higher level of care. These include bleeding, infection, hypertensive disease with fitting, and obstructed labour. Although there are factors known to put women at higher risk of complications, such as first pregnancy, previous Caesarean section, or short stature, it is widely recognised that most complications during labour cannot be predicted and are difficult to prevent. Even where women do not commonly choose to deliver with a trained birth attendant, if a life-threatening condition occurs they will often attempt to seek professional care from a health facility. All women need to be able to reach emergency care in a timely way if they develop a complication during labour. However, globally it is estimated that 80% of rural women and 25% of urban women who need a life-saving obstetric intervention fail to receive it.

To change this, women must have access to good quality health services, within a health system that functions effectively from the community to the first line health facility and to the facility able to provide comprehensive EmOC. Women, their families and communities also need to understand and value the services available.

The ‘three delays’

In a key article in 1994, ‘Too far to walk: maternal mortality in context’, Thaddeus and Maine reviewed the factors that affect the interval between the onset of an obstetric complication and its outcome. They usefully described a new conceptual model, categorising the reasons why so many women do not receive the emergency care they need into three ‘delays’: delay in deciding to seek care; delay in reaching care; and delay in receiving adequate care (Figure 1 and Box 2). The ‘three delays’ model has since been adopted by many agencies working to address maternal mortality.

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1 Basic EmOC includes the capacity for injection of antibiotics, oxytocics or anticonvulsants; manual removal of the placenta; removal of retained products of conception; and assisted vaginal delivery. Comprehensive EmOC includes all the above functions plus Caesarean section and safe blood transfusion.
Phase I delay - Delay in deciding to seek care by individual, family, or both.
Examples of factors that shape the decision to seek care include the actors involved in decision-making (individual, spouse, relative, family); the status of women; illness characteristics; distance from the health facility; financial and opportunity costs; previous experience with the health care system; and perceived quality of care.

Phase II delay - Delay in reaching an adequate health care facility.
Examples include physical accessibility factors, such as distribution of facilities, travel time from home to facility, availability and cost of transportation and condition of roads.

Phase III delay - Delay in receiving adequate care at the facility.
Relevant factors include adequacy of the referral system; shortages of supplies, equipment, and trained personnel; and competence of available personnel.

Box 2. The ‘three delays’

Relative neglect of ‘second delay’

Delay in any of the three phases may contribute to maternal deaths, so it is essential to address all three delays. However strategies to address the ‘second delay’ have been relatively neglected.

There is a strong evidence base for clinical interventions to prevent maternal deaths but a lack of research about how to ensure that women suffering complications during pregnancy or labour are able to reach life-saving care in time to benefit from these interventions. The need for effective referral systems linking communities with EmOC facilities was recognised as a priority at the 2003 Bellagio workshop on new and underutilised technologies to reduce maternal mortality, and the lack of operational research was noted. Interestingly, technologies related to the ‘second delay’ were not mentioned in the 2009 follow up review paper. While a number of policy documents make mention of the need to address barriers to reaching hospital, including transport, there is a lack of practical guidelines that would assist policy makers and planners to effectively address the ‘second delay’. UNFPA has provided a useful checklist for EmOC for planners that includes some aspects of transport and communication, but is lacking in detail related to the ‘second delay’. We hope this review will be able to complement and build on this.

The extent to which the ‘second delay’ is considered within national maternal health strategies varies. There are few examples of systematic approaches, and it is often unclear where responsibility lies for ensuring that women can reach EmOC when needed. It is often left to the woman and her family to make unprepared and desperate efforts to reach care. In countries where good progress has been made in reducing maternal mortality, such as Sri Lanka and Malaysia, the ‘second delay’ has been specifically addressed. This has included a multi-sectoral approach to improve transportation infrastructure, strengthen referral systems, and address the financial barriers to accessing care.

Significance of the ‘second delay’

It is difficult to quantify the specific contribution of ‘second delay’ problems to maternal deaths and other adverse pregnancy outcomes because the ability to reach EmOC, and the timeliness and quality of that care once the facility is reached, both influence care seeking decisions (the ‘first delay’). The significance of the ‘second delay’ depends very much on the local context, but in the Asia-Pacific region there are many areas with high maternal mortality and major obstacles to access related to the geographic terrain or long distance. A woman can bleed to death within two hours, and suffer long term consequences from fitting or obstructed labour if she does not receive timely care. Maine has provided estimates of the average time before death from obstetric complications (Table 1).
Reviews of maternal and perinatal deaths and ‘near-misses’ in Asia and Africa reveal that the ‘second delay’ can contribute considerably to mortality, particularly in rural areas. Where there are high rates of home births a large proportion of maternal deaths occur before reaching a health facility. In Malawi, an investigation of maternal deaths found that 56% occurred outside hospital due to a lack of transport or long distances to health care.\textsuperscript{15} A delay in reaching care was a factor in 84% of 42 maternal deaths reviewed in rural Gambia.\textsuperscript{16} Studies in India in Andhra Pradesh, Maharashtra, and Rajasthan revealed that between 42 and 74% of reported deaths occurred at home or on the way to care.\textsuperscript{17,18,19,20} A review of 104 deaths at a tertiary teaching hospital in Pakistan revealed that 74% of women had experienced a delay in reaching care.\textsuperscript{21} In Bangladesh, almost three-quarters of reported maternal deaths between 1998 and 2001 occurred at home, with 5% of deaths occurring in transit.\textsuperscript{22} A detailed analysis of clinic and hospital records in the Matlab quasi-experimental study in Bangladesh found that greater use of midwives, referrals and proper transport, and better service conditions significantly contributed to the mortality decline experienced in the area in which the Maternity Care Program operated.\textsuperscript{23}

A significant proportion of maternal deaths globally occur in hospitals, including among women who arrive in a moribund state and those who arrive with complications who would have survived with timely intervention.\textsuperscript{5} This emphasises the importance of addressing barriers to reaching hospital care. Delays in reaching EmOC also contribute to maternal morbidity, including obstetric fistula,\textsuperscript{24,25} disabilities, and depression, and to perinatal mortality.\textsuperscript{26,27} Forty-one percent of child deaths occur in the first month of life, most in the first 24 hours, and 9% are classified as due to ‘birth asphyxia’.\textsuperscript{28} In their recent review, Lee et al point out that many of the estimated 1.02 million intrapartum stillbirths and 904,000 intrapartum-related neonatal deaths could be avoided by access to skilled care at birth, timely emergency obstetric care, and immediate newborn care.\textsuperscript{29}

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<th>Time</th>
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<td></td>
<td>Hours</td>
<td>Days</td>
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<tr>
<td>Haemorrhage</td>
<td>2</td>
<td>12</td>
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<td>Postpartum</td>
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<td>Antepartum</td>
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<tr>
<td>Ruptured uterus</td>
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<tr>
<td>Eclampsia</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Obstructed labour</td>
<td>3</td>
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<tr>
<td>Infection</td>
<td>6</td>
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Table 1. Estimated average time from onset of complications to death

\textit{Source: Maine, D (no date) Safe Motherhood Programs: Options and Issues. Center for Population and Family Health, Columbia University.}\textsuperscript{14}
There is also an equity imperative to addressing the ‘second delay’, since those women least likely to be within easy reach of EmOC are usually the poorest and often vulnerable in other ways.

It has not always been clear who has the responsibility for ensuring that all pregnant women are able to reach EmOC in a timely way. Often those responsible for provision of EmOC, whether government, NGO or private sector, assume that their responsibility begins when a pregnant woman arrives at the facility. It is essential that provincial or district level health planners (depending on the level of decentralisation) take responsibility for coordination of the different sectors and stakeholders that can contribute to saving the lives of pregnant women. These improvements in access to emergency care will benefit communities when other emergencies occur, such as road traffic accidents, snakebite, or industrial accidents.
The ‘second delay’ has been rather narrowly conceptualised which has influenced planning and antenatal care (ANC) guidelines. Figure 2 presents a conceptual framework for addressing the varied paths from home to available EmOC.

Most women do not experience complications and do not need EmOC. The aim need not be to have every woman deliver in a health facility, although this is the ideal and has been achieved in some low and middle income countries that have succeeded in reducing maternal mortality. The great majority of women can deliver safely at home with a skilled birth attendant, but all need to be within easy and timely reach of EmOC.

Conceptualising moving to within easy reach of EmOC before labour

The Thaddeus and Maine ‘three delays’ model refers specifically to the interval between the onset of obstetric complication and its outcome. However, it is important to recognise that even if referral processes, transport and communications are effectively strengthened, in many settings there will always be some women who live inevitably beyond timely reach of EmOC, whether because of remoteness, lack of roads, lack of transport, seasonally flooded rivers or other difficult terrain. Addressing the ‘second delay’ therefore needs to include ensuring that these pregnant women are able and supported to move to somewhere within easy reach of EmOC before the onset of labour or a complication, and encouraging them to do so. There is new evidence that community-level interventions, such as antibiotics for sepsis and misoprostol to prevent post-partum haemorrhage, can reduce maternal deaths in rural areas with high rates of maternal mortality and home deliveries. Despite this, the potential to access EmOC remains essential because without access to Caesarean section a proportion of women with obstructed labour will die. Between 11 and 50% of all maternal deaths are estimated to be due to obstructed labour.

Attention in planning services to equitable geographical distribution of new facilities able to provide EmOC can contribute to improving access for remote women. However, where such facilities would serve a small population this may not be feasible because of costs, logistic difficulties maintaining supplies of needed commodities, difficulty in attracting and retaining specialist staff, and insufficient cases for staff to retain their skills. So a strategy to assist remote women to move closer to EmOC before labour will be essential in many settings.

This aspect of addressing the ‘second delay’ has tended to be thought about in terms of ‘Maternity Waiting Homes’ (MWH) or ‘Waiting Mothers’ Shelters’, although there is also much scope to assist women to stay with family, friends or paid hosts either close to EmOC, close to a facility with a trained birth attendant and a good referral system, or close to reliable transport.
Conceptual confusion about the role of MWHs has sometimes led to a dismissive attitude towards this potentially valuable strategy for women in remote communities.

MWHs have often been associated with the ‘risk screening’ approach which aims to identify and refer pregnant women with obstetric risk factors. For example the 1996 WHO review of experiences of MWHs states: “The purpose of maternity waiting homes is to provide a setting where high-risk women can be accommodated during the final weeks of their pregnancy near a hospital with essential obstetric facilities.” and “The concept of maternity waiting homes has been based on the premise that it is possible to identify pregnancies likely to develop complications and need skilled obstetric care.” The WHO Integrated Management of Pregnancy and Childbirth (IMPAC) guide to essential practice information and counselling sheet on ‘preparing a birth and emergency plan’ says: “Based on your health condition, the health worker can make suggestions as to where it would be best to deliver.” But, since most complications cannot be predicted, criteria for moving nearer to EmOC close to term need to include ‘living beyond timely reach of EmOC’. Fortunately the IMPAC section on antenatal care for health care workers appropriately and clearly states: “If living far from the facility, she should go 2-3 weeks before baby due date and stay either at the maternity waiting home or with family or friends near the facility.”

Another common assumption is that the MWH is not a place where deliveries occur. For example, the Cochrane review of MWH defines a MWH as a facility where women stay at the end of their pregnancy and move, once labour starts, to the health facility which provides EmOC. The 1996 WHO review of MWHs simply notes: “In most cases it is assumed that delivery should not take place in the maternity waiting home.” and does not discuss this possibility further. But Maurice King, in his pioneering primary health care primer of 1966, described MWHs as facilities where women could deliver with traditional birthing practices, providing supervised experience for midwives, and with the possibility of ready transfer for EmOC if a complication occurred.

Another example of conceptual confusion are the calls for “proof of efficacy” of MWHs in influencing maternal and perinatal health outcomes. The Cochrane review found that although there have been several studies aiming to assess the effect of MWHs there have been no randomised controlled trials (RCTs), or cluster randomised trials. As the WHO review notes: “A maternity waiting home is not a stand-alone intervention, but rather serves to link communities with the health system in a continuum of care.” Ironically, the Cochrane and WHO reviews of MWHs have tended to reinforce the idea that MWHs can be viewed and trialed as an independent, stand-alone intervention. The characteristics of MWHs and of the women who use them will inevitably and appropriately vary from one setting to another because of differences in geography, scarcity of populations, cultural beliefs, and quality of the health care system, so they cannot be evaluated as a standardised intervention. The efficacy of an MWH will depend on many other elements of the system. Another difficulty in designing MWH trials, and in interpreting the studies that have been conducted, is in defining the study population. Some studies have used a hospital sample, comparing maternal and perinatal outcomes for women who had used an MWH with those who had not, while others have compared those
delivering at home with those delivering at hospital after staying at an MWH. These comparisons introduce marked selection biases and are not valid. As Wild points out in her recent PhD thesis, the studies of MWHs attempting to look at impact on maternal health outcomes have had inevitable methodological limitations that have not always been noted when the trials are reviewed. Instead of RCTs what is needed is more rigorous evaluation, and qualitative and operations research to better understand the influences on use of MWHs in different settings, helpful features for MWHs, comparison of MWHs with schemes to subsidise women to stay with family, friends, or other ‘hosts’, and assessment of the costs involved. In the section on “Moving within timely reach of EmOC before labour begins” we review experiences with MWHs.

In the section on “Barriers to reaching EmOC” we review the many reasons why pregnant women may not take up the opportunity to move within timely reach of EmOC before labour. These perceived difficulties for women and their families are one reason this strategy has been criticised. For example, in 2004, WHO stated: “Some countries have set up ‘maternity waiting homes’ for women living in areas far from health centres”. However, such a step should be decided upon after very careful thought. The potential of this advice for seriously disrupting the lives of women and their families is substantial.” Nevertheless, the barriers can be addressed; experience in some countries, where quality EmOC is available, has shown that it is possible for it to become the norm to move within easy reach of EmOC towards the end of pregnancy.

On the other hand, Timor Leste provides an example of the problems that occur when establishing MWHs is conceptualised as “the way to achieve higher rates of institutional delivery for women”. In 2005 a “National Maternity Waiting Home Strategy” was developed and MWHs were built near to first line health facilities that were not able to provide comprehensive EmOC, nor to refer in a timely way to centres where comprehensive quality EmOC was available. The experience in Timor-Leste has highlighted the necessity of viewing MWHs as just one component in a broader strategy to improve maternal health. If quality care is not available in the community, at first line health facilities, and in referral facilities that undertake comprehensive EmOC, then MWHs cannot fulfill their purpose and will not be used by remote women. Wild has pointed out the dangers in withdrawing services for home delivery when strong referral systems to EmOC of adequate quality are not yet established.

Pathways to EmOC

Some women will continue to deliver at home, and there are opportunities both to increase the number of women who live within easy reach of EmOC, and to reduce the time taken to reach care. So it is also important to address the common problems of transport, communication, weak referral protocols, and capacity to stabilise women with complications at first line centres before referral.
Figure 2 illustrates that there are three potential pathways that need to be considered:

- Direct journey from home to the EmOC facility
- First stage journey to a health centre without EmOC
- Second stage journey from health centre without EmOC to EmOC facility, or from a peripheral centre with basic EmOC to a facility providing comprehensive EmOC

Figure 2. Pathways and time to emergency obstetric care

The first two may be embarked on when the woman is in labour, or after she has developed a complication. The second stage journey, referral to an EmOC facility from a first or second line health centre, may be because a complication has occurred or because the woman is in labour and has risk factors for complicated labour.

Delays can occur at many points in these journeys, therefore a systematic approach is needed at district level to assess and address the likely barriers from the community through to all levels of care. It is essential to have a multi-sectoral approach and to include a wide range of stakeholders in the information gathering, analysis and planning processes. In this report we review the literature for evidence, experiences and new ideas in relation to assisting pregnant women near term to stay within easy reach of EmOC, and in relation to reducing the barriers to safe and timely travel to an EmOC facility, whether in labour, or after a complication occurs.
Purpose and objectives

The purpose of this review is to contribute to a greater understanding of the ‘second delay’ and to how barriers to reaching EmOC may be overcome effectively in low income settings.

Objectives:
- To collate and synthesise evidence, experiences and ideas to overcome the varied components of the ‘second delay’ with a focus on the priority countries of the WHO Making Pregnancy Safer programme in the WHO WPRO and SEARO regions;
- To identify research priorities; and
- To provide a report of our review to help inform WHO WPRO and SEARO in the development of normative guidelines (a systematic checklist) to assist national and district level planners to identify and address the weakest links in the referral chain from the home to a health facility providing EmOC

Research questions

- What are the barriers to reaching emergency obstetric care in varied settings?
- What experiences are there of effective options and strategies to overcome the ‘second delay’?
- What guidance exists for strategies to overcome the ‘second delay’?

Methods

A broad review of the available peer-reviewed research literature and grey literature was undertaken to identify barriers, strategies and experiences related to reaching EmOC. Key topics included arrangements to enable pregnant women to move within timely reach of EmOC before onset of labour, transport, communication, emergency referral systems, birth preparedness, and financing mechanisms in low and lower middle income countries.

PubMed, Ovid-Medline, POPLINE, CINAHL and Cochrane databases, were systematically searched using a combination of broad and specific search terms and keywords to identify peer-reviewed literature from database inception. There were no pre-set limits and no language restrictions were applied. Results were assessed by the authors and full texts of relevant articles obtained. Additional publications were identified from reference lists of short-listed
articles to widen the search. Grey literature was identified through UN agency sites (WHO, UNICEF, UNFPA, World Bank), relevant government and non-government organisations, and general web searches using similar search terms. Some examples in the literature were then followed up with consultations with key informants.

We did not set out to undertake a systematic review of the evidence for interventions to address the ‘second delay’. Attributing maternal health outcomes to specific transport and communication technologies is problematic and often impossible because such interventions are rarely implemented in isolation, but are often a component of a broader program that includes strengthening quality of care and community awareness. In addition, many examples in the literature are of small-scale projects and heavily context dependent, so comparisons are not meaningful. Inclusion or exclusion criteria based on methodological appraisal would be likely to exclude a large number of relevant materials.

Articles and other materials were included if they addressed the barriers or access to EmOC (or other emergency care) in low or middle to low income countries or resource-poor settings, with a focus on emergency referral systems, transportation, communication, financing, maternity waiting homes or birth preparedness; if they addressed the research questions; or if they contributed to conceptual understanding of the topic.

We present first the barriers to reaching emergency care and then analyse the strategies and options to address each of these barriers and provide conclusions.
Findings and discussion

Barriers to reaching emergency obstetric care

Distance to care, geographical barriers, lack of availability of transport, lack of communication possibilities, and associated costs are common obstacles to reaching EmOC when a complication occurs during pregnancy or labour (Figure 3). There are also barriers to pregnant women choosing to move closer to EmOC before labour begins. We can also think of lack of preparation as a barrier to reaching EmOC, which may be at the levels of family, community, front line health care facilities, and district and national planners. Great diversity between and within countries means that the nature of these barriers and their interrelation, and the extent to which they contribute to delays in reaching care, vary substantially depending on the setting.

Figure 3. Interrelated factors that contribute to the ‘second delay’
**Distance**

Clearly, long distances from home to a first-line health centre, to a centre with comprehensive EmOC, and between health facilities, contribute considerably to delays in reaching EmOC. Facilities able to provide Caesarean section and blood transfusion are usually in urban centres, far from the reach of many communities. A population-based, case-control study involving 400 villages in Maharashtra, India, found that the median distance to EmOC was 39km for women who survived an obstetric complication and over 63km for those who died.\(^{18}\) In Pakistan, a review of maternal deaths at a tertiary hospital revealed that long distances contributed to 40% of deaths.\(^{21}\) Many women with obstetric complications will need to be referred on from the health centre they first attend. In rural Gambia a qualitative review of the factors that contributed to maternal deaths found that 26 of 32 women who died had sought care at more than one facility.\(^{16}\) Distance influences whether families decide to set out to seek care in an emergency. For example, in a survey in Cambodia that explored health-care seeking for obstetric complications, only 34% of 141 women with potentially life threatening complications consulted a health professional.\(^{43}\) Of those who lived more than five kilometres from a health centre, only 17% sought professional care and they were four times less likely to consult a health professional than women living closer to care. In these cases, distance appeared to be a greater barrier than cost, as efforts were made to save the life of the mother regardless of expense.

WHO recommend that at a minimum four basic EmOC facilities and one comprehensive EmOC facility be provided per 500,000 population, and that consideration should be given to the geographical location of these facilities, so that they are 'appropriately distributed' and that most women have access within two to three hours.\(^{44,45}\) However, there is little guidance for sparsely populated areas or where there are geographical barriers. WHO suggests that in such settings a greater ratio of facilities to population may need to be provided, and mapping communities and facilities may help to target resources to poorly served regions. However EmOC facilities are rarely distributed in this way for logistical, economic, social and political reasons.\(^{46}\) Appropriately trained staff, including anaesthetists and obstetricians, are often reluctant to live and work in remote settings; efficient commodity supply lines are difficult and expensive to manage and maintain, including to support blood transfusion services; and small numbers of deliveries may mean that staff are not able to retain their skills. In addition populations in the most remote settings are often poor, may be ethnic minorities, and have little political power. The cost-effectiveness of providing greater numbers of EmOC facilities compared to improving transport, infrastructure, communication and referral systems is not known,\(^{46}\) but it is unlikely to be feasible to establish facilities capable of providing comprehensive EmOC in many remote or geographically isolated settings.
**Geography and infrastructure**

The problem of distance is compounded by geographical obstacles and lack of or poor condition of roads. Geographical barriers in the Asia-Pacific region vary enormously - from mountain ranges to deserts, rivers, and the ocean - and present significant challenges to efforts to improve access to emergency care. MMRs are reportedly higher in remote and mountainous regions in Vietnam, Thailand and China.\(^47\) In Bali, Indonesia, MMR was more than four times higher for women living in mountainous areas and double for those living on islands compared with women who lived in less difficult terrain closer to hospital.\(^48\) Road infrastructure (particularly access to all-weather roads) also affects access to and utilisation of health services.\(^46\) In Rajasthan, India a review of 276 women who had been referred for obstetric complications revealed that 88% of the women did not go on to access referral services despite medical advice, and that more than 85% of these women reported poor road conditions and transport as contributing factors.\(^49\)

Geography and infrastructure also influence the type of transport available. In Nepal, the mean travel time to care was found to be 2.8 hours in plains areas and 8.3 hours in mountain districts, where over 50% of women had to be carried on stretchers. Whereas in the plains women commonly travelled by bus or rickshaw.\(^50,51\) Geography also influences the feasibility of communication systems to arrange transport or referral. Mountains can interfere with both radio coverage and mobile telephone signals, and remote islands may have no mobile phone signal.\(^52\)

Seasonal influences on access need to be taken into account in many settings. Flooding during the monsoon or from ice melting in Spring, landslides, snowfalls, and sandstorms can make roads impassable, in some cases isolating communities for several months of the year, while storms can prevent sea crossings from islands.\(^46,53\) Natural disasters, war or civil conflict, and banditry can also damage or prevent use of roads. The time of day of the journey can also be important. Travel at night is often restricted due to poor visibility, security concerns, socio-cultural factors (such as women being prohibited to travel at night), lack of availability of vehicles at night, or lack of street lighting. For example, a review of brought-in maternal deaths in Nigeria revealed that an unwillingness of drivers to travel at night contributed to 25% of delayed presentations.\(^54\) Poor infrastructure may also be a significant barrier for women living in disadvantaged or poorly serviced urban and peri-urban areas.
The patient came to the health centre at around 4:00 pm……she cannot be managed here because she may need an operation [Caesarean section]. We planned to evacuate her to the hospital but our ambulance had a breakdown a week ago. We looked for transport in the village throughout the night but could not get one. The following morning we went to the agricultural department to look for transport but their vehicle had already left for trek. It returned around 11:00 am and thereafter it came to transport the patient to the hospital”.

Health worker recounting the events leading to a maternal death, rural Gambia

Lack of transport

“The patient came to the health centre at around 4:00 pm……she cannot be managed here because she may need an operation [Caesarean section]. We planned to evacuate her to the hospital but our ambulance had a breakdown a week ago. We looked for transport in the village throughout the night but could not get one. The following morning we went to the agricultural department to look for transport but their vehicle had already left for trek. It returned around 11:00 am and thereafter it came to transport the patient to the hospital”.

Health worker recounting the events leading to a maternal death, rural Gambia

Lack of transport is a major barrier to reaching care, most significantly in rural areas. For example, in Senegal 42% of the rural population rely on walking to reach health facilities. A community-based investigation of maternal deaths in Zimbabwe revealed that the absence of
emergency transport was the major community-level factor contributing to maternal mortality due to haemorrhage in rural areas; it was estimated that access to transport would have prevented 50% of these deaths.\textsuperscript{55} The inability to obtain transport contributed to almost 42% of brought-in maternal deaths to a teaching hospital in Nigeria over a five-year period.\textsuperscript{54} A survey of patients at the Fistula Hospital in Ethiopia found that it took women on average 11 hours to reach a facility that could provide obstetric care and that access to transport was a significant factor, with women travelling on makeshift stretchers for several hours.\textsuperscript{56}

Poor access to transport relates not only to the presence of vehicles, but to their appropriateness (such as ability to traverse difficult terrain or to access areas with poor infrastructure) and reliability. Adequate fuel may not be available, or the vehicle may be poorly maintained. There may be no driver willing to undertake the journey, and no way to communicate while on the journey. These problems are not limited to the community level. Many health centres and referral facilities lack functioning emergency transport, particularly in rural areas where ambulances are rarely available or affordable.\textsuperscript{46} A lack of transport between health facilities contributed to 13.6% of reported maternal deaths in a review in South Africa in 1998.\textsuperscript{57}

Lack of transport can also be a barrier to moving closer to EmOC before labour begins. In Sri Lanka 95% of women deliver in hospital, and it is the norm in rural areas to plan to stay near the hospital for delivery, but in a study in Trincomalee, where rates of home delivery are relatively high, 35.5% of women who delivered at home gave lack of transport as the reason.\textsuperscript{58}

\textit{Poor communications}

Even where emergency transport is available, lack of communication systems can lead to delays in mobilising vehicles or arranging referral. Women often lack the autonomy to make a decision to seek emergency care alone so need to be able to communicate with their husband or senior family members if they develop warning signs of a complication in pregnancy or labour. The husband, other family member, or traditional birth attendant (TBA), needs to be able to communicate to mobilise transport, and to communicate with the health workers at the nearest health centre, or directly with the referral hospital. Peripheral health workers need the capacity to communicate with the referral hospital. Ideally the vehicle used to transport the woman will also be equipped with a radio or mobile phone in case her condition deteriorates on the way. In Bangladesh, functional ambulances based at district and primary health care centres are often not able to be accessed by the community because of an inability to communicate with the health facilities.\textsuperscript{59} In Pakistan, a noted limitation of an obstetric ambulance service included communication difficulties faced by TBAs and community members with the hospital to dispatch the vehicle.\textsuperscript{60} The lack of communication systems was also noted as one of the obstacles to providing an effective ambulance service in Nepal,\textsuperscript{61} and poor communication between health centres and the district hospital was identified as one of the major obstacles facing the referral system in Zambia.\textsuperscript{62}
**Costs**

The cost of transport is a significant barrier to reaching care. Demand-side costs can be as much as 60% of the total cost of obstetric care, with transport expenses making up 50% of the cost of a normal delivery and 25% of complicated deliveries in some settings.\(^{63-67}\) Even where obstetric services are free, or almost free, the costs related to reaching care can be prohibitive. In Nepal, transport costs to reach a facility were three times higher in mountainous areas than in the plains and in Ethiopia, bus fares were 50 times higher for obstetric emergencies and higher again in remote areas resulting in delays of up to several days while families sought funds.\(^{51, 56}\) In Sierra Leone, commercial drivers were reportedly reluctant to transport just one woman, charging families up to two times the average annual household income for transport to health care.\(^{52}\) High costs do not only relate to the use of motor vehicles. In Nepal, women also experience high charges for the use of stretchers in mountain areas.\(^{51}\) The high cost of transport is particularly problematic in non-cash economies, or where cash is only available seasonally, at harvest time or when migrant workers return, leading to an inability to pay for transport or a delay while trying to access cash.\(^{68}\)

Opportunity costs, including for accompanying family members, can also be substantial.\(^{51}\) Possible costs a poor family need to take into account include, in addition to transport and medical care costs, paying someone to care for their children, property, crops or livestock while away, accommodation and food for accompanying family members, return transport, and lost productivity. Family responses include borrowing money, typically from friends or relatives, and selling assets.\(^{69, 70}\) Poor women are disproportionately affected as they are likely to have to travel further distances and suffer greater impacts from both the direct and indirect costs of reaching care.\(^{71, 72}\)

**Reluctance to move within timely reach of EmOC before labour**

Ideally all pregnant women who live beyond timely reach of EmOC if they experience a complication during labour would move near term to somewhere close to an EmOC facility. However, even where there are facilities for ‘waiting mothers’, many women are reluctant to move at the end of their pregnancy to stay closer to emergency care.

Studies in Papua New Guinea, Laos, and Zimbabwe,\(^{39, 73, 74}\) and project reports from Tibet and Indonesia, identified several common reasons why women may not take up the opportunity to move within easy reach of EmOC, including:

- Lack of accurate knowledge about expected date of delivery
- Perception that pregnancy and childbirth are natural processes not requiring the attention of health services
- Reluctance to leave children and husband at home
- Concern about loss of time to work in the fields, and boredom at MWHs
- Costs of transport
• Fear of unfamiliar surroundings, lack of privacy and homesickness
• Security concerns in urban centres, especially for ethnic minorities who face language and discrimination problems.
• Cultural beliefs and rituals around childbirth, including beliefs about the significance of place of birth
• Inability to obtain the permission of husband or in-laws

There are many reports of remote women not making use of MWHs because of poor conditions as a result of inadequate resourcing. In Ghana, a MWH established in an old hospital building was used by only one woman who stayed only one night in the first year due to a low perceived need among women and a preference for home delivery, financial constraints, concern about separation from family and farms, little support from health workers and difficulty arranging transport to the hospital at night.75 Lack of transport to the hospital, particularly during the rainy season, was also noted in Laos.76 A MWH in Democratic Republic of Congo (DRC) was rarely used because the perceived risk of staying alone with no food was greater than the risk of a home delivery.77 In rural Zimbabwe, overcrowding, poor sanitation and a shortage of water and firewood contributed to only one third of referred women making use of the facility.78 A review of two MWHs in Timor Leste found that women more than 25km from a facility providing EmOC were no more likely to deliver in hospital after a MWH had been established owing to transport and communication barriers, and socio-cultural factors.40
Overcoming the ‘second delay’

While most obstetric complications are unpredictable, childbirth can be prepared for and so too can the potential need for emergency care. Effective transport and improved communication have been identified as critical elements to reduce maternal mortality, but efforts to address the ‘second delay’ require attention to all the potential pathways to EmOC and all the links in the referral chain to be effective. New and appropriate technologies, such as mobile phones, solar powered portable lights, and bicycle ‘ambulances’, can make a great difference to the ‘second delay’. The 2001 Human Development Report “Making New Technologies Work for Human Development” provides a useful general discussion of the role and benefits of introduction of new technologies for poor people.

Transport options and strategies

There are many examples of efforts to improve transport arrangements for the transfer of women with obstetric complications to care. Provision of sufficient ‘ambulances’ to cover all communities is costly. There are examples where locally available forms of transport have been adapted or their use maximised for emergency transport. Many of these have been small-scale, and there is a lack of data from rigorously evaluated projects, but they provide useful lessons. Improvements in roads and related infrastructure make it possible to make dramatic improvements in transport options for both emergency evacuation and journeys to an obstetric facility before or during labour.

Non-motorised (intermediate) forms of transport

A wide range of locally available means of transport is used in poor and remote communities to transport a woman immobilised by a complicated labour, including stretchers, hammocks, baskets, rickshaws, animal-drawn carts, boats, and bi/tricycles. Such transport is obviously slow and inadequate for long distances. For example, horse or donkey-drawn carts were commonly used in Senegal to transport patients, but were noted to be uncomfortable, took up to two days to reach a health facility, and the animals and carts were not always available – particularly during harvesting or market times. Similarly, in rural Niger where donkey-carts were available, an average of 18 hours of non-stop travelling was required to reach a health facility which will be too late for many women to benefit from emergency care.

Bicycle ‘ambulances’ have been introduced as part of safe motherhood projects in a number of African countries, usually consisting of a purpose-built trailer that can be attached to a regular or slightly modified bicycle or tricycle. Projects in Malawi, Zambia and Namibia included training of local volunteers in maintenance and local production of the trailers to improve reliability and sustainability. Some projects also established village committees that were responsible for operating and maintaining the bicycle ambulances, which in some instances included monthly
financial contributions from community members to cover costs. Unfortunately, few of these projects have been evaluated or have been able to demonstrate impact on maternal health outcomes.

While bicycles and tricycles may be readily available at the community level there is need to consider their appropriateness for the terrain and their reliability. A review of a program in Tanzania that addressed emergency transport found that tricycles were the most popular means of community transport, but locally built models were not robust enough for the conditions. Tricycles were also found to be unsuitable for some rural roads leading to frequent breakdowns in a project in Uganda. In rural Niger a trial of using tricycles for patient transport had to be stopped because they were not able to cope with sandy roads in the dry season or clay roads in the wet. A report on the possible role of non-motorised forms of transport in Senegal noted that while bicycles could be an effective alternative to motor vehicles, consideration had to be given to the conditions, including extreme heat, large distances, poor roads that made travel by bicycle uncomfortable, and a lack of familiarity with cycling, particularly among women.

Despite limitations, intermediate forms of transport are important, particularly where there are no roads. Locally available means of transport are likely to be available, affordable, and easy to operate and repair at the community level. They can be very useful to take a woman to a main road or health centre where a vehicle is available.

**Motorised forms of transport**

A recent review of transport technologies for obstetric emergencies came to the rather obvious conclusion that, while evidence was scarce, experience suggested that “motorised transport is likely to be the most acceptable and effective”, highlighting the paucity of research and lack of attention to the ‘second delay’.

**Motorcycles, tractors and motorboats**

Examples in the literature of the use of motorcycles for obstetric emergencies come mainly from Africa, where purpose-built sidecars or trailers have been used to transport women to care. These motorcycle ‘ambulances’ have been introduced in the Gambia, Malawi, Ghana and South Africa (see Box 4). Many are community operated or stationed at community health posts. Other projects have used existing motorcycle networks, such as The Safe Motherhood Emergency Transport Scheme in northern Nigeria that enlisted the services of local motorcycle taxis with the support of the taxi union. Drivers who volunteered to participate were given training and provided with an ambulance trailer that was built by a local truck manufacturer through an apprentice training program. The scheme was also expanded to include minibus taxis and other commercial vehicles.
Motorcycles are generally less expensive than larger vehicles, and may be more accessible to some communities where roads are poor. They can also increase the mobility and outreach of health workers, such as 'midwives on motorbikes' in Timor Leste. Tractors with trailers have been used in Tanzania, Ghana and Tibet to provide community-level emergency transport and motorboats have been effective in river regions of Ghana, Bangladesh and Myanmar.

Motorcycle ambulances in Malawi

As part of the Safe Motherhood Program, the Ministry of Health (MoH) in Malawi introduced motorcycle ambulances to improve access to EmOC in rural areas. The motorcycle ambulances were fitted with specially designed, covered sidecars (eRangers, see www.eranger.com) with the ability to transport two adults and basic medical equipment. The eRangers were stationed at rural health facilities and had two drivers per ambulance to ensure availability. Drivers were trained in maintenance in addition to safe operation of the ambulance, and were required to keep referral forms and log books. Transport was provided free of charge.

In the central district of Dowa, ten rural health facilities were provided with eRanger ambulances to transport women up to 96km to the district hospital for EmOC. As a result district facility deliveries almost doubled, and MMR was reportedly halved in the first 12 months (while remaining unchanged in neighbouring districts). In addition, the number of rural health centre deliveries increased as women were more likely to deliver at the centre knowing that emergency transport would be available if needed.

A review of a similar pilot project in Mangochi district compared motorcycle ambulances with vehicles. Three rural and remote centres were provided with eRangers and trained drivers. Motorcycle ambulances reduced referral times by 2 to 4.5 hours (depending on the site) and were 19 times cheaper to purchase and 24 times less expensive to operate compared with vehicles – which were only stationed at the hospital (contributing to long travel times) and were not able to pass some roads in the rainy season. The authors concluded that motorcycles were useful where there was limited access to other forms of transport, but supporting systems (fuel, maintenance, roads, communication and referral procedures) needed to be addressed.

Some efforts to introduce a new or adapted vehicle have failed. In Myanmar, a WHO/UNFPA project introduced “trawlergies”, mini tractors with trailers designed to transport women in need of emergency care. While they appeared to have some application where roads were available, communities near railways and rivers preferred to use trains and boats. A community committee managed the maintenance and use of the vehicles, but an evaluation of the project found that
most committees were not functioning, there were problems retaining drivers and a lack of funding for maintenance and to support free transport. In addition, the trawlergies had poor lighting, no roof, were uncomfortable and had structural problems which limited their use.98

Commercial and private vehicles

In some settings, commercial or private vehicles such as trucks, buses and taxis are the only reliable form of motorised transport available. Many women who are able to get to a road will rely on this form of transportation, often at high cost. They are often met with reluctance to take them on as passengers. There are some examples of projects at the community level that have engaged with local vehicle owners or transport companies to overcome these obstacles, and also to avoid the high set up costs of purchasing dedicated vehicles to serve as ambulances. In some cases, drivers were also given basic training. For example, in Ghana 335 bus and taxi drivers underwent a six hour training program in basic first aid to improve pre-hospital care and transport where ambulances were not available.102

In Nigeria partnerships were formed with commercial transport owners, workers and their unions. In one such innovative project, drivers were encouraged to volunteer to provide a ‘humanitarian service’ to the community.103 Drivers who travelled through the project area were provided with training in basic reproductive health and emergency transfer and were then issued with a certificate and vehicle sticker that identified them as participants, as well as a padded bench for women to use. Willing drivers were then summoned by messages sent to the marketplace by bicycle or motorbike. To cover costs incurred, a seed grant was given to the
transport union to cover upfront costs, which the family would later repay. Over two years 29 women used the service with one maternal death and four perinatal deaths. The average transport time of nine hours was significantly shorter and less costly than other commonly used means.

A similar project in northern Nigeria established a transport service management committee that mapped all transport owners, operators and vehicle types in the area and then encouraged voluntary participation of transport workers to make themselves and their vehicles available 24 hours a day in the event of an obstetric emergency. Willing drivers were registered with the committee and agreed to charge standard fees based on distance travelled. Details of drivers were then provided to pregnant women and their families to call upon if needed. A total of 58 local drivers participated in six month rotations. Costs were covered by a community-based loan fund that was financed by community contributions.

Private vehicles have also been used for emergency transfers between health facilities. In Rajasthan, India, nurse-midwives in rural health centres hired private jeep taxis for a fixed fee and accompanied women the 30-58km to hospital. Transport was free for poor women. A review of maternal deaths in Uganda recommended that government vehicles (such as military and police) could be used in obstetric emergencies.

Ambulances

There are many examples of provision of ambulances based at health facilities. Some provide transport only between health centres; others also provide transport from the community to care. For example, in a remote region of India, a secondary level hospital acquired a four-wheel drive vehicle that was dedicated to obstetric emergencies, transporting 271 patients over two years and contributing to an increase in met need for EmOC from 11% in 1999 to 48% in 2002. In Sierra Leone, a project between the Prevention of Maternal Mortality Network (PMMN) and the MoH placed a four-wheel drive vehicle at the referral hospital that was available 24 hours a day to retrieve emergency referrals from peripheral health centres. A fixed fee, agreed upon by the community, was charged for transport to cover fuel and maintenance. Poor women were allowed to defer payment until a later time. Referrals for serious obstetric complications increased from 0.9 to 2.6 per month and the average referral time was just over three hours.
Experience shows that often there is eagerness to accept donated vehicles without considering their appropriateness or the operational costs, resulting in many ambulances not functioning and sitting idle at health centres.87 Experience in Senegal found that motorbikes and two-wheel drive vehicles were purchased in preference to four-wheel drive because of the much lower capital and ongoing costs, but they were not operational within a short time frame because they were unsuitable for the environment.53 In Peru, a program to improve delivery care in a rural region included a plan to provide ambulances free of charge to transport women to EmOC, but this could not be implemented due to high fuel costs.108

A review of 31 ambulance-operating organisations in seven districts in Nepal (most run by NGOs) highlighted factors that need to be considered in order to ensure an effective service.109 These included reliability, related to repairs and regular maintenance. None of the vehicles reviewed were being serviced regularly and repairs were delayed due to the cost and lack of availability of spare parts. The high cost of fuel also affected sustainability, particularly where the pregnant women were unable to help cover costs. Charges for emergency transport were variable and unaffordable for some families. Another concern was the lack of reliable drivers able to be contacted urgently at any time. No drivers had any para-medical training and there were difficulties providing salaries or incentives. Misuse of ambulances contributed to delays.
Where few other vehicles are available ambulances tend to be used for other tasks such as delivering medical supplies or transporting health workers, so they are often not present when needed for an emergency.

Where ambulances were functioning well there was little misuse of vehicles (a factor that was noted to be personnel dependent unless regulations were in place). Drivers were paid a salary, and provided with a phone or stationed close to health facilities at night to facilitate communication. There was motivation to maintain vehicles (particularly where they were driver-owned). The report also suggested that at least two drivers be assigned to each ambulance to ensure availability at all times.61,109

When aid agencies donate emergency vehicles a management policy needs to be developed with district health officials to ensure clear rules about the use of the vehicle, and to clarify who will be responsible for vehicle maintenance, insurance and fuelling.110

Light aircraft

Light aircraft may be the only way to transfer emergency patients from remote island, mountainous or other isolated settings to a hospital. Where such a service exists a high proportion of cases tend to be obstetric emergencies. In Milne Bay in Papua New Guinea, for example, a review of two years in 1983 showed that 50% of air charter evacuations were for obstetric or gynaecological patients, at an average cost per life saved of US$520 (US $1,150, 2010 equivalent). The average cost of providing the emergency service per head of population per year was about US$0.12 (or US$0.27, 2010 equivalent).111

The non profit organization Mission Aviation Fellowship International Asia Pacific provides a subsidised medical emergency service in parts of Papua New Guinea, Bangladesh and Timor Leste.112 Their long experience means that they could provide useful information to governments considering including such a service in their efforts to overcome barriers to emergency obstetric care in the most remote areas. Private air medical emergency services are also starting to be established in some developing countries, such as in Mumbai, India113 but their services could only be afforded by the rich.

Even where an affordable air evacuation service is available, some settings will lack a safe landing strip, and landings and take-offs may not be possible at night, or in poor weather conditions.

Emergency medical transport systems

Emergency transport systems commonly in use in developed countries are not feasible or affordable in many resource-poor settings due to the high costs of equipped vehicles and skilled personnel, particularly in areas of low population density and poor infrastructure.79,114 However, there are some examples of effective coordinated emergency networks in the region. These are
often partnerships between health and other government sectors, the private sector and the community.

There are a number of examples in Pakistan, including the Rescue-15 project, a collaboration between the police, private sector and community, based in Islamabad. The project, which provides free services including first aid and transfer to hospital 24 hours a day, is managed by the police department with contributions from NGOs and the private sector. The fleet includes three equipped ambulances and three doctors provided by NGOs, with communication through radio sets fitted to all vehicles, patrol cars and motorbikes. Financial contributions, provided by the police department, NGOs and the community, cover salaries and ongoing costs. Similarly, the Edhi Ambulance Service is provided free or at minimal cost through private and community donations, supporting a fleet of ambulances (including helicopters and airplanes) that cover even remote areas. The Faisalabad Obstetric Flying Squad was established by the Mother and Child Welfare Association in 1988, providing free emergency transport to the referral hospital, which covered the costs of the program. Emergency calls were made to the hospital from where ambulances equipped with resuscitation equipment and trained health providers were dispatched. Extensive engagement with the community and training of TBAs and Lady Health Workers was also undertaken to increase awareness of the service and address some of the socio-cultural barriers to seeking hospital care. Between 2 and 5% of all obstetric admissions to the hospital were through the Flying Squad, and women of low socioeconomic status were the predominant users. There is no reported data on maternal health outcomes, but an evaluation of the program in 1993 concluded that integrating the referral system into the general operations of the hospital was one of the main facilitating factors and that such a model could be replicated in similar settings.

In Indonesia, the public emergency transport service ‘118’ provides an ambulance system in five of the biggest cities in the country, with a call centre in Jakarta that receives 50-75 calls a day to dispatch 26 ambulances and 12 motorcycles. Calls are not charged and transport fees cover 50% of the costs, if the patient can afford to pay. The program is also funded from income generated by paramedical training courses provided by the organisation. In Madagascar, emergency calls are dispatched by the police and fire departments, with 30% of referrals for obstetric complications.

In India, an innovative public-private partnership was established in 2005 between state governments and the Emergency Management and Research Institute (EMRI, see www.emir.in) to provide pre-hospital emergency care and transport. The system comprises a network of medically equipped vehicles, skilled personnel and wireless communication managed by a central call centre that can be reached by a single toll-free number. The system responds to all emergency calls 24 hours a day, including in rural areas, with a reported average arrival time of 20 minutes in urban areas and 30 minutes in rural areas. Around one third of calls are for obstetric emergencies. Pre-hospital care and transport are free of charge, and agreements have been signed with over 6800 hospitals to provide free stabilisation care for patients for the first 24 hours. There are over 1900 operational ambulances across eleven states with plans to expand the program across the entire country.
General points to consider when planning to improve transport arrangements

Many journeys to EmOC will involve a number of different means of transport. For example, in a study of maternal deaths in Rajasthan, India, many women were carried from their village to the nearest road, then travelled on private vehicle to the city, and then by rickshaw to the hospital. Particularly in remote and rural areas it may be more feasible to mobilise existing intermediate forms of transport or commercial vehicles to transfer women to the nearest health centre, and then ensure a motorised vehicle is available for transfer to the referral hospital. For transporting health workers quickly, Gauthier suggests as a rough guide that bicycles are appropriate for travelling distances of 5-20km, motorcycles for 20-30km, and a vehicle required for distances greater than 30km. These estimates will be influenced by geography and road conditions.

There are rarely sufficient ambulances to meet all needs and district planners will face decisions about the optimal geographical distribution of available emergency vehicles. Such planning will need to take into account density of populations, distance from EmOC, geographical and seasonal barriers, trends in fertility rates, and availability of or potential for alternative transport arrangements. Obstetric emergencies are devastating, but relatively infrequent in smaller communities so it may be difficult to justify a dedicated vehicle. However, efforts to improve access to emergency care for pregnant women are also likely to improve urgent access to care for other medical emergencies, making investments in emergency referral systems more cost-effective. Many of the projects discussed above transported trauma, medical and paediatric emergencies in addition to obstetric cases. For example, an emergency obstetric transport system in Nigeria that transported 29 women over two years also transported 27 men and children for other emergencies during the same time. Decisions also need to be made about other uses of the vehicle, such as distributing medical supplies, supervisory clinic visits, or non-urgent transfer of patients. These decisions should be determined by an assessment of the time interval to return if needed for an emergency, and whether the vehicle has a reliable means of communication so that it can be readily summoned. Improving transport infrastructure more generally can also improve the mobility of health workers and supply of equipment, vaccinations and medications, having a positive impact on maternal and child health more broadly.

There are few examples in the literature of modifications to intermediate or motorised forms of transport to improve privacy, comfort, and safety for the pregnant woman in labour or with a complication, such as blankets for warmth, cushions, ability to keep the woman’s legs raised, a means of lighting (solar or battery powered), a radio or mobile phone, water, drip stands, blood pressure monitor, delivery kit, and oxygen. Such modifications are important for the woman’s condition and also because they influence willingness to use the transport.

Socio-cultural factors can have an important influence on acceptability and use of emergency transport. In Southern Malawi where bicycle ambulances were provided as part of a project to address maternal mortality, most women still preferred to walk to the health facility because the bicycles offered no privacy and cultural taboos about being seen in labour prohibited many
women from using them. A review of bicycle ambulances in Uganda found the government was reluctant to support their wide introduction because they were seen as ‘backwards’. In Senegal, bicycle ambulances were deemed inappropriate because they did not allow a family member to accompany the woman to care. In Nigeria, taboos about women travelling in vehicles, concern about bleeding, and fears about the consequences (including imprisonment) if the woman died on route needed to be addressed in order to mobilise support. Superstitions surrounding birth were also of concern to private drivers in Nepal.

The key to an effective transport system depends on appropriateness for the setting and sufficient attention paid to management of the system including costs, maintenance and repair, drivers, and regulations regarding the use of vehicles for other purposes.

**Improving infrastructure**

One of the major obstacles to improving physical access to EmOC is a lack of transportation infrastructure. Improving roads to facilitate emergency transport reportedly contributed to improved access to EmOC in Sri Lanka. In Vietnam the road rehabilitation project reduced distances to the district hospital and reduced travelling times – most significantly for poorer communities. For those communities included in the project, the time taken to reach hospital for serious injuries was reduced by 46 minutes compared with non-project communities. There are also examples of sector wide approaches in Nepal to improve rural transport infrastructure by building bridges to access remote communities. In Kenya, local communities built and maintained tracks that allowed emergency vehicles to reach remote villages. Improving roads can have wide-reaching health, education, social and economic benefits for communities. The health sector should engage with and advocate for multi-sector investment in infrastructure.
**Transport options and strategies – key points**

- Transport options need to be addressed from the community to health facility, between levels of health facilities and for women who move within easier reach of EmOC prior to labour.

- The choice of transport methods will depend on existing infrastructure, estimated distances, availability (including spare parts and fuel), costs (capital and operational), socio-cultural factors (such as privacy) and demand.

- At the community level and at peripheral health centres, particularly in remote areas or in settings with poor infrastructure, it may be more feasible to maximise the use of locally available methods to transport women to a main road or to a health facility. These include bicycles and motorcycles with trailers or partnerships with private and commercial transport operators.

- At the facility level, a dedicated emergency vehicle is preferable for retrievals to more peripheral health centres or the community (if feasible) and to transfer on to the next level of care. Careful attention needs to be given to the appropriateness and management of such vehicles, including:
  - Suitability for existing infrastructure, terrain and distances
  - Reliability (safety, maintenance, repair and fuel)
  - Adequate budget allocation for operational costs
  - Communication between community, health workers and drivers
  - Trained and supported drivers
  - Regulations regarding use for non-obstetric emergencies and other health activities

- Consideration needs to be given to the cost of emergency transport, particularly for poor women.

- There are examples of innovative public-private partnerships to establish emergency medical transport systems, including in rural areas.

- Efforts to strengthen transport for obstetric emergencies should be part of a broader strategy to improve emergency referrals as this is likely to be more sustainable and cost-effective.
Communication options and strategies

An efficient system of communication must go hand in hand with emergency transport, and is required at both community and health facility levels to mobilise transport, receive advice about immediate first aid management, and arrange prompt referral. In the absence of modern communication technologies and infrastructure, basic approaches have included the use of recognisable symbols to notify motorists of the need for emergency transport. There are examples in Nigeria and Somalia of flags being placed on roadsides or outside homes to alert passing drivers. Messages may also be sent via foot, bicycle or motorbike to mobilise drivers in known meeting areas, such as market places.

The ability to exchange information is important - influencing the decision to seek care and reducing the ‘third delay’ by providing advice and ensuring the referral facility is prepared for the arrival of an emergency. Communication is also important to enable a woman to call for assistance, including contacting her husband, family or other decision-makers, who may also have access to funds. Health workers need to be able to communicate to facilitate referrals and initiate treatment. For these reasons, technologies that allow two-way and real time communication are preferable. In two districts in Vietnam, telephones were placed in all community health clinics and district hospitals to allow advice to be given to stabilise patients and to dispatch the ambulance. Examples in Bangladesh, Peru and Laos demonstrated that the use of telephones contributed to an increase in demand for health services, in part due to access to timely information.

The expansion and increasing accessibility of radios and mobile phones have overcome many of the barriers related to fixed-line telecommunication infrastructure that may not be available or possible in many settings. Advances in communication technology have wide benefits for health and health care in low income countries and there is increasing interest in this topic. A conference on ‘e-health’ was held in 2008 and the papers published online.

Identifying appropriate communication systems

As part of a project in Sierra Leone, motorcycles were provided at peripheral health units as a means of communication with the hospital. In the event of an obstetric emergency requiring referral, riders were to travel by motorcycle to the hospital to summon the four wheel drive vehicle. During the first year of the project problems arose with this system, as breakdowns and accidents resulted in delays in referral, and riders were reluctant to travel at night due to security fears. Two-way radios were instead installed at health units and the referral hospital to summon the ambulance, reducing referral times by two hours from the farthest health centre.

Box 7. Identifying appropriate communication systems, Sierra Leone

Source: Samai O, Sengeh P. Facilitating emergency obstetric care through transportation and communication, Bo, Sierra Leone. International Journal of Gynecology and Obstetrics. 1997;59(SUPPL. 2).
Two-way radios

In eastern Uganda the RESCUER project launched in six health units and one referral hospital included the provision of solar-powered VHS radios at health units and mobile radios (walkie talkies) to TBAs. Mobile radios were also installed in referral vehicles. Radios were chosen because they were affordable and simple to use and were considered less likely to be misused than other technologies. Radio coverage in areas far from health units was problematic with a need to install sub-centres in more remote regions. The project also addressed quality of care and provided transport in the form of bicycles for TBAs, tricycles at health units and a vehicle at the referral hospital. Walkie talkies were used by TBAs to seek advice and call for assistance during an obstetric emergency, during which a midwife and transport would be dispatched from the health unit or hospital. It also allowed advanced warning to be given to the hospital to minimise delays once the woman arrived. The associated empowerment of TBAs led to increased compliance with referrals and facilitated the referral process by allowing verbal hand over, which was particularly beneficial where TBAs were illiterate. Even in cases where transport could not be arranged, there was reportedly some benefit in being able to provide advice to TBAs over the radio system. The project reported an increase in referrals for complications and supervised deliveries and a reduction in MMR from 500 per 100,000 in 1996 to 271 per 100,000 in 1999 compared with MMR greater than 350 in other districts. Midwives also benefited from the communication system with reduced feelings of professional isolation and increased support. Despite these positive outcomes, scaling up the ambulance-communication system to other districts was difficult due to insufficient funds to cover the high demand and high costs of vehicle maintenance.93,133,134

In Sofala district of Mozambique, health facilities were grouped into networks, each with a hospital, and radios installed at the health centre, hospital and in hospital-based ambulances. Solar panels were installed where there was no electricity. The initiative contributed to a 30% increase in emergency obstetric referrals with a halving of the case fatality rate. The radios were also used for medical and paediatric emergencies and trauma. Radios were located next to the delivery and labour ward to prevent misuse. Challenges encountered by the joint UNFPA/AMDD and government project included poor functioning of solar powered systems during the rainy season and the loss of equipment due to theft.135 Radios have also been used in Mali, Sierra Leone, Tanzania and Malawi – where the use of radio communication decreased referral times from 6 to 3 hours.85,136

Two-way forms of communication are especially important when communities are far from health centres.
**Radios in Niger**

A radio-ambulance system was introduced in two districts in Niger. Prior to the project women requiring EmOC had to walk (or take a camel) 75km to hospital. Radios were installed to allow communication between health centres, the district hospital and the ambulance service to call for transport in an emergency (47% of which were obstetric). They were also used weekly for the epidemiological report. Hospital radios were placed in the emergency room with a link to a night duty room (with a nurse on call) to ensure 24 hour access. The radios were solar powered, allowing up to three weeks communication between recharging. To encourage maintenance, staff houses were also fitted with a lamp and a socket for a radio to motivate health workers to clean the solar panels regularly. The initiative led to a significant increase in obstetric referrals, allowed advice to be given to health centre staff and had a number of other benefits such as improving the organisation of supplies, notification of outbreaks and increasing community confidence in the health services. There was an initial cost of US$5640 per health centre and US$608 yearly replacement costs, but once the system had been correctly installed there were no recurrent costs to maintain the radios and the entire system represented less than 5% of the health budget.

*Box 8. Radios in Niger*


**Mobile phones**

The significant potential of mobile phones due to their increasing accessibility and relative affordability was highlighted in a recent review of transport and communication technologies for obstetric emergencies. Globally, mobile phones are one of the most rapidly expanding technologies, with an estimated 4.6 billion subscriptions by the end of 2009, or 67 subscriptions per 100 people (Figure 6). There are approximately 37.2 subscriptions per 100 people in Asia and the Pacific, which has increased almost six-fold since 2000. Despite the rapid expansion, inequities exist with only 23.7 subscriptions per 100 people in low income quintiles, and 92.7 for high income groups. The benefits of mobile phones over other technologies are the relatively low start up costs, user-friendliness, and the increasing accessibility by communities. However, there is a need to improve access in rural areas, affordability for the poor (including upfront costs and ongoing costs related to recharging and purchasing airtime), and access for women. Solar cells for recharging may be a solution in settings without electricity.
As yet, there are few documented examples of the use of mobile phones for maternal health, particularly EmOC. A qualitative study in Egypt revealed that the increasing availability of mobile phones, particularly in rural areas, has reportedly led to an increase in communication between TBAs and midwives, and health workers and women seeking advice. Mobile phones have also been used during home deliveries to arrange formal or informal transport in the event of a complication, reportedly reducing response times. There are other examples of mobile phones being used to encourage breastfeeding and support women during pregnancy through text-messaging. Another potential role for mobile phones in improving access to EmOC may be in the electronic transfer of funds to drivers in the absence of ready access to cash. In Kenya and Tanzania, mobile phones are used to deposit or withdraw money and transfer funds or airtime electronically to other users, particularly in remote areas with limited access to financial institutions. This scheme was initially supported by the UK-based Department for International Development (DFID).142

There is increasing experience of mobile phones being used in developing countries for non-maternal health programs, such as to support chronic disease and medication compliance (particularly related to HIV), behaviour change, disease surveillance and information systems. There is also an increasing interest in the potential role of mobile phones in telemedicine, with examples in India where medical consultations and guidance during surgery have been provided in rural areas. A mobile telemedicine system in rural Indonesia with the capacity to monitor vital signs, transmit data and assist teleconsultation has been...
Mobile phones for maternal health in Ghana

The introduction of a district ambulance as part of the Millennium Villages Project in south-central rural Ghana had not led to a reduction in maternal deaths as village residents were not able to call for the vehicle when needed due to a lack of communication technologies. In 2006, in partnership with a corporate company (Ericsson), the project provided mobile phones freely to health workers and for a small fee (US$10) to residents in village clusters. This introduction reportedly contributed to a dramatic reduction in maternal deaths for the region.

Through the Millennium Villages Project in a number of African countries, including Ghana, Ericsson has been involved in providing information and communication technologies to poorly serviced areas. This has included projects that improve infrastructure, provide mobile phones with solar chargers to health workers, establish toll-free emergency numbers and provide internet at health centres.

Box 9. Mobile phones for maternal health in Ghana

Source: 156, 158, 159

developed, with potential use in ambulances. However more research is needed to identify the cost-effectiveness of these new uses, how to scale up and to identify impacts on maternal health.

There are some innovative approaches to increase community access to mobile phones. In Pakistan a project provided rural health workers with mobile phones to collect data and patient information and transfer the information to urban specialists who would provide advice, training and education. Such a program could potentially be used for community-based health workers dealing with obstetric complications. In Ethiopia, an NGO project provided mobile phones to village leaders as well as the hospital doctor, anaesthetist, birth attendants and technicians for use during obstetric emergencies. In rural villages in Bangladesh, the Grameen's Village Phone program has provided mobile phones to poor women as part of an income generation scheme. Village women acquire a microcredit loan to purchase a mobile phone and accessories and then resell phone calls and services within their villages. In 2000, 960 village phones were being used in rural areas servicing some 65,000 people and a similar project is now being introduced in Uganda. Grameen Bank has also helped provide affordable mobile phones to pregnant women in rural Ghana, allowing women to seek advice before and after delivery and receive reminders about appointments and vaccinations. In settings of low phone ownership in the community, providing health workers or volunteers with mobile phones to use in emergencies may be a feasible alternative. Some authors have suggested that mobiles be loaned or provided to all women during the final month of pregnancy. Possessing a mobile phone may encourage women to move closer to EmOC towards the end of pregnancy, reducing homesickness and security fears.
**Communication options and strategies – key points**

- Communication needs to be addressed at the community level and at health facilities to:
  - Summon transport or call for help
  - Seek advice and initiate first aid or stabilisation
  - Arrange prompt referral and allow the receiving facility to prepare for the emergency
  - Allow reassuring communication between a woman far from home and her family

- Two-way technologies are preferable. Mobile phones are the most promising technology due to their increasing availability and relative affordability.

- Consideration needs to be given to existing telecommunication infrastructure, costs and power supply. In remote settings solar-powered technologies have been successful. In remote or mountainous regions where mobile network coverage is problematic, two-way radios with remote sub-centres have been used.

- There are examples of innovative public-private partnerships to increase mobile phone access in underserved populations or for poor women.

- Mobile phones in particular have wider benefits for maternal health and community health more generally, including reducing staff isolation and facilitating staff development, supporting treatment adherence, building health information systems and assisting disease surveillance, and telemedicine.

**Box 10. Communication options and strategies**
Financing options and strategies

A comprehensive review of financing models for maternal health is beyond the scope of this review. Whenever reforms for financing of health care in general are being considered it is important that the cost of transport to reach EmOC (both before and after onset of a complication) is included. Here, we focus specifically on meeting the costs associated with reaching EmOC, but acknowledge the considerable overlap with meeting the broader costs of obstetric care. A review of the literature addressing financing for maternal health services noted that transport costs can contribute substantially to the overall costs and that they need to be included in other efforts to finance maternal health care. As previously discussed, the cost of transport is the major financial barrier contributing to the ‘second delay’, however opportunity and other costs may also be substantial. This includes lost productivity, costs of care for remaining children or livestock, costs of communication technologies, and costs incurred by accompanying family members. Such expenses mean that families may be unable to pay for transport or experience a delay in accessing cash. Many have to borrow from family, neighbours or moneylenders, putting the family into debt, or sell essential assets with sometimes catastrophic consequences.

A range of strategies are described in the literature to address the costs of reaching care. These can be broadly categorised as follows:

- Free, subsidised or fixed fees for transport
- Community-based emergency loans
- Pre-payment, risk-sharing and community insurance schemes
- Cost-sharing
- Vouchers or entitlement cards
- Cash transfers or reimbursement

Free, subsidised or fixed fees for emergency transport

Facility-based financing schemes to improve maternal health often do not include transport costs, although there are examples in India and Pakistan where transport is provided freely for EmOC with the cost shared by NGOs, the health facility and the government. In Sri Lanka, emergency transport was introduced as part of the national maternal health program, with the government providing three to five ambulances per hospital (at provincial, district and remote level) and also providing reimbursement for health workers to cover costs if a private vehicle had to be organised in the absence of an ambulance.

Setting fixed fees at a standard charge for emergency transport (often at a subsidised rate) or per distance travelled has been included in projects that made use of commercial or private vehicles and facility-based ambulances. Fees are generally charged per kilometre travelled and are considerably less expensive than hiring private vehicles. In rural Niger, the
fixed fee per distance for using the hospital ambulance was up to three times less expensive than hiring private transport, but this contribution was still sufficient to cover the running costs of the vehicle. Also in Nigeria, local transport unions and other transport owners ensured that women were not delayed trying to raise cash.

A fixed and widely advertised fee allows women and families to plan for potential costs faced during an emergency and make some efforts to have cash ready if needed. However, these costs may still be prohibitive, particularly for poor women who are also likely to live further distances from health facilities, so other financing mechanisms are required.

**Community-based emergency loan funds**

Projects implemented through the Prevention of Maternal Mortality Network (PMMN) in Africa provide a number of examples of community-based loan funds. A project in Nigeria established a community emergency loan fund after costs of care and transport were identified by communities as a major barrier to EmOC. With the support of traditional leaders, clans were established to manage the funds, with supervision from the project team. Clan members donated to the fund, contributing to 80% of the scheme. Women or families in need applied for a loan, which was charged at 2% interest with no timeframe for repayment, and waivers if the woman died. In the first year of operation 456 women requested loans of between US$7 and US$15 to cover transport as well as hospital fees, drugs and blood. Eighty-three percent of loans were granted, and 93% repaid in full. As repayment was not 100%, fund depletion was a concern and ongoing external support and funding was required. It was also noted by the authors that one of the factors leading to high uptake of loans was that it coincided with an improvement in hospital facilities, so families were more willing to pay for a real or perceived increase in quality of care.

In northern Nigeria, a similar scheme managed by traditional village leaders was established through community contributions, which covered 60% of the project costs. Women were encouraged to apply for a loan two months prior to their expected due date, and were then provided with the details of local drivers who were able to provide transport. No interest was charged on loans, with a six month grace period and 24 months to repay. The loan was to cover transport costs as well as hospital fees and food, and was restricted to obstetric emergencies encountered by women who had been a resident in the village for at least 12 months. No repayment data are available, although 18 women had accessed the fund in the first 10 months.

In Cambodia, CARE has helped to establish Village Emergency Referral Systems in collaboration with local authorities in rural areas. Villages selected for the program had a history of maternal deaths due to transport delays or were located more than five kilometres from the nearest health centre. The program includes community-wide birth preparedness education and support to develop community funds for emergency transport, managed by the Village Health Committee. An initial cash grant was provided by the NGO and then each family contributed an
agreed on monthly payment to the fund. Poor villages were subsidised by the NGO. Those women who borrow from the fund repay the loan in small monthly increments (with no interest), although in some villages women were not expected to repay. Community participation in the fund was facilitated if the local chief was seen to be contributing. Chiefs were also integral in mobilising drivers to ensure transport in an emergency. A review of the program in two districts noted that inconsistent eligibility criteria and poor communication needed to be addressed to ensure ongoing community support. A consistent and transparent monitoring process was also vital. In some communities, this involved documentation of monthly contributors with reports to the council and quarterly reports to the NGO. The increasing cost of fuel was also a noted challenge, in terms of the increased costs of transportation of women in an emergency, and the inability of support staff to visit villages as frequently as planned. 

In Sierra Leone, community mobilisation and engagement with local village leaders was undertaken to encourage the formation of village committees and loan funds for hospital care. Money was to be collected via a levy that the local leadership agreed on, which was a fixed contribution from men and women in the village. The loan was for covering the costs of the hospital bill, but this model could potentially be used to include transport costs. It was noted that only two of the six villages engaged established a fund, with strong community leadership a factor in successful villages.

A pilot project in rural Pakistan used Lady Health Workers and TBAs to help communities establish health committees that included an emergency transport fund, and was implemented in 31% of included villages. In Uttar Pradesh in India, the Community Partnerships for Safe Motherhood Project (USAID) included the formation of village health committees, often as part of other community groups, to raise funds to pay for emergency transport through social marketing, interest from loans and revenue from the sale of grain donated by community members.

Experiences reported in the literature of community-based loans for transport and other costs during obstetric emergencies are often small-scale and there are no examples of long-term, sustainable schemes. Issues of sustainability due to limited capacity to generate funds, failure to repay loans and complex management have been identified as challenges, and such schemes should not replace the need for governments to respond to their responsibility for ensuring access to care. Inclusion and utilisation by the poor also needs to be addressed. In Makwanpur Nepal, where loan funds were introduced for maternal and child health through facilitated women’s groups, some of the poorest women were not approved for loans because of fears of default on repayment. In addition, the monthly contributions to the fund were a disincentive for some poorer women to join the women’s groups. Extensive engagement with the community to raise awareness about the need for EmOC and strong local leadership have been identified as factors that increase success.
Pre-payment, risk-sharing and community health insurance

Community health insurance, or risk-sharing, often in the form of pre-payment, aims to improve financial access to health services by allowing households to pool risk and protect themselves from catastrophic costs at the time of care-seeking. Membership is generally voluntary and targets households that may be excluded from national social insurance, such as those engaged in informal economies. Paying in advance allows families to plan and pay for services when cash is available, and not at the time of the obstetric emergency when delays may occur while trying to raise cash. Pooling risks also reduces the direct costs incurred by individuals for health care.168

This concept has been implemented in Africa (often as isolated projects) since the 1980s, but has recently expanded and is part of national policy in a number of countries including Ghana and Rwanda making the schemes more sustainable.169,170 Most aim to cover the costs of obstetric care, but there are some examples where the cost of emergency transport to a referral centre if needed is also covered, most commonly an ambulance between health centres.169

In Mauritania, a pre-payment scheme was introduced as part of a broader Safe Motherhood project. Women who attended ANC were encouraged to join the scheme through a payment of US$22 which could be paid in two instalments (compared with US$333 for a complicated delivery). Membership of the scheme entitled the women to antenatal, delivery and postnatal care and included ambulance transport to the referral hospital if needed. After five years and following intensive community mobilisation through a local NGO, enrolment though ANC was over 98% with an increase in assisted deliveries from 1% to 3.3% and a reduction in MMR from 250 to 64 per 100,000 live births. The fee appeared to be acceptable to the community and covered the majority of expenses, such that the scheme was functioning without the need for external funding after an initial injection of donor funds.171

In a remote region of Kenya, family groups were encouraged to join a community insurance scheme through a voluntary annual payment that was to cover the costs of emergency referral. There was initially no provision for poor families who could not afford premiums, but this was adjusted after discussions with project management, local leaders, community groups and women’s groups with the development of a sliding-scale for payment based on socio-economic status. Payments in kind were also permitted, such as the exchange of livestock. Community contributions covered around 15% of the recurrent costs of emergency transport, and 8% of the total health program budget. Several years of advocacy were required to gain community support, with ongoing education and leadership needed to encourage continuing membership. Strengthening health services was also crucial. Nurses were responsible for keeping track of membership and collecting payments, which led to increased workloads. The scheme also faced challenges from external factors such as drought and insecurity that meant payments had to be deferred, or when families moved out of the area.128 A community health insurance scheme in Democratic Republic of Congo led to an increase in Caesarean sections, most
pronounced for communities located far from the hospital, suggesting it was effective in overcoming some of the costs associated with geographical barriers to EmOC.  

Premiums or pre-payment are usually a flat-rate and therefore poorer families cannot participate unless exemptions or subsidies are in place. There may be limited financial sustainability and ability to generate enough funds in low income communities, in addition to limited risk pooling if there is little perceived need, which presents challenges for sustainability. Available evidence suggests that pre-payment schemes increase utilisation of services among users. However, when such schemes are introduced caution is needed to ensure that provider payment arrangements do not lead to unnecessary over-serving. China introduced the “New Cooperative Medical Scheme”, in 2003, in many rural counties, with cost-sharing between the Central Government and local governments and voluntary pre-payments from the population. In 2004 WHO made recommendations to avoid potential problems with the scheme and a recent study report highlights the problem of dramatic increase in Caesarean section rates (well above the recommended maximum rate of 15%) in five countries resulting from introduction of the scheme.  

The Tabulin scheme, Indonesia

“When Kawit’s third childbirth did not go smoothly, Yuniar, the midwife in Sukapulit village, realised the problem was obstructed labour and knew what to do. Yuniar took 150,000 rupiahs ($15) from her emergency funds and hired a truck to take the patient to the nearest hospital for a Caesarean section. On the way, she used a mobile phone to alert hospital staff. A village volunteer, previously identified as having the same blood type, accompanied them to the hospital in case Kawit needed a transfusion. Both mother and infant survived.”

Ogan Komering Ilir, South Sumatra, Indonesia

Box 11. The Tabulin scheme, Indonesia


The Tabulin (Tabungan Ibu Bersalin – ‘saving pregnant mothers’) scheme has been implemented widely in a number of provinces in Indonesia, including Central Java, South Sumatra, and South Kalimantan, since the late 1990s. Tabulin is a community savings scheme that enables pregnant women to have access to antenatal and postnatal care visits, deliveries assisted by health professionals, transportation and lodging costs when referred, and free obstetric emergency care treatment for the poor. The Tabulin scheme varies in different settings but is usually a subsidised scheme with initial seed money from government or a donor agency to encourage savings by families of pregnant women and to create a system for responding to obstetric emergencies. In many places the Tabulin scheme has catalysed community mobilisation for better emergency readiness and stimulated interest in addressing other
maternal and child health problems. Evaluations have found that the scheme works well in many but not all villages; in the poorest villages transport was not available.176,177

In some settings the Tabulin scheme has been viewed as being similar to the Social Safety Net program, and resented by some village midwives as undermining self-reliance and reducing their ability to make money from private fees. With the introduction of any financing mechanism it is important to consider and address any impact on incentives and fees for local health care providers, including midwives.178

Community mobilisation and strong political support and monitoring to ensure transparency appear to increase the success and sustainability of such community-based programs.

Cost-sharing

Cost-sharing aims to improve access to health care by spreading the direct costs across multiple parties, thereby reducing the financial burden on families and creating a surplus of funds to cover costs for those who cannot afford to pay.179 Such a scheme was implemented in an urban district of Burkina Faso. Direct costs for emergency ambulance transport (at a fixed price), Caesarean section and other EmOC, and postoperative care were shared between four parties: women and their families; community health centres (managed by community management committees) and health facilities run by religious groups; local authorities; and the MoH. After 18 months of preparation, during which stakeholders were consulted and mobilised, the costs incurred by women accessing EmOC were estimated and a breakdown of contributions was settled on, a formal agreement was signed by representatives of each party. Families initially contributed 34% of the total costs, but this reduced to 7% following the introduction of a national subsidy for EmOC. Women paid their contribution before or after EmOC, which was managed by a Cost-Recovery Officer. Poor women were issued with a certificate from social services which exempted them from payment, or had their costs waived after rapid assessment at the point of care. Other parties gave annual contributions, and the scheme was managed by a monitoring committee made up of financial contributors and an executive committee of hospital and health centre staff, with technical input and support from international organisations. The Cost-Recovery Officer was also responsible for monitoring the components of EmOC provided to women who were part of the scheme to ensure that prescription and surgical protocols were adhered to to minimise misuse of the system.

The cost-sharing initiative led to an increase in emergency obstetric referrals from 84 in 2004 to 683 in 2005, with caesarean section rates increasing from 2.5% to 3.7% and a 23% increase in obstetric interventions. In the first year, 91.3% of costs had been recovered. Noted challenges related to ensuring that referral centres were adequately resourced to cope with the increase in demand and the increase in workload associated with managing the system. It was also noted that rural women had fewer interventions than urban women, suggesting that the scheme had not addressed all the geographic and distance barriers, and it was unclear to what extent poor women were benefiting from the scheme. Factors that lead to success included the extensive
engagement and education of the communities and stakeholders through local NGOs, ongoing participation of all contributing parties, support of local health authorities, and monitoring to ensure rationalisation of care and financial viability.179,180

**Vouchers or entitlement cards**

Vouchers or entitlement cards are potentially effective in targeting populations groups, such as pregnant women and the poor. They aim to increase access to health services by avoiding the catastrophic costs of health care, particularly in non-cash economies, although there is limited evidence documenting their impact on health outcomes.168,181,182

In Cambodia, the Belgian Technical Cooperation and the MoH initiated a financing scheme to help improve maternal health outcomes and access to services. This included the establishment of the Health Equity Fund (HEF). As part of the scheme, poor beneficiaries who meet eligibility criteria (either identified in the community or at the health facility) receive full or partial financial support to cover user fees, transport and other costs (such as food and funeral costs) associated with accessing priority public health services. The fund is implemented by local NGOs. Many poorer women were noted to still face barriers to care, so a voucher program was developed in 2007 to encourage safe deliveries. Poor pregnant women are identified by local health staff who conduct interviews during home visits to assess eligibility for the program. Selected health centres are contracted to provide care for women with vouchers, which entitles women to three antenatal visits, facility delivery and one postnatal visit. These include transport to all services, including referral if EmOC is required. Payment for transport is done by the health centre based on a defined price list. In the review areas, HEF and vouchers accounted for around one third of facility deliveries, which had doubled since the introduction of the scheme. Those women using vouchers to deliver at a health facility had done so for the first time. However, many poor women were still not benefiting, with only 25% being identified and many vouchers not used. Reasons for low utilisation included that only 61% of home visits were being conducted and some centres were not part of the voucher program and so were excluding some women. In addition other factors, such as difficulty accessing transport (particularly at night), lack of an accompanying family member and negative attitudes by staff towards voucher users were noted.161 A similar scheme is being piloted in Bangladesh, which includes a small payment for transport.59

Targeting women can be challenging as identifying the ‘poor’ can be difficult and stigmatising and the inclusion of women who do not require exemptions can overburden resources. Including women who live a threshold distance or time from EmOC facilities may help to overcome these issues, as these women are likely to be poorer than those living close to care and because the costs associated with reaching EmOC can also be devastating for ‘non-poor’ families, who will then also benefit from financial assistance to reach care.51,183
Cash transfers and reimbursements

Cash incentives and transfers, often tied to use of health services, may be effective in increasing the use of preventive services, including maternal health services. There are also some examples of cash transfers that address transport and other costs associated with institutional deliveries or EmOC.

The “Referral Transport Scheme” was initiated in 1999-2000 in 19 of 32 districts in Rajasthan, India as part of the Reproductive and Child Health Programme. Government funding was allocated for transport to referral centres, targeted at those who could not afford transport costs. Funds were provided to village councils who would then hire a vehicle for women for institutional delivery or for referral for obstetric complications. Lists of pregnant women and plans for transport were arranged in advance to minimise delays at the time of the emergency. Lack of clear eligibility criteria and low awareness of the scheme among health workers and community members led to low utilisation, with only 17.7% of funds used over five years and 10 of the 19 districts not using the allocated funds at all. Concerns about transparency and misuse were also raised, with some discrimination by distributing agents on the basis of caste, and women who were listed as having received payment not being aware of ever receiving any funds. In addition, many women experienced a delay or lack of payment, with only 9 of 30 users in one district having received any money. In response to low uptake and utilisation by village councils, funds were given to health centres and nurse-midwives to manage and distribute. Further recommendations included establishing clear eligibility guidelines, increasing community awareness of the scheme, providing training to health workers and strengthening monitoring systems.

A collaborative initiative between an academic institution and the Department of Health in Madhya Pradesh, India established a similar fund for emergency transport targeting villages that were identified as vulnerable or disadvantaged. As part of the one year operations research project, local women were trained as ‘Emergency Obstetric Care Facilitators’, who were responsible for managing the cash grant and organising emergency vehicles through informal contacts (typically tractors or vans) and accompanied the woman to the health facility. A small cash grant was also given to pregnant women from disadvantaged groups who registered during their first trimester and incentives given to health workers for registering women, providing ANC and facilitating referrals. Despite high community awareness, support of local leaders and readily available cash, uptake of the scheme was low with less than 24% of women advised of referral actually benefiting from the project. Poor reputation of health services, other informal costs and socio-cultural barriers were possible explanations. In addition, facilitators were often of a higher social status than potential beneficiaries and rigid social hierarchies may have hindered interaction between these groups.

This project was supplanted in 2005 by the Janani Sruaksha Yojana scheme funded by the central government. The initiative targeted economically disadvantaged areas, provided cash payments to poor women (who had been issued with a certificate) who were over 19 years of age. 
age and had no more than two children, unless they were willing to undergo tubal ligation after the third child. To receive payment, eligible women had to register with the government nurse, attend three ANC visits and have an attended delivery. Cash payments were given soon after delivery and were designed to cover costs for transport and other opportunity costs associated with maternal health care. Transport costs were reimbursed upon arrival at an accredited facility and were higher for rural women. There has been a subsequent increase in institutional deliveries, but a number of challenges exist including low awareness of the scheme among poor women, delayed or incomplete payment and time-consuming documentation procedures resulting in increased workloads. It should also be noted that reimbursement for transport on arrival at a health facility may not reduce delays if women do not have ready access to cash to cover upfront transport costs.\textsuperscript{187,189,190} This was also a problem noted in Nepal as women did not always have access to cash to pay upfront for transport, or did not believe that they would be reimbursed on arrival at the health facility.\textsuperscript{191}

The Chiranjeevi scheme implemented in Gujarat, India sought to overcome this problem by providing cash payments to eligible women in advance to help cover transport and other out-of-pocket expenses, including loss of earnings for an accompanying family member.\textsuperscript{119,192} This was in addition to a voucher program targeted at poor women for antenatal and delivery care provided by private obstetricians. A noted problem was that the cash payment did not cover all the transport costs of reaching EmOC.

The Safe Delivery Incentive Programme implemented nationwide in Nepal included a cash payment to all women in 25 least developed districts, avoiding the need to identify ‘poor’ women.\textsuperscript{191} Women were eligible if they had up to two living children and/or any obstetric complication. The payment represented around 30-50% of transport costs and was higher for women in mountain regions. As with other similar schemes, several problems were reported. Payment was given after delivery which did not help with the need to have cash up front. There were delays in transfer of funds from the central to district level and therefore delayed payment to women. Variations in implementation, payments, and eligibility, and lack of guidance and transparency, resulted in perceptions of misuse of funds.

Approaches to address financial barriers that contribute to the ‘second delay’ vary depending on context, and as such there is no “best fit”. Costs may be borne by individuals, communities, health facilities, donors and NGOs, and governments – or a combination of these. Community-based strategies require strong, sustained leadership and community support. They can be complex to manage and require monitoring to ensure transparency and to avoid misuse of funds. Some schemes may be more successful if they are linked to existing community groups such as women’s groups or income-generation activities. The ability to generate enough funds and sustainability are major issues and there are few examples in the literature of sustainable long-term initiatives. Most programs have required ongoing financial and technical support from governments or donors.
**Financing options and strategies – key points**

- The costs of reaching EmOC need to be addressed within broader financial reforms for maternal health. While the cost of transport is a major financial barrier, other costs, such as opportunity costs, need to be considered.

- In some settings, facility-based transport has been provided free, or subsidised. Adequate budget allocation is required to ensure sustainability of such programs. There are examples of innovative public-private partnerships to provide free emergency transport as part of a broader emergency referral system.

- Community-based schemes have demonstrated some potential to overcome the financial barriers to reaching EmOC. These include:
  - Emergency loan funds
  - Insurance
  - Pre-payment schemes
  Challenges include the generation of sufficient funds, particularly in small communities, and sustainability. Strong and sustained leadership, good management and links to other community-based groups may increase the success of such approaches.

- There are a number of examples of government programs that have included aspects of the ‘second delay’, sometimes in partnership with NGOs or the private sector. These include:
  - Cost-sharing initiatives
  - Vouchers and entitlement cards
  - Cash transfers and reimbursement
  Many of these target poor women or underserved communities. Attention to management, transparency and regulations to ensure rationalisation of care are important.

- Special attention is needed to identify and reach poor women, and ensure that the poorest are not excluded.

*Box 12. Financing options and strategies*
Moving within timely reach of EmOC before labour begins

In many settings, lack of infrastructure, long distances and seasonal or geographical barriers mean that referral in time for life-saving care is not feasible. There is a need to pay much greater attention to the idea that women who live beyond timely reach of EmOC should move closer to EmOC near term. As described earlier there are many reasons why women and their families may be unable or reluctant to move away from home near term. Planning needs to be informed by a district mapping exercise to establish the distribution of pregnant women, availability of transport, and of facilities that can provide emergency obstetric care. Local studies of the context-specific barriers remote women and their families face in moving closer to care before labour are also needed.

Potential strategies

The meaning of “within easy reach of EmOC” will vary in different settings.

Women near term could move to stay with family or friends who live within easy reach of the hospital with EmOC facilities. This might mean being physically close to the hospital, or some distance away but staying next to a road and where there is a vehicle available. It might include moving closer to a first line health facility which has transport for ready referral to the EmOC facility if needed. Another possibility might be a subsidised billeting system which would be a source of income for people living near the hospital willing to take temporary lodgers.

There is a need for qualitative research to learn more about the different measures women take to deliver within reach of EmOC. In Sri Lanka many rural women live in remote villages far from hospital. Yet in 2007 more than 98% of rural women, and 97% of the lowest wealth quintile, delivered in hospital. This has been achieved in part because of carefully planned geographical distribution of hospital facilities, but also it is widely accepted by those in rural areas in Sri Lanka that it is necessary to move to stay with friends or family at the end of pregnancy. Early antenatal care also means that women have a good estimate of when they expect to go into labour.

Maternity Waiting Homes – experiences and benefits

The concept of the ‘Waiting Mothers’ Shelter’ or ‘Maternity Waiting Home’ is an old one, with early examples in Europe, and modern experiences in Africa, Latin America and Asia. For example, in 1966, Maurice King described the idea of the ‘maternity village’ or ‘maternity hostel’ for remote women, with a detailed description from Nigeria.

There have been several reviews of experiences with MWHs in different countries. As we have described above, it is not possible to quantify contribution of MWHs to better maternal and perinatal health outcomes because their characteristics are so variable, their value is dependent
on the strength of the broader health system, and there are methodological challenges in choosing an appropriate comparison population. The WHO review of MWHs found that the structure, services and care provided to women varies greatly: from traditional huts or homes to modern buildings and facilities; self-catering or catered; established by communities, non-government organisations, hospitals or government; provided free, subsidised or user-fees charged; simply a space to wait or also providing ANC, health education, microcredit and postnatal care; may be for pregnant women only or also provide accommodation for families; may include nursing or health education staff, or have visits from hospital staff to provide ANC and other health services. The wide variation in MWHs reflects the diverse socio-cultural contexts, but there has been a lack of clarity about the critical elements of a MWH, and there are few guidelines regarding their establishment and management.

WHO defines essential factors as: including a clear definition of risk and selection of women to be referred based on obstetric, geographic and socio-economic risk factors; functional community level health services to enable identification and referral of women during ANC; access to skilled obstetric services, either at the primary level facility or through effective referral to EmOC; and community and cultural support which includes attention to culturally appropriate facilities and consideration of local practices and beliefs.

When the role of MWHs has been assessed in countries where they exist within a well functioning health care system, such as Zimbabwe (in 1994), Cuba (in 1989), or Sri Lanka (in 2002), the findings have been positive. MWHs may increase hospital delivery rates and improve access to EmOC, but may also provide potential benefits in terms of health promotion to waiting mothers – including nutrition, infant feeding, family planning, and immunisation. In Peru, Mongolia and Cuba, MWHs are included in national maternal health policy. In Cuba in 1989 30% of all deliveries were through MWHs. But often there is a lack of coordination between the health system and MWHs. For example, in Honduras, MWHs were constructed with community assistance alongside several of the hospitals so that remote rural women would be able to wait for labour closer to care. But clear direction for the homes’ operation and supervision was not available, and records from the MWH have not been incorporated into the health information system.

To have value, MWHs must be within easy access of a hospital or health facility that can provide EmOC of adequate quality, either being located very close to these facilities, or close to reliable transport to these facilities. In Ghana, a MWH located a significant distance from the main hospital was little used. Experience in Timor Leste and recent anecdotal reports from PNG highlight the problems when MWHs are constructed, often with community help, but planned EmOC facilities are not established or upgraded.

The Cochrane review of MWHs concluded that there is insufficient evidence to determine the effectiveness of MWHs for improving maternal and neonatal outcomes because there have been no randomised controlled trials. It is important to recognise, though, that it is not possible to standardise a specific intervention to assist women to travel closer to EmOC before labour begins that could be evaluated through a randomised controlled trial. There have been serious limitations in the ‘trials’ that have been reported, as identified in the Cochrane review and in the
recent review by Lee et al. For example trials have compared perinatal outcomes for women admitted to MWHs and those admitted directly to hospital, but without adjusting for differences in baseline characteristics, so that the findings are not meaningful. A 2008 review of progress towards reducing MMR since 2003 in seven priority countries of the WHO Western Pacific region found that, in difficult geographical areas, maternity waiting homes can help women to access health care services.

In rural Zimbabwe, a hospital-based cohort study that compared MWH-users with those who presented directly to hospital found that MWH-users had a significantly lower perinatal mortality rate (19.1 per 1000 live births versus 32.2 per 1000 live births) and that women identified as high risk on defined criteria had 50% less perinatal mortality if they attended a MWH compared with high risk women who presented directly to hospital.

A report from Milne Bay Province, Papua New Guinea in 1985 described MWHs that consisted of 10-room houses on stilts located on hospital grounds. Grand multiparas from remote villages were encouraged to attend in the last two to four weeks of pregnancy for a hospital delivery and were offered a free tubal ligation, which was an incentive for some women. There was a noted reduction in emergency obstetric evacuations from 25 in 1979 to 9 in 1982 and it was observed that the costs of such early referral were at least partially offset by decreasing costs for late emergency air transfer of obstetric disasters.

Several factors have been found to increase use of MWHs, including subsidised or free services, assistance with transport, income generation programs to compensate for loss of income, availability of education, meals, crafts, and links to other community groups, such as women’s support groups. Care of livestock and remaining children also needs to be addressed. In Peru, MWHs are part of the national maternal health strategy and consist of culturally appropriate houses similar to indigenous homes where women are allowed to bring their families and traditional birthing positions are permitted. In Columbia, steering groups that included local leaders, workshops and meetings with community groups were held to address barriers and provide information and promotion of MWHs, and financial and other support from local groups was mobilised for building and equipment to increase community ownership and acceptance.

A feasibility study of MWHs in remote areas of Nepal found that lack of awareness of the facilities contributed to the fact that none of the 27 MWHs were operational. Of 18 pregnant women interviewed who attended a maternity unit, none had any knowledge of the existence of the MWHs, although 12 expressed a willingness to stay at one for the next delivery. Some of these women had attended hospital 2-10 days prior to the onset of labour. Various means of mass media as well as communication through health services, such as immunisation cards and sessions, mothers’ meetings and school health programs were suggested to increase community awareness. Focus group discussions (FGDs) with pregnant women, community members and health workers in Nepal suggested that bedding, cooking equipment, telephones and space for family members (particularly mothers-in-law) should be provided at MWHs. Access to quality maternity services was also identified as an important facilitating factor.
Silk Homes, Lao PDR

Silk Homes were introduced in Southern Laos, where there are significant geographical barriers, poor roads, weak communication infrastructure and lack of emergency transport. Villages are located 3 to 29km from hospital (up to an 8 hour walk) making timely access to EmOC extremely difficult. MWH were established in partnership with the government, WHO and UNDP, and were built in traditional styles. The facilities provided a range of pre and postnatal services, health promotion, microcredit programs and crafts to minimise the loss of earnings, as well as providing land for women to grow vegetables. Some non-harmful traditional practices were also permitted. The community was engaged with the management committee to provide evaluation and feedback. An evaluation in 2005 found an increase in births at the district hospital and a high level of acceptability among women and families, however it was noted that transport and communication with the referral hospital, particularly during the rainy season, was problematic. There are reports that attendance has declined sharply since incentives (such as food and microcredit schemes) have ceased.

Box 13. Silk Homes, Lao PDR

Source: 76,201

MWHs are likely to have little impact on maternal health outcomes if they do not improve access to quality EmOC services or if attention is not given to overcoming transportation, communication and financial obstacles from the community to the MWH and between the MWH and health facility. More investigation is required to determine how the substantial socio-cultural barriers to use might be addressed.

Who should move?

Pregnant women who may not be able to reach EmOC in time in the event of a complication should be encouraged and supported to move closer to care before labour. This would include all women in settings too distant, or geographically isolated, to reach EmOC in a timely way, women with obstetric risk factors, and women who may not be able to seek care for a complication for social or cultural reasons. In rural Ethiopia, distance from a health facility was included in criteria, and women were identified and referred by TBAs, midwives or through outreach ANC. In Latin America young, unmarried women and those of low socio-economic status are also encouraged to use MWHs.

Antenatal risk selection

Although the majority of complications will arise unexpectedly in women with no risk factors, there are some known factors that make complications more likely, including young or old age, primipara and multigravida, short stature, past history of obstetric complications and major
interventions, twins, and the development of complications during the current pregnancy. Ideally, all women will have a well-trained, skilled birth attendant, with transport and communications available in case of emergency referral, wherever they deliver, but it is especially important for women with obstetric risk factors. If the potential for timely referral is not certain then these women should be encouraged to move closer to EmOC and deliver in a facility where EmOC is available.

Chandramohan et al reviewed MWHs in rural Zimbabwe and assessed ANC risk assessment based on parity 0 or >6, history of perinatal death or complicated delivery, height less than 150cm, non-cephalic presentation or multigestation, and pregnancy complications.37 Primiparity was the most sensitive for predicting dystocia, but had low specificity. Overall any risk factor was 78% sensitive for dystocia, with 51% specificity. Fifty-four percent of women were identified as high risk on these criteria but only 31% of those identified as high risk attended the MWH.37 The authors concluded that antenatal risk screening can be useful where women have limited access to EmOC. However, limited ability of health workers to identify high risk women has been noted.200 In rural Zambia, a review of MWHs that were used by women identified as high risk as determined by similar criteria found that 91% of those in MWHs had risk factors, compared to 57% of non-users.202

District health officials need to map their districts to identify those communities where women would not be able to reach EmOC if they experience a complication because of distance or geographical barriers. Community consultation then needs to occur to encourage and support all pregnant women to move closer to care near term. Midwives and other health care providers need training in assessing pregnant women and encouraging those who could benefit to move closer to care before labour. Antenatal information materials should also include this encouragement. Where women do not attend ANC, community health workers (CHWs) or volunteers can be trained to inform pregnant women about the existence of MWHs, and women can be allowed to refer themselves.34

When should they move?

If pregnant women are encouraged to move very close to term the possibility of going into labour at home increases, but they may be reluctant to leave home much before term. An audit in remote northern Australia of women referred to a major regional centre to await labour found that transfer at 36 weeks gestation was appropriate, in terms of minimising deliveries in the community, but the long period of separation from family and community had a number of negative financial and social consequences and in some cases led to women not attending ANC in order not to be referred.203

To minimise the time that a pregnant woman is away from her family it helps to be able to estimate the expected date of delivery (EDD) accurately. The duration of gestation varies between different population groups and between different women. Estimating gestational age, and expected date of delivery, with accuracy, is difficult. A combination of methods can help to
provide a more reliable estimate, but some have argued that it is better to speak of an expected week of delivery rather than an expected date of delivery. This method of estimation tends to result in EDDs that are too early. The 95% confidence interval for gestational age using menstrual dates is -27 to +9 days. This means that women would be away from home longer than needed. This method cannot be used if women have irregular periods, or become pregnant while using hormonal contraception.

Many women do not know the date of their last menstrual period. There are some examples of simple methods to assist women to know, such as keeping records of menstrual cycles on health cards (such as child health cards), or the use of moon phases where calendars are not readily available or used. Women can learn how to tell easily when they ovulate by checking the texture of their cervical mucus. These ideas could be given to women who are planning marriage or pregnancy.

Ultrasound dating is more accurate than using menstrual date. Foetal head circumference measured using ultrasound in the second trimester was found to enable prediction of the EDD to within one day. Ultrasound is used for dating in many developing country settings. However few women in remote areas will have access to an ultrasound, especially in the first or second trimester of pregnancy.

The size of the uterus can be assessed by pelvic examination or by abdominal palpation. Size can be misleading in the presence of multiple pregnancy, uterine fibroids, or a full bladder. Tape measurement of the symphysis-fundus height may be useful, especially before 30 weeks' gestation. Andresson et al constructed a graph representing the expected remaining time to delivery fundal height measurements in 7790 pregnant women delivered in a rural African hospital from 1970 to 1988. The graph was used to predict the probable week of delivery in 604 pregnant women giving birth to a singleton child. The mean deviation of the actual week of delivery from the predicted week was -0.6 (standard deviation 3.4) weeks. In 270 of 604 cases (45%) delivery occurred within two weeks of the predicted week.

Women may use ‘quickening’ or the first time they feel the baby move in the uterus, to estimate when they will deliver. But this is also a variable phenomenon, occurring at about 19 to 21 weeks in nulliparous women and 17-19 weeks in multiparous women. There is a need for qualitative research to explore traditional ways that women estimate when their baby will be born.
Addressing cultural beliefs and concerns

Childbirth is an event of great cultural significance. Cultural beliefs about the importance of traditional birthing practices, and fears and perceptions of lack of understanding and breaking of taboos in medical care facilities, are major reasons why women are reluctant to travel away from home near term to await institutional delivery.\textsuperscript{34} It is therefore important to establish culturally appropriate, familiar and warm environments for women to deliver near to availability of EmOC, with the opportunity to have an appropriate family member attending. Education is also necessary to ensure that women and their families understand that, although relatively rare, complications in labour are mostly unpredictable, of sudden onset, can be very dangerous, and can be managed if EmOC is available quickly. Some communities have strong beliefs about the significance of place of birth including, for example, the Navajo, the Maoris, Australian indigenous people, and the Hmong.\textsuperscript{214,215} Simply enabling traditional birthing practices at MWHs does not address this problem. Some cultures believe there is a strong lifelong connection between the child and the place of burial of the placenta.\textsuperscript{214} For example, villagers in Zimbabwe believe that burying the placenta in the family home will ensure that their offspring will always return home.\textsuperscript{216} Enabling the family to take the placenta home for burial may overcome the problem of ‘homeless spirits’ or lack of belonging to land. This has been reported to be a successful approach in Bolivia where many women still deliver at home, but growing numbers go to maternity hospitals which try to accommodate beliefs about traditional birthing practices such as squatting on the floor to deliver and burying the placenta at home.\textsuperscript{217}

It is interesting to consider the experience in wealthy countries with small, remote, indigenous communities, where distances from EmOC facilities are very great but resources are much less constrained than in low-income countries. In Australia, women in remote communities have been required since the 1970s to fly to an urban centre at 36 weeks of pregnancy to wait for a hospital delivery. Traditionally, place of birth has importance to identity, responsibility for land and sense of belonging to land. In the 1980s this was a cause of great concern to many indigenous women, but over the past 30 years it has become the norm to deliver in hospital, and young women have grown up expecting that this is what they will do when pregnant. Concerns remain but relate more to fears about discrimination in town, missing home and family, shyness, boredom, insecurity associated with alcohol and violence, lack of culturally appropriate support during childbirth in hospital, and leaving husbands to look after children.\textsuperscript{218}

In Canada a similar approach was taken to evacuation of Inuit pregnant women near term from remote communities. However the ‘Nunavik model’ provides an effective example of attempts by Canadian Inuit communities to ensure that women can deliver in or near their home communities with a strong referral system to take them by air to emergency care only if needed.\textsuperscript{219}
The Nunavik model

Delivery care is provided to the Inuit women in their own region, language, and culture from Inuit midwives. A quarter of the women still have to leave home, but they often stay with relatives in the larger villages and give birth surrounded by relatives or friends. Air Inuit offers reduced airfare for partners to travel with women for childbirth. There is always a physician on-call able to arrange referral after consultation with the midwives by phone. Transfer is by small plane to Puvirnituq and then to Montreal by an emergency medical services jet; the journey may take up to eight hours.

Box 14. The Nunavik model


In addressing the need for pregnant women to move within easy reach of EmOC before labour it is more useful to think in terms of strategies and systems for providing a range of opportunities for women in different circumstances. There is a danger that the conclusions “Current evidence for maternity waiting homes … is low quality.”29 or “There is insufficient evidence to determine the effectiveness of Maternity Waiting Facilities for improving maternal and neonatal outcomes.”33 will result in further neglect of the MWH strategy. There is strong evidence that the majority of obstetric complications that cause death and disability are not predictable, but can be managed with comprehensive EmOC. Where women live beyond timely reach of EmOC once a complication occurs there is an inevitable logic that strategies are needed to enable them to move closer to care before labour begins.
Moving within timely reach of EmOC before labour begins – key points

• In some settings, women will not be able to reach EmOC in time, even following improvements in transport and communication, due to long distances, poor infrastructure or seasonal barriers. These women need to be encouraged and supported to move within easy reach of EmOC before labour begins.

• There is much experience with MWHs or waiting mothers’ shelters in Africa, Latin America and Asia. The structure, services and care provided at these shelters varies greatly.

• There are few evaluations of MWHs and significant methodological limitations associated with previous studies. This has contributed to the neglect of this approach.

• The strategy of providing MWHs should not be considered a stand-alone intervention, but as part of the continuum of care.

• There are significant socio-cultural barriers to moving closer to care before labour. Factors that increase the acceptability of this approach include:
  o Attention to costs, including transport costs and opportunity costs (such as loss of income)
  o Availability of food, education, activities and links to other community groups
  o Provision of antenatal and postnatal care in addition to delivery care
  o Attention to cultural and traditional practices during childbirth and allowing a companion
  o Community engagement to support the husband and family left at home

• Socio-cultural barriers are substantial but in some settings moving near to care at the end of pregnancy has become the expected norm over time.

• Further qualitative and operations research is required to better understand the influences on use of MWHs in different settings, helpful features for MWHs, comparison of MWHs with schemes to subsidise women to stay with family, friends, or other ‘hosts’, and assessment of the costs involved.

Box 15. Moving within timely reach of EmOC before labour begins
Birth preparedness and complication readiness

Preparation is important at the level of the individual pregnant woman and her family, at community level, at the first level health facility and at district level in planning for strong referral systems to ensure equitable access to EmOC.

Preparing for a safe delivery may include factors related to identifying and reaching care at the onset of labour, identifying and reaching care if a complication should arise, or planning to move closer to care before labour if emergency referral is not feasible. It is also important to consider that, with increasing urbanisation, women living in peri-urban and urban settings may move when near term to their village of origin to deliver at their mother’s home. So preparation for labour is also relevant in urban and peri-urban antenatal clinics.

Many programs that aim to improve maternal health have included efforts to improve preparation for birth and readiness for complications.

In many settings women do not traditionally prepare for birth. However, a benefit of antenatal care is that it provides an opportunity to help the woman and her family to prepare for labour and the delivery. The traditional birth attendant, or other community volunteer, can also play a role in assisting the preparation for a safe delivery. Such preparation can contribute to reducing both the first and the second delay if a complication occurs.

Preparation might include:

- Learning about care during pregnancy and childbirth
- Learning the warning signs during pregnancy, labour and post-partum
- Planning for transport and communication in case a complication occurs
- Learning about risk factors and that complications can occur without risk factors
- Addressing any false traditional beliefs about complications in labour (which in some cultures are blamed on the woman)
- Identifying a trained birth attendant and the closest facility able to deliver comprehensive EmOC, or with a vehicle for referral to EmOC if needed
- Identifying potential costs and making a plan to save or borrow money in case of emergency
- Identifying someone to care for husband, children, home, livestock, crops, if an emergency occurs
- Sometimes preparation includes identifying a potential blood donor too.

The IMPAC manual ‘Pregnancy, Childbirth, Postpartum and Newborn Care: A guide for essential practice’ lists some key points to be addressed in ANC, which include identifying where the woman would go in an emergency and issues of transport and costs, as well as considering moving closer to care if ‘living far’ from a facility. However, greater guidance is required in terms of identifying which women should be strongly encouraged to move closer to
care prior to labour and identifying the most appropriate facility to attend in the event of an emergency, recognising that it may not be the closest health centre.

Experience suggests that discussions about preparing for birth should occur not only with pregnant women but with the communities that support them. The aim is education, motivation, cohesion and mobilization of pregnant women, families and communities. Community participatory approaches are most effective. A project that used such an approach in Kampong Chang in Cambodia was evaluated and found that community engagement was a feasible, effective and cost-effective way to introduce birth preparedness. The project increased referrals to hospital by 281%.

“In the old days, no one noticed when a mother would bleed or had retained the placenta. We would only slaughter a goat and give the blood to drink and see the outcome....Now after Home Based LSS, we take action immediately. We know where to go and what we should do on the way.”

Traditional Birth Attendant, Ethiopia

Another well evaluated example of a birth preparedness intervention is the Home Based Life Savings Skills (HBLSS) training program devised by the American College of Nurse Midwives to increase access to basic life saving measures within the home and community and by decreasing delays in reaching referral facilities where life-threatening problems can be managed. HBLSS takes into account the social context of childbirth, focusing on the pregnant woman, her family caregivers, and the home birth attendant as a team. The model has been implemented in India, Ethiopia, Haiti and Liberia. An evaluation of the model in rural Uttar Pradesh, India, found that the pictorial ‘Take Action Cards’ (see Figure 7), role-play and demonstration enhanced retention of knowledge and skills for recognition and intervention for maternal bleeding and newborn sepsis, but did not change care-seeking during emergencies. An evaluation of the program in the Oromia region of Ethiopia found that learning was retained and after three years 54% of women giving birth were exposed to the training. Lack of emergency transport prevented decrease in delays for referral.
The Dinajpur SafeMother Initiative in Bangladesh was designed to test the impact of several interventions on use of government obstetric services. CARE implemented a community mobilisation program that included birth planning and support for funding and transportation, in addition to strengthening EmOC services, during 1998-2001. In areas that received all interventions ‘met need’ increased by 24%, compared to 13% in communities where only basic EmOC services were upgraded, and no change in communities with no intervention. Successful systems had a high degree of community motivation and participating households. Some villages raised enough money to purchase their own van or village ‘ambulance’ and others also established a system of listing blood groups of members so they could be mobilised to donate when needed.227

In a remote region of Nepal, the Birth Preparedness Package (BPP) covered four areas of birth planning – ANC, care of mother and newborn, danger signs and financial and transport preparations. The package included a flip chart used by CHWs to systematically work through these areas with women. In addition, pregnant women were provided with a key chain made up of laminated cards containing similar messages and illustrations for use by both literate and illiterate women. There was improvement in knowledge and newborn care practices but no significant change in the use of EmOC, suggesting that other barriers also need to be addressed.228
It is clear from these evaluations that, to be effective, birth preparedness cannot be an independent intervention but must be implemented with other efforts to strengthen the quality of maternal health care at community and referral levels.

There are many other examples of effective efforts to mobilise communities for obstetric complications.

In Maharashtra, in India a study of maternal outcomes in the area of the longstanding Jamkhed primary health care project found that a low rate of maternal adverse outcomes was in part because, as a result of community education, cultural and traditional objections to modern obstetric care have almost disappeared and almost every family knows that obstructed labor, hemorrhage, convulsions, and sepsis are treatable conditions.229

The Maternal and Neonatal Health Program of JHPIEGO implemented a district-based model service-delivery system in Koupéla, Burkina Faso, during 2001-2004. In a survey to assess the effect of birth preparedness and complication readiness, of the 180 women who had given birth within 12 months of the survey, 46% had a transport plan, and more than 83% had a plan to save money.230

In Nepal, women’s groups were facilitated through ten participatory meetings over one year addressing issues of pregnancy and childbirth.231 Many of the women’s groups established community fund schemes and transport systems with stretchers for use during obstetric emergencies. The intervention was implemented as a cluster-randomised controlled trial, which found significantly lower maternal deaths among women in women’s groups compared to controls (69 versus 341 per 100,000 live births).231 There is also potential for women’s groups to provide support to families to enable a woman to travel closer to care near term.

In Tanzania, communities were supported to form their own plans for emergency transport. Of 50 villages, 32 developed transport plans which included written action plans, emergency funds, or community transport systems.86 A similar project engaged with local leaders to help 10 of 12 villages develop functional plans for emergency transport which included the use of locally available transport, emergency funds and equipping health staff with radios or phones. Successful communities offered assistance to other villages. Complications treated at the district referral hospital increased from 4 to 15%.84

There are some examples of community-based emergency response teams to provide initial pre-hospital care and facilitate transport to health care. These include community motivators, mobilisers or contact persons who facilitate emergency transport and liaise with health centres.161,232 In one such example in Sierra Leone, men were chosen for this role because they were considered to have more time available and were able to move more freely between villages, particularly at night. They received three days of training and organised action groups of volunteers who would assist transporting women by hammock.233 Despite some positive anecdotal evidence, the impact of motivators on reducing maternal mortality appears to be relatively small, labour intensive in some settings, and difficult to sustain.
In Cambodia, lay community “First Responders” were trained to respond to landmine injuries in regions of poor communication and transportation infrastructure. As part of the program, local villagers were trained to provide basic first aid and mobilise health care. As a result, trauma mortality rates reduced from 40% to less than 10% in three years. Recently this model has been adapted to respond to obstetric emergencies. ‘Delivery Life Support’ aims to build a chain-of-survival network similar to that for trauma by linking midwives and TBAs into the existing trauma response system. “First Responders” are trained to assist with basic life support during obstetric emergencies and trauma paramedics at local health centres are also trained in emergency obstetrics.

In Nepal, the ‘Nepal Community Emergency Preparedness Group’ plans to develop a community-based network to respond to common emergencies in the community. Motivated community members will take part in a web-based tutorial and if successfully complete a multiple-choice test are eligible to undertake a three hour training program at a health centre in basic triage skills. Those who complete the training are provided with a certificate and then included in a database. In an emergency, a phone call to the service provides the caller with the mobile phone number of five community responders in the area who are also notified and requested to provide assistance until formal help arrives.

**Strengthening referrals between health facilities**

A review of maternity referral systems concluded that while a strong referral system was necessary to address maternal mortality, many health systems in developing countries are not able to enable rapid access to care. While there is a lack of documented evidence, a successful referral system is likely to require effective communication and designated transport in addition to clear protocols for identifying complications and determining referral to the next level of care, resourced referral facilities, affordable costs, effective monitoring systems and policy support. Appropriate triage, stabilisation and referral protocols are essential, particularly at the first level of care, to initiate emergency treatment and to ensure timely and appropriate transfer of those women who require care at a higher level facility. Such efforts to stabilise women with complications facilitated successful transfer to the next level of care in Sri Lanka and Malaysia. Triage and initial stabilisation can be improved with training of health workers, clear guidelines and provision of basic equipment and supplies, and has led to improved health outcomes for women and children in a number of settings. Triaging can also help staff determine the most appropriate facility to refer women, rather than transporting to the nearest health facility which may not be equipped to provide appropriate treatment. Where women’s condition is thought too unstable for travel, trained staff and medical equipment have been successfully transported from referral facilities to the peripheral centre to provide care, or treatment advice has been provided via phone or radio.
Formalising referral links between health facilities is critical, as efforts to help women reach care will have limited impact if prompt transfer to the next level of care is not available when needed. This should include establishing criteria for who is referred and procedures for receiving patients at the referral facility to avoid delays. There are some examples of women experiencing delays at referral facilities because they are forced to queue with other patients, accompanying health workers are not permitted to enter hospital premises without authorisation, or women referred from CHWs or TBAs are ignored because of discrimination within the health system. Experiences in African countries where referral links between district referral hospital and primary health units have been strengthened have shown some promising results in reducing maternal deaths at primary health centres and increasing the number of obstetric complications presenting at hospital. In some settings there was also an increase in the number of facility births because women were more willing to deliver at the health centre knowing that emergency transport was available if needed.

A national referral system was implemented in Mali in 2002, where 50% of the population lives more than 5km from a primary health centre and 30% more than 15km. The system included the provision of improved radio communication and ambulance services between community and district health centres, with funding from international donors. Communities, local governments and local health services also developed cost-sharing schemes to overcome some of the financial barriers to reaching EmOC. The initiative led to an increase in major obstetric interventions and a reduction in case fatality rates from 10 to 5%. Risk reduction was most pronounced for women presenting with haemorrhage, for whom time to care is most critical. Strong and sustained political support at all levels and investment in the system (including integration into the existing government system) were noted facilitating factors.

Studies in Africa and Nepal have found that many women who deliver in hospitals have self-referred to these facilities, by-passing lower-level centres and referral structures. While this can lead to congestion in hospitals, by-passing peripheral centres (which may not be equipped to manage obstetric complications) may be the most timely and appropriate option for women with complications, particularly where significant geographic and transport barriers exist and where referral systems are weak. Attention therefore needs to be given to counselling women or couples during ANC to identify the most appropriate health facility in the event of an obstetric complication, which may not be the nearest health centre.
Preparing at the individual, community and facility level – key points

- The ‘second delay’ can be addressed as part of other approaches that aim to prepare pregnant women and expectant fathers for delivery and the possibility of complications, such as antenatal care and women’s groups.

- Communities can also be assisted to plan for obstetric emergencies through community awareness and mobilisation programs.

- These approaches allow women and communities to plan for emergency transport, communication and financing, or to plan to move closer to care before labour. However these should not be considered as isolated interventions, and attention to strengthening referral chains and quality of care is crucial.

- At the facility level, ensuring emergencies are prepared for will include:
  - Triage, stabilisation and referral protocols
  - Formalising referral links between health facilities, including ensuring a reliable system of emergency transport and communication

Box 17. Preparing at the individual, community and facility level
The desire to increase the momentum towards achieving the Millennium Development Goals has led to renewed interest in strategic plans to improve maternal health by national governments and donors. Planning at district level is important to strengthen systems and services.

The ‘second delay’ cannot be addressed in isolation. A plan to improve maternal health must address the underlying causes of poor maternal health, and improvements in safety of home deliveries, at the same time as improving access to quality EmOC through addressing all three of the ‘delays’ in an integrated way. However the ‘second delay’ has often received less attention, and has particular significance for equity in access, so we provide here some guidance on steps for systematic planning to address this at district level. It is also important to consider the ‘second delay’ in the context of a more comprehensive emergency referral system for maternal and non-maternal health care.46

Some settings may have an existing maternal health plan and will want to review and strengthen efforts to address the ‘second delay’; others will be paying attention to the ‘second delay’ as one aspect of a new maternal health plan. District level plans will be guided by and consistent with national strategic maternal health plans.

It has not always been clear who has the responsibility for ensuring that all pregnant women are able to reach EmOC in a timely way. Often those responsible for provision of EmOC, whether government, NGO or private sector, assume that their responsibility begins when a pregnant woman arrives at the facility. It is essential that provincial or district level health planners (depending on the level of decentralisation) take responsibility for coordination of the different sectors and stakeholders that can contribute to saving the lives of pregnant women.

**Step 1. Identify key stakeholders and clarify responsibilities**

In addressing the ‘second delay’ it is important to engage and consult stakeholders beyond the health sector. Other relevant sectors may include transport, infrastructure and communications, industry, and agriculture. Within the health sector it is important to include those at the community level, the level of the first line health facility, and the referral facility level. It is also essential to advocate with provincial or district leaders (depending on the level of decentralisation of decision-making) who are responsible for resource allocation.

If there is a group or committee responsible for maternal health it may be helpful to establish a sub-committee that takes a particular interest in addressing the ‘second delay’. This sub-committee could then include representation from those with broader responsibility for district infrastructure development in relation to transport and communications.
Possible stakeholders

At community level:
- Village leaders, including religious leaders
- Women’s groups
- Church groups
- Community based organisation leaders
- Young women and young men
- Expectant fathers and pregnant women
- Older women
- Traditional birth attendants
- Community level health workers or volunteers

At district / administrative level
- Health officials
- Hospital administrators
- Ambulance service manager
- Government infrastructure development planning officials (transport and communication)
- Government officials from industry, agriculture, social services, women’s affairs
- Relevant private sector companies’ senior staff eg telecommunications, manufacturing, agriculture, retail
- Relevant local, national and international NGOs
- Health professionals’ associations

At sub-district level:
- Health care providers
- Health policy officials and program managers
- Health education officers
- District council/administrative officials
- Local politicians
- Ambulance drivers
- Bus drivers / boat operators

Box 18. Preparing at the individual, community and facility level

It is worthwhile to include a range of stakeholders in the processes of gathering and analysing information and planning; these processes have potential to contribute to raising awareness.
**Step 2. Gather information**

**District level mapping**

A map can bring together essential information for planning including:
- Population numbers at different sites
- Estimated number of pregnancies (and complications) each year
- Distribution of health services able to provide:
  - safer home delivery
  - basic EmOC
  - comprehensive EmOC
- Facilities where mothers can stay near term
- Availability of transport
- Roads (including sites susceptible to seasonal barriers such as mudslides and flooding)
- Current communication services and potential – such as coverage of mobile phone signals
- Community social structures that could be mobilised for maternal health (such as women’s groups, church groups, sporting groups)
- Specific population groups (such as plantation workers and commercial farm compound residents; displaced people; ethnic minorities; border populations)

A map can be built up from a variety of sources of data. It is useful to undertake participatory mapping at community level as well as at district level to capture information from different perspectives. Data from national household surveys such as the Demographic and Health Surveys and Multiple Cluster Indicator Surveys can provide useful information about numbers and places of births.

The map should enable an assessment of the numbers of pregnant women:
- Who live within easy reach of comprehensive EmOC
- Who could reach EmOC after a complication occurs if transport, communication and referral systems were strengthened
- Who need to move closer to EmOC before labour begins
Qualitative methods to understand the range of knowledge, attitudes, beliefs and practice, their influences and trends

Qualitative research can provide valuable insights into decision-making processes, cultural beliefs, the barriers families encounter in seeking emergency obstetric care, and potential solutions. ⁶⁹

Methods

Review of existing data

There may be relevant published and unpublished studies conducted in the district or similar districts.

Key informant interviews with key stakeholders including health care providers, traditional birth attendants and village leaders, and referral hospital staff.

Focus group discussions

Group discussions can be held with young men and women, pregnant women and expectant fathers, and older women. It will be usually be best to hold separate discussions with men and with women. It may also be helpful to have separate group discussions with different ethnic groups or specific marginalised groups. Using participatory tools during FGDs helps to stimulate discussion. For example, a story in pictures can be used to understand better the reasons for delay at different stages (see Figure 8) and the likely costs that would be incurred:

- A pregnant woman with a complication such as bleeding informs her husband
- The husband visits or communicates with the nearest healthy facility
- The health facility arranges transport to the nearest EmOC facility

It is interesting to note that careful probing may be needed to elicit important cultural beliefs. A qualitative study in Malawi provides a good example, where it was only after the failure of a program to introduce ambulance bicycles for women in labour to travel to the clinic that it was found that women had strong cultural beliefs that publicising the onset of labour summons evil spirits causing obstructed labour and possible death. The women had not mentioned this in the pre-program consultations. ¹²⁴
Figure 8. Experience from the Tibet Health Sector Support Project

This picture shows a pregnant woman who bleeds at home, tells her mother-in-law, who summons the husband from the fields, who then goes to the local clinic, where transport is found and the woman taken to the referral hospital for EmOC. She is shown at the end happily breastfeeding her baby.

Health officials, health care providers, village women and men discuss the delays and problems likely at each stage of the story.

(W. Holmes)
Completing a seasonal calendar though a participatory process also provides helpful information. In planning to encourage and support remote pregnant women to move closer to availability of EmOC near term it is useful to know at which time of year most births occur. Although there are few published studies from developing countries it is clear that seasonal variation in pregnancy rates is a common phenomenon influenced by both biological and socio-cultural factors, especially in agricultural societies (such as timing of wedding festivals, annual pilgrimages etc). 247-249

A question guide for interviews and focus group discussions can be developed with a local team of researchers based on local priorities and informed by the review of evidence and experiences in this report.

It is important to make an effort to reach remote and isolated communities to gather information because these are the communities that have the poorest access to EmOC.

Quantitative household survey

A survey can help to quantify the annual frequency of journeys to reach an EmOC facility, whether these were taken before labour, after the onset of labour, or after the onset of a complication, and an assessment of the costs incurred, including opportunity costs.

Maternal and perinatal mortality and ‘near miss’ audits

An exploration at hospital and community level of the circumstances that led to a maternal death or ‘near miss’ (defined as pregnant women with severe life-threatening conditions who nearly die but, with good luck or good care, survive) can be very useful in identifying pre-hospital barriers to care.250 However there is a need to conduct these with great sensitivity because of the potential for perceptions of blame to result in conflict or other adverse effects.251
Step 3. Planning responses

In consultation with key stakeholders, and in the light of the information gathered:

- Review geographical distribution of facilities and existing plans for new or upgraded facilities. Modify plans to ensure equitable distribution of facilities, taking into account the factors discussed on page 14. Include an assessment of costs and potential resource allocation.

- Review options, strategies and costs for improving availability of transport taking into account the factors discussed on page 20. Consider transport for the different pathways to EmOC – from home direct to EmOC facility, from home to first line health facility, and from first line health facility to EmOC facility. Consider transport options and strategies for journeys before labour begins, after the onset of labour, and after the onset of a complication.

Figure 9. Planning responses
Review options and strategies for improving communications, taking into account particularly the potential for expansion of mobile phone use and functions, and the experiences and ideas discussed on page 31.

Review strategies for community engagement in birth preparedness (including pooling of resources for transport and financing), and in providing support to husbands and families when a pregnant woman leaves home near term to stay closer to EmOC. Consider the experiences and models discussed on page 37 and 56.

Review what is needed to strengthen first aid emergency care, including basic EmOC, and referral processes at first line health facilities discussed on page 60. Develop or adapt clinical protocols for health care providers at this level.

Review what is needed to address the barriers to moving closer to EmOC near term for women in remote or isolated settings taking into account the factors discussed on page 18 and 47.

It is important that the plans recommended by the group addressing what is needed to overcome delays in reaching EmOC are incorporated into the overall district (or provincial) plan for maternal health. Advocacy to gain the resources needed, implications for training, support, supervision, and deployment of health care personnel, and development of a communication strategy for better maternal health are all essential considerations. These are best addressed as part of the overall district plan to improve maternal health.

Planning for monitoring and evaluation

Indicators to track progress in addressing the ‘second delay’ should be included in the district monitoring and evaluation framework for maternal and newborn health and services. A technical consultation to provide guidance to strengthen M&E of maternal and newborn health and services at the district level was organized by WHO in 2006. This includes useful case studies from selected countries. The consultation highlighted the importance of using multiple sources of information, identifying how and when data collected will be used and by whom. Collection of information for monitoring and evaluation should take place at community, facility and district level. Results should be accessible and shared with stakeholders in the community and in health care facilities, and should link to the national health information system.

Guidance documents on selection of indicators for maternal health lack indicators for charting progress in overcoming the ‘second delay’. For example the Reproductive Health Indicators manual suggests two process indicators in relation to access to EmOC:

“The number of facilities with functioning basic essential obstetric care per 500,000 population” and “The number of facilities with functioning comprehensive essential obstetric care per 500,00 population.”
It is important for the district level team to select a minimum number of process and impact indicators so that data collection, analysis and feedback will be manageable. The UNFPA Emergency Obstetric Care Checklist for Planners include useful questions for planners but lacks detail in relation to the ‘second delay’.\textsuperscript{11}

The JHPIEGO manual “Monitoring birth preparedness and complication readiness tools and indicators for maternal and newborn health” provides useful guidance on evaluating several aspects of the second delay and suggests a broad range of indicators, some very relevant to the second delay, and importantly acknowledging the key role of expectant fathers in decision-making.\textsuperscript{220} These include:

- % of women who (plan to) save money for childbirth
- % of women who (plan to) identify a mode of transport to place of childbirth
- % of women who know that their community has a financial support system
- % of women who know that their community has a transportation system
- % of husbands who plan to save money for childbirth
- % of husbands who plan to identify a mode of transport to place of birth
- % of husbands who know that their community has a financial support system
- % of husbands who know that their community has a transportation system
- % of communities that have a financial support system
- % of communities that have a transportation system
- % of communities that have a blood donor system
- % of communities that have an emergency response mechanism

It is important that evaluation of efforts to address the ‘second delay’ should include assessing the satisfaction with services of women and their families. There is much to be learned from interviewing women and their husbands who have experienced an obstetric complication and were able to reach EmOC in time for a successful outcome.
Conclusions

The MDGs have generated great momentum in the push to reduce the terrible toll of preventable maternal deaths. But it is important that this does not increase inequity. To avoid deaths in childbirth it is agreed that we need to reduce unintended pregnancies, increase deliveries with a skilled attendant, and improve access to EmOC. The ‘three delays’ model has proved useful in tackling the barriers to emergency care for unpredictable complications of pregnancy and labour. The need to take a systematic approach – strengthening all links in the referral chain to good quality comprehensive EmOC – is widely emphasised. Yet the ‘second delay’ – the difficulty in reaching EmOC once a decision has been made to seek care – has received relatively little attention. The barriers to reaching care are more significant for poor women living in remote communities, who are more likely to have very high lifetime risks of death in childbirth. To reduce existing inequities much greater investment is needed to reduce the ‘second delay’.

To do this health planners need to work with other sectors, such as transport, infrastructure, telecommunications, microfinance and industry. A multi-sectoral approach has potential to bring broader health benefits. New roads improve economic, educational, and social outcomes for rural populations as well as enabling evacuation for medical as well as obstetric emergencies.

We need to take advantage of the opportunities provided by new technologies. Iqbal Quadir has demonstrated the extraordinary impact on rural people’s lives with the connectivity that mobile phones can deliver. Solar power charging makes this possible where there is no electricity.

Some barriers can be reduced with few resources – greater attention to understanding women’s cultural beliefs, adapting vehicles to allow for privacy, encouraging a family member or friend to accompany the pregnant woman, and arranging support for husbands left at home to care for children will increase the likelihood that women will be referred in a timely way.

Experience in numerous settings shows the remarkable potential of communities to mobilise, once their awareness is raised, sharing funds and transport to support emergency referral of pregnant women. The role of community participatory approaches, and of women’s groups in particular, has been receiving renewed attention. Evidence has shown that they can contribute to improved health of women, children and families. They also have potential to address some of the problems of the ‘second delay’.

Investment in new and upgraded facilities with capacity for good quality EmOC needs to be increased in rural areas. But we also need to recognise that some women live inevitably beyond timely reach of EmOC, even if availability of transport and communication is improved. There is a genuine dilemma in making policy recommendations about how best to invest to improve maternal health and reduce deaths in remote settings where home delivery rates and maternal mortality are very high. On the one hand there is increasing evidence for the effectiveness of community-based efforts to address infection and haemorrhage, with potential to save many
lives, and experience from Nepal that this does not prevent a move towards hospital deliveries. On the other hand, even though obstructed labour is not the most common direct cause of maternal death, it is a significant cause of both deaths and disabilities, and without the possibility of access to EmOC it is inevitable that some women will die an agonising but preventable death in childbirth. There is therefore an ethical imperative to invest in addressing the various barriers to remote women moving closer to EmOC before labour begins, and to ensuring a more equitable distribution of facilities with capacity for EmOC. Deborah Maine has argued that programs that improve the ability of the health system to treat women with a variety of complications will have a much larger effect on maternal mortality than simply addressing bleeding and infection.

District level planners need to consider, in a systematic way, two pathways that women may take to reach EmOC – from home direct to an EmOC facility, and from home to a first line clinic with referral on to an EmOC facility. They also need to consider the implications of undertaking this journey during labour, as well as after the onset of a complication.

Efforts to address the ‘second delay’ need to be integrated with other efforts to strengthen maternal and newborn health, reproductive health, child health, and primary health care more broadly.

More research is needed, especially to answer the following questions:

- How can effective pilot projects be scaled up to sustainable district approaches?
- What is the relative cost-effectiveness of improving transport and infrastructure, and increasing the number and distribution of EmOC facilities in varied contexts?
- How can health authorities engage effectively with other sectors?
- How can synergies ensure that management of neonatal emergencies and perinatal health outcomes are improved effectively?
- How can efforts to address the ‘second delay’ be informed by an understanding of gender roles and responsibilities, and of the low status of women?

There is a need for guidance for health policy makers and planners on how to assess and address factors associated with the second delay, and how to chart progress. We plan to develop and trial a checklist to assist district level planners. This synthesis of evidence and experience, and our conceptual analysis, provides a foundation to inform such a checklist, and a wealth of information and ideas to assist policy makers and planners.
References

1. Shrestha SD, Rajendra PK, Shrestha N. 2007. Feasibility study on establishing maternity waiting homes in remote areas of Nepal. Regional Health Forum 11(2); 33-38. WHO-SEARO.


47. Sauvarin J. Maternal and neonatal health in East and South-East Asia. UNFPA Country Technical Services Team for East and South-East Asia, Bangkok, Thailand. March 2006.


52. Samai O, Sengeh P. Facilitating emergency obstetric care through transportation and communication, Bo, Sierra Leone. International Journal of Gynecology and Obstetrics. 1997;59(SUPPL. 2).


147. Kaplan WA. Can the ubiquitous power of mobile phones be used to improve health outcomes in developing countries? Globalization and Health. 2006;2.


181. Ir P, Horeman D, Narin S and Van Damme W. Improving access to safe delivery for poor pregnant women: a case study of vouchers plus health equity funds in three health districts in Cambodia.


218. Kildea S. And the women said... Reporting on birthing services for Aboriginal women from remote top end communities. 1999. Women's Health Strategy Unit, Territory Health Services. Available at: [http://www.maningrida.com/mac/bwc/references.html](http://www.maningrida.com/mac/bwc/references.html).


## Appendix

### Sources of grey literature

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<td>Save the Children</td>
<td><a href="http://www.savethechildren.org">http://www.savethechildren.org</a></td>
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<td>Supporting Policy Relevant Reviews and Trials collaboration (SUPPORT)</td>
<td><a href="http://www.support-collaboration.org/">http://www.support-collaboration.org/</a></td>
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<td>TeleCommons Development Group (TDG)</td>
<td><a href="http://www.telecommons.com/">http://www.telecommons.com/</a></td>
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