Health Care Seeking for Maternal and Newborn Health

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List of Abbreviations

ALRI	Acute Lower Respiratory Infection
AMSTAR	Assessment of Multiple Systematic Reviews
BHU	Basic Health Unit
CDP	Continuous Distending Pressure
CHW	Community Health Workers
CI	Confidence Interval
CMWs	Community Midwives
CPAP	Continuous Positive Airway Pressure
EmONC	Emergency Obstetric and Neonatal Care
EPOC	Effective Practice, Organization and Communication
GRADE	Grading of Recommendations, Assessment, Development and Evaluation
HFPPV	High Frequency Positive Pressure Ventilation
HIC	High Income Countries
IPT	Intermittent Preventive Treatment
ITN	Insecticide Treated Nets
KMC	Kangaroo Mother Care
LHW	Lady Health Worker
LMIC	Low and Middle Income Countries
MD	Mean Difference
MDGs	Millennium Development Goals
PDHS	Pakistan Demographic and Health Survey
PROM	Premature Rupture of Membrane
RCT	Randomized Controlled Trial
RDS	Respiratory Distress Syndrome
RHC	Rural Health Centre
RMNCH	Reproductive, Maternal, Newborn and Child Health
RR	Risk Ratio
SAM	Severe Acute Malnutrition
SBA	Skilled Birth Attendants
SDG	Sustainable Developmental Goals
SP	Sulfadoxine Pyrimethamine
STI	Sexually Transmitted Infections
TBA	Traditional Birth Attendants
TT	Tetanus Toxoid
WHO	World Health Organization

Abstract

Background

Complications during pregnancy and childbirth can lead to emergency situations which are critical to address promptly in order to avoid birth-related deaths of mothers and newborns.

Aims

1. To identify effective interventions for improving neonatal and child survival.
2. To identify strategies for improving maternal and newborn health care seeking in low- and middle-income countries.
3. To understand the maternal and neonatal health care seeking pathways in rural communities of Pakistan.
4. To assess the effectiveness of the Emergency Obstetric and Neonatal Care (EmONC) package on health care seeking behaviour in rural communities of Pakistan.

Methods

To evaluate the above aims, the following methodologies were employed:

1. An overview of systematic reviews on World Health Organization list of essential interventions.
2. A systematic review of quantitative and qualitative studies.
3. A qualitative assessment of the perceptions of health care seeking.
4. A cluster randomised controlled trial to evaluate the impact of the EmONC package.

Results

1. The overview identified six effective and 11 promising interventions for improving fetal, neonatal and child survival. The effective interventions include corticosteroids for at-risk pregnant women, breastfeeding, cord care, kangaroo care, treated bednets for children, and vitamin A for infants from six months.
2. The meta-analysis of 29 RCTs, with a range of different community-based interventions provided through community mobilization and home visitation, indicated significant improvement in health care seeking for neonatal illnesses (RR 1.47; 95% CI 1.24-1.75), whereas, no impact was seen on health care seeking for maternal illnesses (RR 1.06; 95% CI 0.92-1.22). The review of 151 observational and qualitative studies identified several social, cultural and health services related factors that contribute to delays in health care seeking.

3. Factors which lead to delays in health care seeking include lack of women's autonomy to decide to seek care, lack of money, workload at home, and the attitude of staff at health facilities.
4. The EmONC package showed no impact on health care seeking for maternal and newborn illnesses. However, improvements were seen in uptake of beneficial aspects of maternal and newborn care including receiving antenatal care (RR 1.06; 95% CI 1.04-1.08), use of clean delivery kits (RR 1.49; 95% CI 1.45-1.54), skilled birth attendance (RR 1.07; 95% CI 1.04-1.10), and newborn care practices including application of chlorhexidine to the umbilical cord and emollient use.

Conclusion

While comprehensive adoption of the effective and promising interventions can improve neonatal and child survival around the world; community-based intervention strategies such as home visitation and counselling can help improve the awareness and accessibility of those interventions. In Pakistan, strategies are not only required to prevent the delay in health care seeking, which include reinforcement of health supplies and improvement in practices of health care profession, but also to improve factors which can prevent women from using health facilities. Although the EmONC package did not show any improvement in health care seeking for maternal and newborn illnesses, improvements were observed in the uptake of antenatal care attendance, institutional births, skilled birth attendance, and other care practices.

Declaration

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name in any university of other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due relevance has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint award of this degree.

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Chapter 1: Literature Review

1.1. Maternal and newborn health: global scenario

Deaths of mothers and babies are particularly critical to address. Complications during pregnancy and childbirth can lead to emergency situations with a small time to intervene. In 2013, an estimated 2.7 million newborns and 289,000 mothers died globally [1, 2]. Of these, maternal health complications contribute to half of all stillbirths and half of total neonatal deaths in the first week of life, suggesting that there is a major lack of intervention around the time of birth and in the early postnatal period, a time when mothers and babies are most at risk [3].

During the past decade substantial work has been done to highlight global commitment and focus attention to the health of mothers and their newborn children. The Millennium Development Goals (MDGs) set ambitious targets for reducing maternal and under-five child mortality, for achieving social and economic development, and for ending poverty by the year 2015. Even with this increased attention, actual progress has been slow and intermittent: rates of decline in maternal, newborn and under-five mortality in several countries, particularly in low and middle income countries (LMICs) have not met planned targets. Furthermore, large inequities have been observed, not only across regions, but also across urban/rural settings and socioeconomic status.

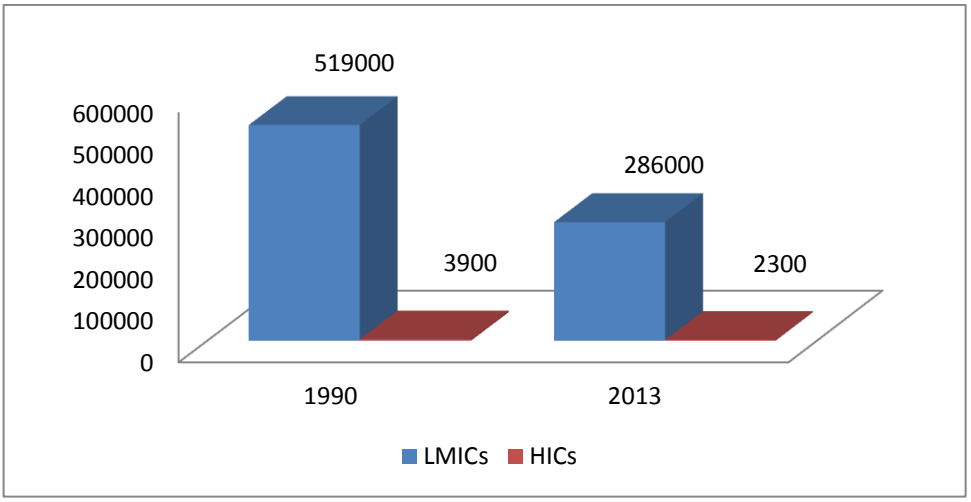
Even with improvements in some areas, deaths of children under five years and the risk of maternal mortality in pregnancy or childbirth remain many times higher in LMICs compared with high income countries (HIC) (Figure 1.1). In HICs, the risk of pregnancy-related maternal mortality is 1 in 3700 as opposed to 1 in 160 in the LMIC [4].

1.2. Causes of maternal and newborn deaths and morbidities

For every woman who dies of pregnancy-related causes, approximately 20 women experience morbidity; chronic or acute [5]. Among the 136 million births annually, 1.4 million women experience acute obstetric morbidities and approximately 20 million suffer from long term disabilities [5]. Maternal morbidities include sepsis, depression, anaemia, fistula, uterine rupture and uterine prolapse. Some complications can force women to incur excessive health expenses, and result in a loss of productivity from reduced ability to work. A newborn's health inherently depends on the mother's health and so maternal ill health

may also lead to complications in her child, during pregnancy, childbirth and postpartum. Data on neonatal morbidities are limited, for both maternal and neonatal mortality or morbidity and data collection is a particular challenge especially with a significant number of births taking place at home in LMIC.

Figure 1.1: Global distribution of maternal deaths

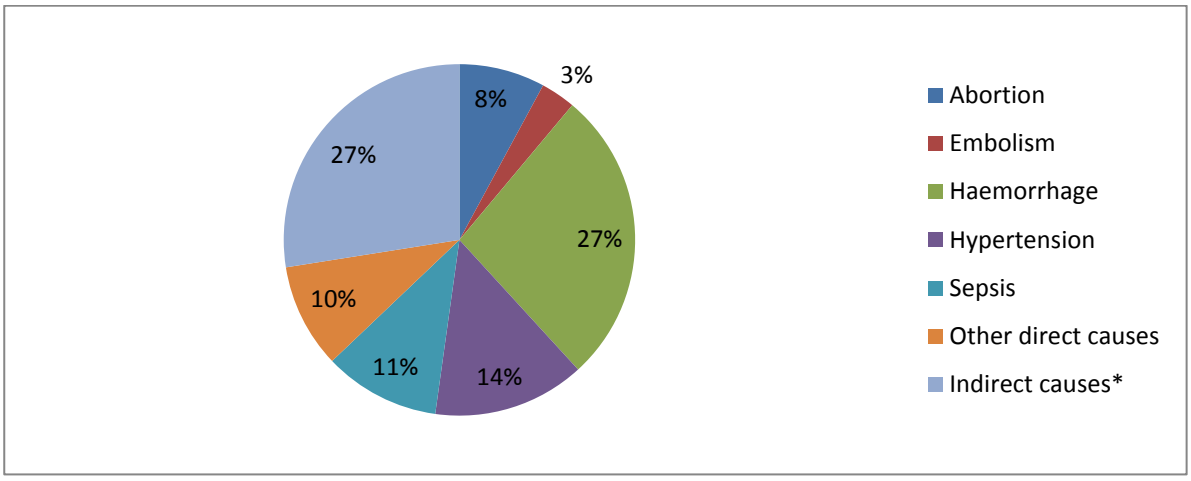


Source: Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division [2].

Given that most maternal and child deaths are preventable using current knowledge, the burden of mortality and morbidities is unacceptably high. The majority of maternal deaths occur during labour, and the early postpartum period, with obstetric haemorrhage being the main medical cause of death globally (Figure 1.2a). Hypertensive diseases, sepsis/infections, obstructed labour, and abortion-related complications are the other main causes of maternal mortality. In sub-Saharan Africa, the combined maternal mortality ratio for severe bleeding, hypertensive diseases, and infections is almost 500 deaths per 100,000 live births, compared with fewer than 300 per 100,000 in South Asia and only four per 100,000 in HICs [6]. The main direct causes of neonatal death and morbidity are considered to be infections; complications arising from preterm birth, and intrapartum-related neonatal deaths, which together account for nearly 80% of all neonatal deaths globally (Figure 1.2b). With an estimated 99% of maternal, newborn, and child deaths occurring in LMICs increased health resources and appropriate interventions have significant potential for reducing the burden of maternal and child mortalities in these countries [7, 8].

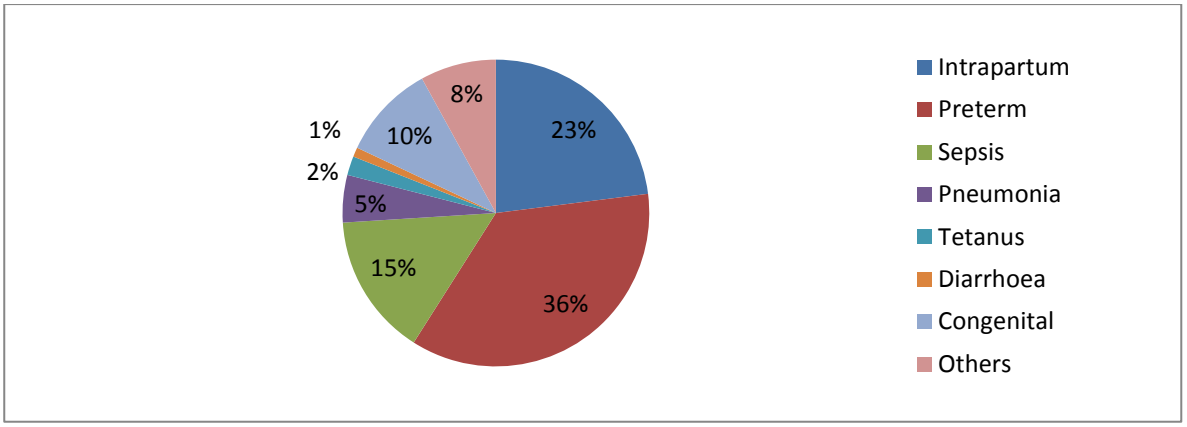
Figure 1.2: Causes of maternal and neonatal mortality

a. Causes of maternal mortality



**Indirect causes include anaemia, malaria, and heart disease*

b. Causes of neonatal mortality



Source: a: Say 2014, Lancet [9] **b:** Lawn 2014. Lancet [10].

Effective interventions even in low-resource settings have the potential to avert maternal and neonatal deaths. With simple interventions such as blood transfusions, oxytocics to prevent maternal bleeding, and manual removal of the placenta by a skilled birth attendant, haemorrhage can be managed in time to prevent mortality [8, 11]. Similarly, access to antenatal health care visits and medicines can prevent death from hypertensive disorders, while deaths due to sepsis can be averted with hygienic infection control measures during birth provided by skilled birth attendants and screening for prenatal maternal infection and sexually transmitted infections (STIs) during antenatal visits.

While many factors contribute to maternal and neonatal deaths, one of the most effective means of solving this problem requires effective preventive measures or treatment

provided rapidly to women and newborns, often at their home or in primary health care settings.

Worldwide 50 million births take place at home without a skilled birth attendant [12]. Access to skilled birth care and especially to emergency obstetric care is lowest among the poor, who therefore suffer the greatest burden of maternal and neonatal mortality and morbidity related to complications of childbirth [13]. Skilled attendance at birth remains particularly low in sub-Saharan Africa and Southern Asia. There are further wide disparities within countries, across socio-economic status, geographic location, and educational status. In sub-Saharan Africa, more than half of women birth at home with no birth attendant present. In South Asia, around one-third of home births are without traditional birth attendants. In these instances, the primary caregivers for the pregnant woman and her baby/babies are her mother and her family. Furthermore, within LMICs, the proportion of women receiving the World Health Organization (WHO) recommended four or more antenatal visits in urban areas is 67% versus only 34% in rural areas. In Africa, only one in four infants are born in the presence of an attendant skilled in neonatal resuscitation with appropriate supplies [14].

Effective interventions to avert maternal mortalities in such scenarios can also prevent neonatal deaths. As illustrated in Table 1.1, decreasing coverage of skilled birth attendance correlates with higher neonatal mortality, with 77% of neonatal mortalities occurring with half or less than half coverage with skilled birth attendance. For more hygienic births through skilled birth attendance, simple treatments such as cleansing of the umbilical cord, and promotion of early and exclusive breastfeeding, can largely prevent neonatal infection. Furthermore, providing birth attendants with simple training and equipment (bag and mask) for neonatal resuscitation is a low-tech, low-cost opportunity that can reduce intrapartum-related neonatal deaths [15]. Complications from preterm birth and low birth weight (LBW) take the largest toll on neonatal deaths, with more advanced care being required for those born before 33 weeks of gestation. Use of low cost interventions such as kangaroo mother care (KMC) yields a 51% reduction in mortality among newborns with body mass of less than 2000g [14, 16].

Table 1.1: Skilled attendance at birth correlated with neonatal mortality

	Very low mortality	Low mortality	Moderate mortality	High mortality	Very high mortality
				77% of Neonatal Deaths	
Neonatal mortality rate (1000 live births	≤ 5	6-15	16-30	31-45	> 45
Neonatal deaths	42,000	212,000	627,000	1,891,000	1,065,000
Skilled attendance at birth	100%	99%	88%	52%	46%
				Less than half of birth with skilled attendance	

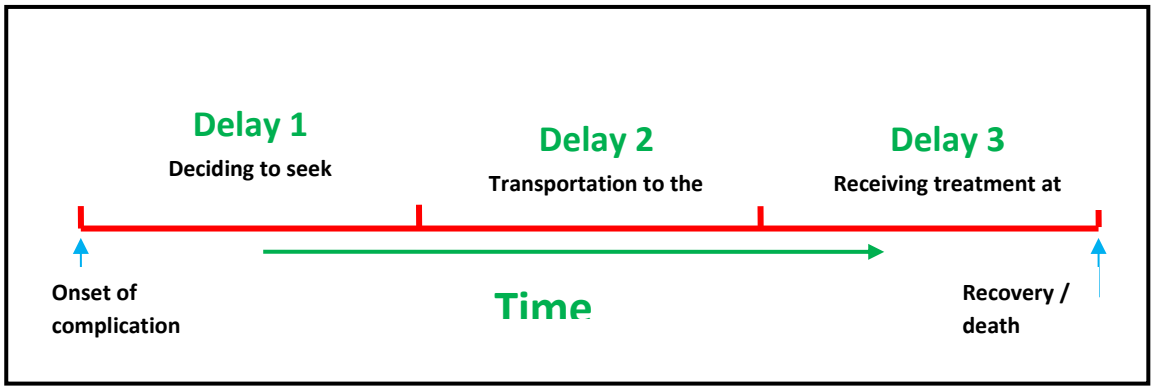
Source: Adapted from: Lawn et. al. 2010 [14].

1.3. Three delays model that explains the maternal and newborn mortality

It is often suggested that these overwhelming maternal and neonatal mortalities and morbidities are closely linked with a number of interrelated delays that prevent a pregnant women from accessing the health care she needs. Each delay is closely related to services, logistics, facilities and conditions, which are important elements for their health (Figure 1.3). These delays are:

1) Delay in seeking appropriate medical help for an obstetric emergency or neonatal complication for reasons of cost, lack of recognition of an emergency, poor education, lack of access to information and gender inequality;
2) Delay in reaching an appropriate facility for reasons of distance, infrastructure and transport;
3) Delay in receiving adequate care when a facility is reached because there are shortages in staff, their competency, or due to unavailability of required medical facilities and equipment.

Figure 1.3: The 3-delays model of maternal mortality



Source: Thaddeus and Maine 1994 [17].

As a result, many preventable maternal deaths, most often in resource poor settings, occur where births are home-based and in the event of complications the woman is unable to access the required care in time [18].

Another important issue to highlight is that the neonatal health is intimately related with the health of the mother and a large number of newborns deaths occur on the first day of life due to complications related to pregnancy and childbirth. It is argued that addressing these deaths requires combined packages that address the problem at each level of delay. The most effective strategy is the provision of care to the mother and the newborn through a "continuum of care" [19]. This commences when women are young, begins well before they conceive, helps prevent unintentional pregnancies and is maintained through antenatal, labour and the post-natal period into their child's early years, and which incorporates household, community and health care system [19]. This approach helps to avoid the disparity between maternal and child health and health services delivery [20].

1.4. What is already known?

Several efforts have been made to identify interventions and strategies to improve maternal and neonatal health indicators as well as to bridge the gap between the developed and the underprivileged nations and communities of the world. The interventions proven effective in these efforts are compiled in Table 1.2.

The 2014 *Lancet Every Newborn Series* reported that 1.5 million of maternal, newborn and stillbirths could be prevented by 2015 if five key interventions including skilled care, emergency obstetric care, immediate care for newborn (baby breastfeeding support, cord and thermal care), and newborn resuscitation were implemented. With effective care of small and ill newborn babies, which includes kangaroo mother care, prevention or management of neonatal sepsis, neonatal jaundice, and neonatal encephalopathy after intrapartum hypoxia, almost 600,000 additional newborns could be saved. A life cycle approach, especially meeting unmet need for family planning, could also lead to large reductions in child deaths and stillbirths. Antenatal and postnatal preventive care, including support for breastfeeding, is also important. Achieving equitable high coverage of facility care and healthy home behaviours requires community approaches such as women's groups and home visits [21].

The *Lancet Maternal and Child Under-nutrition Series* (2013) [22] identified ten proven nutrition-specific interventions which included: periconceptual folic acid supplementation, maternal balanced energy protein supplementation, maternal calcium supplementation, multiple micronutrient supplementation in pregnancy, promotion of breastfeeding, appropriate complementary feeding, vitamin A and preventive zinc supplementation in children aged 6–59 months, management of severe acute malnutrition (SAM), and management of moderate acute malnutrition. The paper reported that if coverage of these interventions improved to 90% then an estimated 900,000 lives could be saved in 34 high nutrition-burden countries (where 90% of the world's stunted children live) and the prevalence of stunting could be reduced by 20% and that of severe wasting by 60%. This would reduce the number of children with stunted growth and development by 33 million.

Another recent *Lancet Diarrhoea and Pneumonia Series 2013* [23] underscored several preventive and therapeutic interventions with proven effectiveness. The preventive interventions included water, sanitation, and hygiene (WASH), breastfeeding promotion, zinc supplementation, and vaccines for pneumonia (H. influenza, pneumococcal, and measles) and diarrhoea (rotavirus and cholera). Oral rehydration solution, zinc treatment, and antibiotic treatment for some strains of diarrhoea (cholera, shigella, and cryptosporidiosis) were effective strategies for treatment of diarrhoea, and antibiotic treatment and oxygen therapy were effective for pneumonia.

The *Lancet Maternal Survival Series* (2006) [24] emphasized that although there are numerous outcomes to consider for maternal health, the most important outcome to focus on, especially in areas with high burden, is maternal mortality, as prioritized by the 189 countries signing the Millennium Declaration. In recent years the focus has shifted from providing single interventions to delivering packaged treatment strategies with high geographical coverage in the hope of decreasing this growing burden. Considering the timing of most maternal deaths to be during labour, birth, or 24 hours postpartum as well as the difficulty of timely prevention of complications in resource-poor environments, intrapartum care strategies need priority, with an emphasis on such care being provided at a health-centre. This approach would provide detection, prevention, and management of problems, along with all basic emergency obstetric functions, apart from blood transfusions or surgery which would take place at the referral level. Antenatal care,

postpartum care, family planning, and safe abortion were cited as secondary, but complementary to intrapartum care [24].

The 2007 *Lancet* series emphasizes a continuum of care throughout the life cycle and also at places of care giving, ranging from households to clinical care settings. Accordingly, the case has been made for providing approximately 190 interventions through eight packages. These packages have been developed to be delivered at various levels of the health system, including clinical care, outpatient and outreach services, and through integrated family and community care throughout the life cycle. Furthermore, the paper brings to light the lack of a defined postnatal care package that results in discontinuity between maternal and child health programs. A similar gap has been seen with family and community packages as they are not regarded to be part of the health system, precluding efforts to scale up or integrate with other levels of care [19].

The 2008 *Lancet Alma-Ata Series* emphasized skilled care at facility levels for saving maternal lives and scaling up community and household care for improving newborn and child survival. The series identified 37 key promotional, preventive, and treatment interventions and also strategies for delivery in primary health care. This review reaffirms that primary health care interventions can make a significant difference to maternal, newborn and child health (MNCH) and other outcomes and substantial gains can be made for maternal and newborn outcomes by focusing on packages that relate to outcomes for both [25].

In the 2009 review of interventions during labour for stillbirth [26], the need for improving infrastructure for comprehensive essential and emergency obstetric care was emphasized. It was seen that provision of caesarean section and timely induction of labour had great potential to reduce stillbirth rates, especially in low-resource settings. Although most of the evidence regarding these packaged interventions is based on observational data, there is no doubt that they have a significant impact on maternal and neonatal mortality, especially in low-resource settings.

Furthermore, the 2011 *Lancet Stillbirth Series* identified ten interventions, particularly for LMICs, with sufficient evidence for recommending implementation through health systems [27]. The analysis further showed that if these interventions were almost

universally (99%) made available in countries with the highest burden of stillbirths, they could prevent up to 45% of stillbirths. These interventions include care during childbirth, particularly emergency obstetric care (including caesarean section), that can reduce the highest number of stillbirths. Antenatal care (e.g. detection and management of syphilis, hypertension, diabetes, fetal growth restriction, and post-term pregnancy) is also highly effective, and can be provided through outreach workers and services. Family planning interventions were not included in this analysis, but would also have a major effect on the number of maternal, fetal and newborn deaths that could be prevented at an affordable cost.

In 2011, WHO reported a list of the most effective interventions for reducing maternal, newborn and child mortality. These interventions, if delivered across the reproductive, maternal, newborn and child health continuum, have the potential to prevent a large proportion of maternal, newborn and child deaths [28].

1.5. Health care seeking for maternal and newborn health

Despite consensus about priority maternal and neonatal health interventions, evidence is lacking on how best to increase utilization of these interventions. Researchers analysing data from 54 Countdown to 2015 countries have shown that wealth inequalities remain far greater for skilled attendance at birth than any of the other proven interventions for maternal, newborn, and child health for which national data are available [29]. Promoting birth preparedness and complication readiness have been described as “one of the conceptually compelling and logical means” of ensuring timely receipt of skilled and emergency obstetric care [30]. These interventions have been described to be effective for improving health care seeking for maternal and newborn health as they primarily focus on improving preparations for obstetric emergencies by improving awareness of danger signs, identifying a facility where emergency obstetric care is available, setting aside money for an emergency, and arranging for emergency transport [31, 32]. In the face of existing evidence, it remains unclear which elements of birth preparedness and complications readiness interventions are important in supporting and motivating women to seek institutional delivery care during birth.

Table 1.2: Consolidated list of essential maternal and newborn interventions

	Lancet Every Newborn Series 2014 [21]	Lancet Maternal and Child Under nutrition Series 2013[22]	Lancet Diarrhoea and Pneumonia Series 2013[23]	WHO essential interventions 2011[28]	Lancet Stillbirths series 2011[27]	BMC series on stillbirths 2009[26]	Lancet Alma Ata series 2008[25]	Lancet series 2007[19]	Lancet maternal survival series 2006[24]
Family planning									
Prevention and management of Sexually Transmitted Infections (STIs), including HIV for Prevention of Mother to Child Transmission (PMTCT) of HIV and syphilis									
Management of unintended pregnancy/Provision of post abortion care availability and provision of safe abortion when indicated and legally permitted									
Folic acid fortification and/or supplementation									
Antenatal Care									
Multiple micronutrient supplementation									
Balanced energy protein supplementation									
Iodine supplementation									
Promotion of appropriate care seeking during pregnancy									
Iron and folic acid supplementation during pregnancy									
Deworming									
Tetanus immunization in pregnancy for preventing neonatal tetanus									
Prevention and management of malaria in pregnancy									
Interventions for smoking cessation during pregnancy									
Interventions to prevent indoor air pollution									
Screening and treatment of Syphilis									
Prevention and management of HIV and PMTCT in Pregnancy.									
Prevention and management of hypertension in pregnancy Use of calcium for prevention of hypertension Low-dose Aspirin (anti platelet agents) for the prevention of pre-eclampsia Use of antihypertensive drugs for treating severe hypertension Prevention and treatment of eclampsia									
Detection and management of diabetes									
Reduce malpresentation at term using External Cephalic Version (> 36 weeks)									
Detection and management of fetal growth restriction									
Induction of labour for management of premature rupture of membranes at term.									
Antibiotics for management of preterm rupture of membranes.									
Corticosteroids for preterm labour									
Corticosteroids for prevention of neonatal respiratory distress syndrome									
Labour surveillance (including partograph)									
Prophylactic antibiotic for caesarean-section									
Prophylactic uterotonic to prevent postpartum haemorrhage									
Active management of third stage of labour to prevent postpartum haemorrhage									
Induction of labour for prolonged pregnancy									
Induction of labour rather than expectant management in post-term pregnancies									
Caesarean section for absolute maternal indication									
Planned Caesarean section for term breech presentation									
Management of post-partum haemorrhage e.g. Uterine massage, uterotonic									
Skilled care at birth									
Basic emergency obstetric care									

	Lancet Every Newborn Series 2014 [21]	Lancet Maternal and Child Under nutrition Series 2013[22]	Lancet Diarrhoea and Pneumonia Series 2013[23]	WHO essential interventions 2011[28]	Lancet Stillbirths series 2011[27]	BMC series on stillbirths 2009[26]	Lancet Alma Ata series 2008[25]	Lancet series 2007[19]	Lancet maternal survival series 2006[24]
Comprehensive emergency obstetric care									
Clean delivery practices									
Maternity waiting homes									
Advice and provision of family planning									
Prevent, measure and treat maternal anaemia									
Detection and management of postpartum sepsis.									
Screening and initiation or continuation of Antiretroviral therapy for HIV									
Immediate essential newborn care (at the time of birth)									
Promotion and provision of thermal care									
Delayed cord clamping									
Promotion and support for early initiation and exclusive breastfeeding									
Promotion and provision of hygienic cord and skin care.									
Neonatal resuscitation with bag and mask									
Neonatal infection management									
Presumptive antibiotic therapy for the newborns at risk of bacterial infection.									
Case management of neonatal sepsis, meningitis and pneumonia.									
Interventions for small and ill babies									
Kangaroo mother care for preterm and for < 2000g babies.									
Extra support for feeding the small and preterm baby.									
Prophylactic and therapeutic use of surfactant to prevent respiratory distress syndrome in pre-term babies									
Continuous positive airway pressure (CPAP) to manage pre-term babies with RDS									
Management of newborns with jaundice.									
Neonatal vitamin A supplementation									
Promotion and support for exclusive breastfeeding for 6 months									
Promotion and support of continued breastfeeding and complementary feeding									
Prevention and management of childhood malaria									
Comprehensive care of children infected or exposed to HIV infection.									
Promote and provide routine immunization plus *H.influenzae*, meningococcal, pneumococcal, and rotavirus vaccines									
Vitamin A supplementation from 6 months of age									
Management of severe acute malnutrition									
Case management of childhood pneumonia in children above 6 months Vitamin A as part of treatment for measles-associated pneumonia Vitamin A as part of treatment for non-measles-associated pneumonia									
Case management of diarrhoea: Acute watery diarrhoea Dysentery									
Community strategies across the continuum of care									
Home visits across the continuum of care									
Behaviour change communication Employment based commodity distribution and behaviour change communication School based commodity distribution and behaviour change communication									
Social marketing and use of pharmacies and drug sellers									
Community health workers to deliver interventions									
Condition cash transfer with nutritional education									

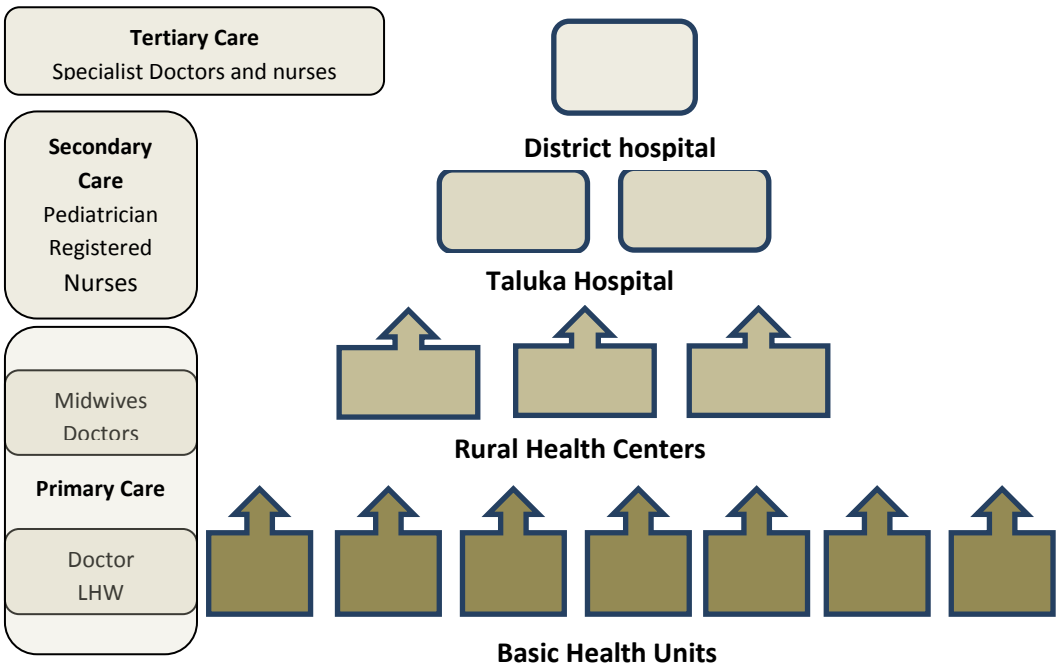
1.6. Scenario of maternal and newborn health in Pakistan

The health status of women in Pakistan is poorer than other neighbouring countries in Asia. In recent reports by UNICEF and the Pakistan demographic and health survey (PDHS), the maternal mortality ratio was reported to be 276 per 100,000 live births [12]. This overwhelming early mortality and morbidity of a woman also affects the health of her children. Under-1 year mortality is 74, and neonatal mortality is 55 per 1000 live births [33]. It is estimated that annually 216,000 Pakistani newborns die before they reach their first month of age, which represents 58% of the total deaths of children under five [33]. These deaths are more prevalent in rural areas, particularly among poor families, as compared with urban areas. The maternal mortality in urban areas is 204, compared to overall 336 per 100,000 live births in Pakistan [12]. Similarly the neonatal mortality ratio (NMR) in urban areas is 41, compared with 68 per 1000 live births in rural areas [33]. NMR in the highest wealth quintile is 34, compared with 62 per 1000 live births in the lowest wealth quintile [33].

1.7. Health care infrastructure in Pakistan

Pakistan has an impressive infrastructure for primary health care with a network of basic health units (BHU) and rural health centres (RHC) [34] (Figure 1.4). While the RHCs and BHUs are staffed by qualified medical and nursing staff, health care at the community level is largely supported by a large number of trained cadres of lady health workers (LHW) and newly deployed community midwives (CMWs). Although CMWs are trained in the identification of complicated pregnancy and its management, very few have been deployed so far, and many districts do not have any CMWs. Also the services for basic or comprehensive emergency obstetric or newborn care at the level of BHUs and RHCs are questionable in terms of quality [33]. Similarly, there is very little emphasis in the current training program of LHWs as well as primary care lady health visitors and physicians in Emergency Obstetrics and Newborn Care (EmONC) services. The latter is important as available evidence indicates that despite impressive reduction in infant mortality rates in certain areas such as the northern areas, perinatal mortality still remains distressingly high [35]. According to PDHS 2006-07 for instance, NMR is high in Punjab (58 per 1000 live births) compared to 30 per 1000 live births in Baluchistan.

Figure 1.4: Health care infrastructure in Pakistan



Source: Ariff et al. 2010 [36].

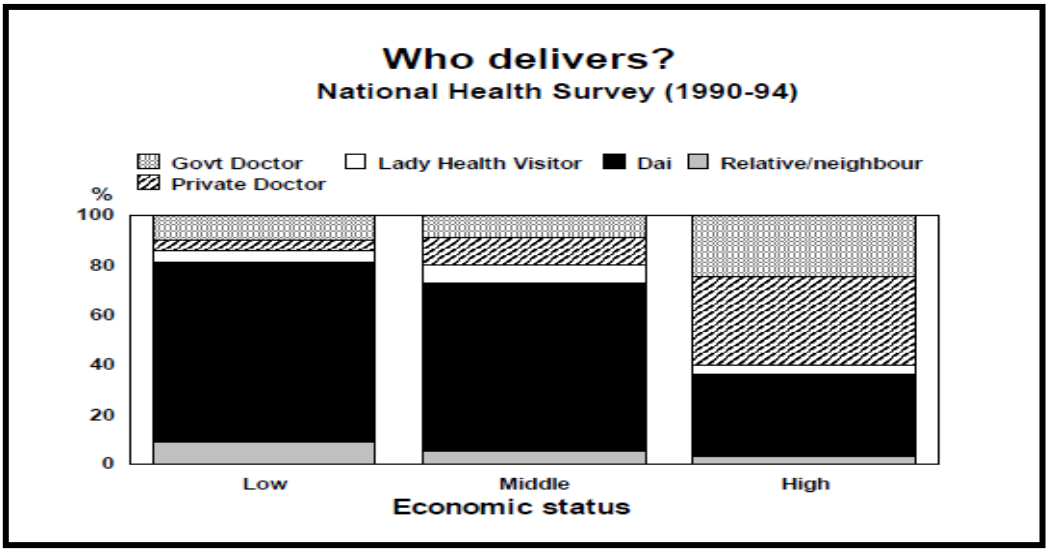
There is considerable potential for training LHWs and CMWs in Pakistan, in order to improve maternal and newborn care. Currently almost 102,000 LHWs are in the community, and while they are not directly involved in births, LHWs are supposed to function in close liaison with BHU and RHC staff in providing antenatal care, contraceptive advice, growth monitoring of children and immunization services.

A largely ignored cadre of primary care workers in Pakistan is the semi-trained and traditional birth attendants (TBAs). This large group of individuals is responsible for the vast majority of births in rural settings and a large proportion of births even in urban areas (Figure 1.5) (Box 1.1). The TBA (*Dai*) has been recognized as an important resource person in the quest for improving reproductive health delivery, both in relation to maternal as well as newborn care, particularly in those areas where no formal health care outreach services are available.

The Government of Pakistan has recently started investing in training and deploying community midwives in every district of Pakistan, with the aim of extending coverage by skilled birth attendants to 70% of home births and to address a huge gap of skilled birth attendance utilization at birth (the first batch of CMWs graduated from training in 2010).

Box 1.1: Primary Health Care Workers in Pakistan: their roles and responsibilities.	
PHC workers in Pakistan	Role and Responsibilities
Lady health workers[37] Over 110,000[38]	The primary role of LHWs is to provide PHC services to the communities in her catchment area and to organize community by developing women groups and health committees in her area. They have to look after a population of 1000 individuals in order to effectively involve them in family planning, primary health care and other related community development activities. In these meetings they discuss issues related to better health, hygiene, nutrition, sanitation and family planning and emphasize their benefits towards improved quality of life. They also act as a liaison between formal health system and the people and ensure coordinated support from NGOs and other departments.
Community Midwives	Management of pregnant women, mothers and infants under her care, identify abnormal conditions and refer such cases to the appropriate facility/specialist, after providing emergency first aid care to stabilize the condition of the patient.
Lady health visitors	Prevention of disease and promotion and maintenance of health, reducing morbidity and mortality of mother and children at BHUs and RHCs.

Figure 1.5: Who delivers?



Source: National Health Survey Pakistan 1998 [39].

CMWs are expected to be able to address issues critical and emergency situations such as complication during labour, birth asphyxia, prematurity related problems and neonatal infections. However, it is unclear how many have been trained and deployed in each district so far. In addition, it is too early to know whether, upon successful completion of training, the CMWs will be willing to serve in the rural areas and provide care at household level. India's experience, for example, has not been very encouraging. Bang and colleagues [40], report that a full-time paid cadre, called 'an auxiliary nurse-midwife', (one midwife covering five thousand population) created in the early 1990s all over India, was present only in 15% of home births. They suggest that a community health worker who is from the same village is more likely to attend home births. There is also evidence from

Sindh to indicate that TBAs can link satisfactorily with health system staff, especially with the LHWs [41].

1.8. What has been done so far in Pakistan?

There is a large body of global literature that has identified interventions to improve maternal and newborn health. While many proven, cost-effective ways to save the lives of mothers, and newborns exist, they are not always available to those who need them most. Poor people, who lag behind in accessing formal education, usually lack awareness on health issues, do not have the capacity to access health services and above all lack money to pay for services. Therefore, simple interventions that can target these circumstances have the potential to improve health status.

The Hala Perinatal Trial (both during the pilot and scale-up phase) [42, 43] in which an intervention package was delivered through community-based LHWs and TBAs, reported improvements in household care seeking behaviours with an overall 25-30% reduction in perinatal and neonatal mortality. The trial was associated with significant improvement in care seeking and skilled attendance in facility settings. A recent trial from Khuzdar, a rural part of Baluchistan, Pakistan, had similar findings and concluded that providing safe motherhood education increased the probability of pregnant women having prenatal care and utilization of health services for obstetric complications [44]. However, notwithstanding the observed improvements in skilled attendance, clear needs have been identified for further improvement in health care seeking and facility-based care, and demand creation for institutional care. These include creating linkages with health facilities through preparing community for building funds for emergency transportation.

1.9. What are the research and implementation gaps identified for this literature review?

The current large burden of maternal and neonatal mortalities, heavily concentrated in LMICs, is grave especially considering the existence of simple cost-effective, low-technology interventions. During the last decade a number of systematic reviews have been published which have assessed several interventions for improving maternal and newborn health [45-71]. These reviews have evaluated the role of individual antenatal, natal, postnatal and child health interventions and their potential role at improving morbidity and mortality. However, neonatal and child mortality in countries with highest mortalities

cannot be reduced without knowing which, among those interventions, are the most effective in reducing neonatal and child mortality. Therefore an overview of systematic reviews on interventions for reducing neonatal and child mortality is required to identify the most appropriate set of interventions which have a potential to save large numbers of lives annually.

Apart from direct provision of interventions, research has shown that interventions involving community mobilization and empowerment, and including counselling for mothers on topics related to birth and newborn care preparedness for bringing behaviour change can reduce total neonatal deaths by 16% and early neonatal deaths by 26% [72]. Improvement of women's access to antenatal, intrapartum and postnatal care with training cadres of community workers, and traditional birth attendant can reduce maternal morbidities by 25% and further improve total neonatal mortalities by 25% [72]. While the majority of maternal and neonatal deaths occur due to delays in health care seeking during illnesses and complication, it is important to identify strategies which can improve health care seeking for maternal and newborn health.

If we specifically talk about Pakistan, there is also a need to identify the health care seeking pathways of rural communities in Pakistan and to assess if emergency obstetric and neonatal care (EmONC) package can improve the accessibility of services when required. The role of EmONC package for improving health care seeking pathways has not been evaluated in Pakistan.

1.10. Research questions from this literature review to be addressed in this thesis

1. What are the interventions that reduce neonatal deaths and improve neonatal survival?
2. What are the strategies that can improve health care seeking behaviour for maternal and neonatal health and survival?
3. What factors impact health care seeking behaviours for maternal and neonatal health in rural communities of Pakistan?
4. What is the impact of Emergency Obstetric and Newborn Care (EmONC) package on improving health care seeking behaviour in maternal and neonatal health in rural community of Pakistan?

1.11. Aims and objectives for this thesis

1. To conduct an overview of systematic reviews of interventions for improving neonatal survival. (Chapter 2)
2. To conduct a systematic review to identify the strategies to improve maternal and newborn health care seeking in developing countries. (Chapter 3)
3. To conduct an in-depth analysis of maternal and neonatal health seeking patterns and behaviours in rural community of Pakistan. (Chapter 4)
4. To assess the effectiveness of EmONC package (community mobilization, training of CHWs to provide antenatal, natal and postnatal care services, and recognize and refer complicated pregnancy and childbirth cases and sick newborns to health facilities) on health care seeking behaviour in rural community of Pakistan. (Chapter 5)

Statement of Authorship

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Principal Author

Name of Principal Author (Candidate)	Zohra S Lassi		
Contribution to the Paper	ZSL conceptualised the review in consultation with other authors and wrote the first draft. Also contributed to the scientific literature search, screening, collection, and analysis of data for all the included interventions. Finalised the paper and is the overall guarantor.		
Overall percentage (%)	90%		
Signature		Date	June 30, 2015

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Philippa F Middleton		
Contribution to the Paper	PM contributed to the scientific literature search, screening, collection, and analysis of data for all the included interventions. PM finalised the paper with other authors.		
Signature		Date	June 30, 2015

Name of Co-Author	Caroline Crowther		
Contribution to the Paper	CC provided inputs to the first and successive drafts and finalised the paper.		
Signature		Date	June 30, 2015

Name of Co-Author	Zulfiqar A Bhutta		
Contribution to the Paper	ZAB provided inputs to the first and successive drafts and finalised the paper.		
Signature		Date	June 30, 2015

Please cut and paste additional co-author panels here as required.

Chapter 2: Overview of systematic reviews on interventions to improve neonatal and later survival

2.1. Abstract

Background: Evidence-based interventions and strategies are needed to improve child survival in countries with a high burden of neonatal and child mortality. An overview of systematic reviews can focus implementation on the most effective ways to increase child survival.

Methods: In this overview we included published Cochrane and other systematic reviews of experimental and observational studies on antenatal, childbirth, postnatal and child health interventions aiming to prevent perinatal/neonatal and child mortality using the WHO list of essential interventions. We assessed the methodological quality of the reviews using the AMSTAR criteria and assessed the quality of the outcomes using the GRADE approach. Based on the findings from GRADE criteria, interventions were summarized as effective, promising or ineffective.

Findings: The overview identified 148 Cochrane and other systematic reviews on 61 reproductive, maternal, newborn and child health interventions. Of these, only 57 reviews reported mortality outcomes. Using the GRADE approach, antenatal corticosteroids for preventing neonatal respiratory distress syndrome in preterm infants; early initiation of breastfeeding; hygienic cord care; kangaroo care for preterm infants; provision and promotion of use of insecticide treated bed nets (ITNs) for children; and vitamin A supplementation for infants from six months of age, were identified as clearly effective interventions for reducing neonatal, infant or child mortality. Antenatal care, tetanus immunization in pregnancy, prophylactic antimalarials during pregnancy, induction of labour for prolonged pregnancy, case management of neonatal sepsis, meningitis and pneumonia, prophylactic and therapeutic use of surfactant, continuous positive airway pressure for neonatal resuscitation, case management of childhood malaria and pneumonia, vitamin A as part of treatment for measles associated pneumonia for children above 6 months, and home visits across the continuum of care, were identified as promising interventions for reducing neonatal, infant, child or perinatal mortality.

Interpretation: Comprehensive adoption of the above six effective and 11 promising interventions can improve neonatal and child survival around the world. Choice of intervention and degree of implementation currently depends on resources available and policies in individual countries and geographical settings.

Funding: This review was part of my doctoral thesis that was funded by University of Adelaide, Australia.

2.2. Introduction

The global burden of neonatal and child mortality is alarmingly high in low and middle income countries (LMICs). There has been a sharp decline in mortality rates in children under five years of age between 1990 and 2013 (from 90 mortalities per 1,000 down to 46 mortalities per 1,000 live births between 1990 and 2013). This rate needs to further decrease, to just 30 mortalities per 1,000 live births, in order to meet the Millennium Development Goals (MDGs) 2015 target [73].

Despite all the progress made in the last decade, it is very unlikely that the MDG targets will be met in many LMICs, where 99% of global deaths occur [73]. In countries with a high burden of neonatal and child mortality, a variety of interventions could substantially reduce deaths and improve maternal and perinatal outcomes. Interventions and care primarily employed during different periods from antenatal to the later childhood period can facilitate reductions in neonatal and later mortality. However, a major obstacle in meeting the proposed reduction is that most neonatal and child health programs do not reach to those who need it the most. Therefore, effective interventions and care-based strategies need to be widely deployed to all and be delivered across the continuum of reproductive, maternal, neonatal and child health (RMNCH) care.

As we approach the deadline for the target of the MDGs and begin the journey towards achieving sustainable development goals (SDGs) we must focus efforts on programs and interventions shown to work. Several systematic reviews have evaluated the role of individual antenatal, natal, postnatal and child health interventions and their potential role at improving morbidity and mortality, however, there has been no overview on these interventions. Such an overview of systematic reviews of interventions to prevent neonatal and child mortality would facilitate the development of a definitive framework for preventing neonatal and child mortality in LMICs.

2.3. Methodology

In this overview of reviews, we have included all published Cochrane and the most recent (most latest on the given subject) other systematic reviews of randomized, non-randomized controlled trials of interventions and observational studies aiming to prevent perinatal (stillbirths + early neonatal mortality) or neonatal or child mortality (or stillbirths where either of these were not reported). We included interventions considered for improving

neonatal and child survival and provided during pre-pregnancy, antenatal, childbirth and postnatal periods to mothers or the infant or child included in a set of 61 most comprehensive RMNCH interventions reported as essential interventions for reproductive, maternal, newborn and child health by the World Health Organization (WHO) (Box 1.1) [74]. We considered reviews that included women of reproductive age, including pregnant women at any stage of gestation, their newborns and children up to five years of age. This overview considered reviews on interventions which were compared against no placebo or treatment or control group (unless otherwise indicated).

All available recent non-Cochrane and updated or most recent Cochrane systematic reviews were identified from the Cochrane Library and PubMed using the search strategy devised for each intervention separately during Nov 2012 to Jan 2013 (Appendix 1). The search terms were limited to title, abstract, or keywords. The methodology for data collection and analysis is based on the Cochrane Handbook of Systematic Reviews of Interventions [75]. The outcomes of interest for this overview of reviews were perinatal mortality, neonatal mortality, infant mortality and under-five mortality reported as primary or secondary outcomes in included reviews.

The protocol for this overview is registered with PROSPERO 2014: CRD42014007091 (http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42014007091#.U75a1RCLMiw). Two review authors (ZSL and PM) independently assessed the inclusion of all the potential systematic reviews and extracted information using a predefined form (intervention, comparison, mortality outcome, type of studies included - Characteristics of included reviews Appendix 2). Any disagreement was resolved through discussion or, where required, we consulted a third person. We addressed two different quality assessments in this overview: the quality of evidence in the included reviews (Table 2.1) using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach [76, 77] and the methodological quality of the systematic reviews using the 'assessment of multiple systematic reviews' (AMSTAR) measurement tool [78] (Appendix 3). We did not update individual reviews. Where reviews did not prepare and report mortality outcomes using GRADE-pro software [79], we formulated 'summary of findings' tables. The following criteria were taken into account to grade the evidence: study limitations (risk of bias for the outcome of interest), consistency of effect,

Box 2.1: List of interventions reviewed
Pre pregnancy interventions
Family planning
Prevention and management of sexually transmitted infections including HIV
Folic acid fortification and/or supplementation
Pregnancy interventions
Antenatal care
Iron and folic acid supplementation during pregnancy
Tetanus immunization in pregnancy
Prophylactic antimalarial and insecticide treated bednets for preventing malaria in pregnancy
Interventions for smoking cessation during pregnancy
Screening and treatment of syphilis
Prevention and management of HIV and prevention of mother to child transmission in pregnancy
Calcium supplementation in pregnancy
Low-dose aspirin for the prevention of pre-eclampsia
Use of antihypertensive drugs for treating severe hypertension in pregnancy
Prevention and treatment of eclampsia
Reduce mal presentation at term using external cephalic version (> 36 weeks)
Induction of labour for management of premature rupture of membranes at term.
Antibiotics for management of preterm rupture of membranes
Childbirth interventions
Corticosteroids for preventing neonatal respiratory distress syndrome
Management of unintended pregnancy
Social support during childbirth
Prophylactic antibiotic for caesarean-section
Prevention of postpartum haemorrhage: prophylactic uterotonic to prevent postpartum haemorrhage
Active management of third stage of labour to prevent postpartum haemorrhage
Induction of labour for prolonged pregnancy
C-section for absolute maternal indication (e.g. obstructed labour and central placenta previa)
Management of post-partum haemorrhage e.g. uterine massage, uterotonic
Postpartum interventions
Advice and provision of family planning
Prevent, measure and treat maternal anaemia
Detection and management of postpartum sepsis
Screening and initiation or continuation of ARV therapy for HIV
Neonatal interventions
Promotion and provision of thermal care for all newborns to prevent hypothermia
Promotion and support for early initiation and exclusive breastfeeding (within the first hour)
Promotion and provision of hygienic cord and skin care
Neonatal resuscitation with bag and mask for babies who do not breath at birth
Newborn immunization
Presumptive antibiotic therapy for the newborns at risk of bacterial infection
Case management of neonatal sepsis, meningitis and pneumonia
Kangaroo mother care for low birth babies
Extra support for feeding the small and preterm baby
Prophylactic and therapeutic use of surfactant to prevent respiratory distress syndrome in pre-term babies
Continuous positive airway pressure (CPAP) to manage pre-term babies with respiratory distress syndrome
Management of newborns with jaundice
Infant and child health interventions
Promotion and support for exclusive breastfeeding for 6 months
Continued breastfeeding up to 2 years and beyond
Appropriate complementary feeding starting at 6 months
Provision and promotion of use of insecticide treated bed nets for children
Case management of childhood malaria
Comprehensive care of children infected or exposed to HIV infection
Promote and provide routine immunization plus *H. Influenza*, meningococcal, pneumococcal, and rotavirus vaccines
Vitamin A supplementation from 6 months of age in Vitamin A deficient populations
Management of severe acute malnutrition
Case management of childhood pneumonia
Vitamin A as part of treatment for measles-associated pneumonia for children above 6 months
Vitamin A as part of treatment for non-measles-associated pneumonia for children above 6 months
Case management of diarrhoea: Acute watery diarrhoea
Dysentery
Cross cutting intervention
Home visits across the continuum of care women's groups

Table 2.1: Grading analysis of mortality outcomes from included reviews

Intervention	Comparison	Outcomes	Study design	ROB	Inconsistency	Indirectness	Imprecision	Other consideration	Overall quality
Pre-pregnancy interventions									
Family planning	Less than 18 months of interval compared to 36-<60 months [45]	Neonatal mortality OR 1.49 (95% CI: 0.93, 2.37) 5 studies, n=19240	Observational	Serious	Serious	Serious	Serious	Dose response relationship	Low ⊕⊕⊖⊖
	>60 months compared to 36-60 months of interval [45]	Neonatal mortality OR 1.01 (95% CI: 0.68, 1.49) 5 studies, n=19240	Observational	Serious	Serious	Serious	Serious	Dose response relationship	Low ⊕⊕⊖⊖
Folic acid supplementation	Folic acid versus placebo [46]	**Neonatal mortality** **RR 0.43 (95% CI: 0.27, 0.67)** **1 study, n=360994**	Before/after study	Not Serious	Very serious	Very serious	Not serious	-	Very Low ⊕⊖⊖⊖
		Perinatal mortality **RR 0.34 (95% CI: 0.25, 0.47)** **1 study, n=321,711**	Before/after study	Not Serious	Not serious	Very serious	Not serious	-	Low ⊕⊕⊖⊖
	Folic acid versus no treatment/other micronutrients/placebo [47]	Stillbirths RR 0.96 (95% CI: 0.51, 1.83) 4 studies, n=5994	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
	Folic acid alone versus no treatment/placebo [47]	Stillbirths RR 0.13 (95% CI: 0.01, 2.46) 1 study, n=188	Experimental	Not Serious	Not serious	Very serious	Serious	-	Very Low ⊕⊖⊖⊖
Pregnancy interventions									
Antenatal care	Reduced number of antenatal care visits/goal oriented versus standard antenatal care visits [48]	Perinatal mortality RR 1.14 (95% CI: 1.00, 1.31) 5 studies, n=108002	Experimental	Serious	Not serious	Not serious	Not serious	Certain confoundin g factors	Moderate ⊕⊕⊕⊖
Iron and folic acid supplementation	Folic acid versus no folic acid [49]	Stillbirths/neonatal mortality RR 1.33 (95% CI: 0.96, 1.85) 3 studies, n=3110	Experimental	Very Serious	serious	Not serious	Not serious	Certain confoundin g factors	Very Low ⊕⊖⊖⊖
	Supplements containing iron versus same supplements without iron/no iron or placebo [80]	Neonatal mortality RR 0.90 (95% CI: 0.68, 1.19) 4 studies, n=7465	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Tetanus immunization in pregnancy	TT versus influenza vaccine [50]	Neonatal mortality RR 0.12 (95% CI: 0.00, 7.88) 1 study , n=1182	Experimental	Not Serious	Very serious	Very serious	Not serious	-	Very Low ⊕⊖⊖⊖
	Tetanus-diphtheria toxoid vs with cholera toxoid [50]	**Neonatal mortality** **RR 0.68 (95% CI 0.56, 0.82)** **1 study**	Experimental	Not Serious	Very serious	Very serious	Not serious	-	Very Low ⊕⊖⊖⊖

Intervention	Comparison	Outcomes	Study design	ROB	Inconsistency	Indirectness	Imprecision	Other consideration	Overall quality
	TT immunization versus none [51]	**Neonatal mortality from tetanus RR 0.06 (95% CI: 0.02, 0.20) 2 studies, n=2146**	Experimental and observational	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Antimalarials during Pregnancy	Any antimalarial drug versus no drug [81]	Stillbirth RR 1.01 (95% CI: 0.79, 1.28) 7 studies, n= 9833	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
		Perinatal mortality RR 0.99 (95% CI: 0.81, 1.22) 6 studies, n= 6836	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
		Neonatal mortality RR 0.93 (95% CI: 0.76, 1.14) 9 studies, n= 10,486	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
	IPTp versus none [52]	Neonatal mortality RR 0.62 (95% CI: 0.37, 1.05) 2 studies, n=2091	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		Perinatal mortality RR 0.83 (95% CI: 0.52, 1.20) 1 study, n=904	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Provision and promotion of ITNs	ITNs versus none [82]	**Fetal loss (miscarriage/stillbirth) RR 0.68 (95% CI: 0.48, 0.89) 3 studies, n=4457**	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
	ITNs versus none [53]	**Fetal loss (miscarriage/stillbirth) RR 0.68 (95% CI: 0.48, 0.98) 5 studies**	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Smoking cessation during pregnancy	Nicotine replacement therapy versus control [54]	Neonatal mortality RR 0.28 (95% CI: 0.06, 1.41) 3 studies, n=1386	Experimental	Not Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
	Smoking cessation interventions: counselling vs usual care [83]	Perinatal mortality RR 1.10 (95% CI: 0.52, 2.31) 1 study, n=935	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
		Stillbirths RR 1.08 (95% CI: 0.51, 2.30) 4 studies, n=2212	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
		Neonatal mortality 2.06 (95% CI: 0.61, 6.92) 3 studies, n=2095	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
Calcium supplementation	Calcium supplementation versus none [55]	Perinatal mortality RR 0.86 (95% CI: 0.70, 1.07) 4 studies, n=333	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖

Intervention	Comparison	Outcomes	Study design	ROB	Inconsistency	Indirectness	Imprecision	Other consideration	Overall quality
	Calcium supplementation versus none [56]	5 Stillbirth or death before discharge from hospital RR 0.90 (95% CI: 0.74, 1.09) 11 studies, n=15665	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
Prevention and treatment of eclampsia	Magnesium sulphate versus phenytoin [57]	Neonatal mortality RR 0.95 (95% CI: 0.59, 1.53) 2 studies, n=665	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
	Magnesium sulphate verses none or other	Neonatal mortality RR 1.16 (95% CI: 0.94, 1.42) 1 study, n= 8260 [84]	Experimental	Not Serious	Very serious	Very serious	Not serious	-	Very Low ⊕⊖⊖⊖
		Perinatal mortality RR 0.98 (95% CI: 0.88, 1.10) 2 studies, n=1079 [55]	Experimental	Not Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
	Magnesium sulphate versus lytic cocktail [85]	Neonatal mortality RR 0.37 (95% CI: 0.14, 1.00) 2 studies, n =153	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
	Magnesium sulphate versus diazepam [58]	Neonatal mortality RR 1.18 (95% CI: 0.75, 1.84) 4 studies, n=759	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
		Stillbirths RR 0.97 (95% CI: 0.70, 1.34) 5 studies, n=799	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
External cephalic version	Tocolytic drugs vs placebo [86]	Perinatal mortality RR 0.0 (95% CI: 0.0, 0.0) 1 study, n=310	Experimental	Not Serious	Very serious	Very serious	Serious	-	Very Low ⊕⊖⊖⊖
	Planned caesarean section for term breech presentation [87]	**Perinatal/neonatal death or severe neonatal morbidity RR 0.33 (95% CI: 0.19, 0.56) 1 study, n=2078**	Experimental	Not Serious	Very serious	Very serious	Not serious	-	Very Low ⊕⊖⊖⊖
	External cephalic version at term [88]	Perinatal death RR 0.34 (95% CI: 0.05, 2.12) 6 studies, n=1053	Experimental	Serious	serious	Not serious	Not Serious	-	Low ⊕⊕⊖⊖
	External cephalic version before term versus no ECV [59]	Perinatal mortality RR 0.35 (95% CI: 0.04, 3.22) 1 study, n=102	Experimental	Not Serious	Very serious	Very serious	Serious	-	Very Low ⊕⊖⊖⊖
Induction of labour for PROM	Any planned versus expectant management [89]	Perinatal mortality RR 0.98 (95% CI: 0.41, 2.36) 7 studies, n=692	Experimental	Serious	serious	Not serious	Not Serious	-	Low ⊕⊕⊖⊖
		Neonatal mortality RR 1.59 (95% CI: 0.61, 4.16) 7 studies, n=692	Experimental	Serious	serious	Not serious	Not Serious	-	Low ⊕⊕⊖⊖

Intervention	Comparison	Outcomes	Study design	ROB	Inconsistency	Indirectness	Imprecision	Other consideration	Overall quality
Antibiotic for PROM	Any antibiotic versus placebo	Perinatal mortality /death before discharge RR 0.93 (95% CI: 0.76, 1.14) 12 studies, n=6301 [90]	Experimental	Serious	serious	Not serious	Not Serious	-	Low ⊕⊕⊖⊖
		Neonatal mortality RR 0.90 (95% CI: 0.72, 1.12) 15 trials, n=4269 [60]	Experimental	Serious	serious	Not serious	Not Serious	-	Low ⊕⊕⊖⊖
Childbirth interventions									
Corticosteroid for prevention of neonatal RDS	Dexamethasone versus betamethasone [61]	Perinatal mortality RR 1.41 (95% CI: 0.54, 3.67) 4 studies, n=596	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
	Antenatal steroids [62]	**Neonatal mortality** All countries **RR 0.69 (95% CI: 0.58, 0.81)** **18 studies, n= 3956** Subset of middle income countries **RR 0.47 (95% CI: 0.35, 0.64)** **4 studies, n=672**	Experimental	Not Serious	Not serious	Not serious	Not serious	-	High ⊕⊕⊕⊕
	Corticosteroids versus placebo or no treatment [63]	**Neonatal mortality** **RR 0.69(95% CI: 0.58, 0.81)** **18 studies, n=3956**	Experimental	Not serious	Not serious	Not serious	Not serious	-	High ⊕⊕⊕⊕
Active management for third stage of labour	Early versus late cord clamping [91]	Neonatal mortality RR 0.37 (95% CI: 0.04, 3.41) 2 studies, n=381	Experimental	Serious	Not serious	Not serious	Serious	-	Moderate ⊕⊕⊕⊖
Induction of labour for prolonged pregnancy	Labour induction versus expectant management by cervical status	**Perinatal mortality** **RR 0.31 (95% CI: 0.12, 0.81)** **17 studies, n=7407** [64]	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		Stillbirth RR 0.30 (95% CI: 0.08, 1.08) 17 studies, n=7407 [64]	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		Newborn death within 7 days RR 0.37 (95% CI: 0.10, 1.38) 17 studies, n=7407 [64]	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		Perinatal mortality **RR 0.31 (95% CI: 0.11, 0.88)** **14 studies, n=6597** [92]	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		Stillbirths RR 0.29 (95% CI: 0.06, 1.38) 14 studies, n=6597 [92]	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Newborn interventions									
Thermal care for all newborns	Plastic wrap versus routine care [67]	Death within hospital stay RR 0.66 (95% CI: 0.35, 1.24) 4 studies, n=266	Experimental	Serious	Not serious	Not serious	serious	-	Low ⊕⊕⊖⊖

Intervention	Comparison	Outcomes	Study design	ROB	Inconsistency	Indirectness	Imprecision	Other consideration	Overall quality
	Plastic cap versus routine care [67]	Death within hospital stay RR 1.5 (95% CI: 0.27, 8.38) 1 study, n=64	Experimental	Serious	Not serious	Not serious	serious	-	Low ⊕⊕⊖⊖
Early initiation of breastfeeding	Early versus none [93]	**Neonatal mortality** **RR 0.56 (95% CI: 0.40, 0.79)** **3 studies, n=44249**	Observational	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Hygienic cord care	Cord care versus none/standard [94]	**Neonatal mortality** **RR 0.77 (95% CI: 0.63, 0.94)** **3 studies, n=54651**	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
	Cord care versus none/standard [95]	**Neonatal mortality** **RR 0.77 (95% CI: 0.63, 0.94)** **3 studies, n=54651**	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
	Washing cord vs. dry/placebo [95]	Neonatal mortality RR 1.00 (95% CI: 0.76, 1.32) 1 study, n=10189	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Neonatal resuscitation with bag and mask	Training on resuscitation [96]	**Deaths among babies "not breathing at birth"** **RR 0.70 (95% CI: 0.59, 0.84)** **3 studies, n=197061**	Before/after studies	Serious	Not serious	Not serious	serious	-	Low ⊕⊕⊖⊖
Presumptive antibiotic therapy	Prophylactic versus selective antibiotics [97]	Neonatal mortality Risk Ratio: Non estimable 2 studies, n=116	Experimental	Not Serious	Not serious	Not serious	Very Serious	-	Very Low ⊕⊖⊖⊖
Case management of neonatal sepsis, meningitis and pneumonia	Community-based management versus none	**All-cause neonatal mortality** **RR 0.73 (95% CI: 0.65, 0.82)** [98]	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		Pneumonia-specific mortality, **RR 0.58 (95% CI: 0.43, 0.78)** [98]	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		All-cause mortality **RR 0.75 (95% CI: 0.64, 0.89)** [68]	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		Pneumonia specific mortality **RR 0.58 (95% CI: 0.41- 0.82)** **4 studies, n=11080** [68]	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Kangaroo mother care for preterm	KMC versus conventional neonatal care [99]	**Mortality at latest follow-up** **RR 0.67; 95% CI: 0.48, 0.95)** **11 studies, n=2167**	Experimental	Serious	Not serious	Not serious	Not serious		Moderate ⊕⊕⊕⊖

Intervention	Comparison	Outcomes	Study design	ROB	Inconsistency	Indirectness	Imprecision	Other consideration	Overall quality
	KMC versus none/standard [100]	**Neonatal mortality RR 0.49 (955 CI: 0.29, 0.82) 3 studies, n=1075**	Experimental	Not Serious	Not serious	Not serious	Not serious	-	High ⊕⊕⊕⊕
Prophylactic and therapeutic use of surfactant	Synthetic surfactant vs placebo [101]	**Mortality RR 0.73 (95% CI: 0.61, 0.98) 6 studies, n=2352**	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
	Multiple vs single dose surfactant for severe RDS [69]	**Mortality RR 0.59 (95% CI: 0.44, 0.78) 3 studies, n=1220**	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
	Early vs delayed selective surfactant treatment [102]	**Neonatal mortality RR 0.84 (95% CI: 0.74, 0.95) 6 studies, n=3577**	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Continuous positive airway pressure (CPAP)	HFPPV vs CMV [103]	Mortality RR 0.80 (95% CI: 0.62, 1.03) 3 studies, n=585	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
	CDP vs standard care [70]	**Mortality RR 0.52 (95% CI: 0.32, 0.87) 6 studies, n=355**	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
	Prophylactic CPAP vs. control [104]	Neonatal mortality RR 1.29 (95% CI: 0.45, 3.67) 2 studies, n=312	Experimental	Serious	Not serious	Not serious	Serious	-	Low ⊕⊕⊖⊖
Infancy and child health interventions									
Provision and promotion of use of ITNs for children	ITNs versus all controls [105]	**Child mortality from all causes RR 0.82 (95% CI: 0.76, 0.89) 5 studies, n= 149221**	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Case management of childhood malaria	Case management of malaria versus placebo [71]	**Malaria mortality in children 1-23 months RR 0.01 (95% CI: 0.00, 0.06)**	Observational	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		Malaria mortality in children 24-59 months RR 0.03 (95% CI: 0.01, 0.14)	Observational	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
	IPTc versus placebo or no IPTc [106]	Death from any cause RR 0.66 (95% CI: 0.31, 1.39) 6 studies, n=9533	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Comprehensive care of children infected or exposed to HIV infection	Cotrimoxazole versus control [107]	**Mortality RR 0.67 (95% CI: 0.53, 0.85) 1 study, n=534**	Experimental	Not Serious	Very serious	Very serious	Not serious	-	Very Low ⊕⊖⊖⊖
Vitamin A supplementation from 6 months of age	Vitamin A versus no treatment [108]	**Mortality (all-cause) RR 0.76 (95% CI: 0.69, 0.83) 17 studies, n=194795**	Experimental	Not Serious	Not serious	Not serious	Not serious	-	High ⊕⊕⊕⊕

Intervention	Comparison	Outcomes	Study design	ROB	Inconsistency	Indirectness	Imprecision	Other consideration	Overall quality
Case management of childhood pneumonia	Case management versus standard	**Acute Lower Respiratory Infections (ALRI) mortality RR 0.65 (95% CI: 0.52, 0.82) 9 studies** [109]	Concurrent Before/after	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		All-cause mortality RR 0.79 (95% CI: 0.70, 0.82) 9 studies [109]	Concurrent Before/after	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		ALRI specific mortality RR 0.65 (95% CI: 0.52, 0.82) [110]	Experimental and before/after	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		pneumonia specific mortality RR 0.68 (95% CI: 0.53, 0.86) 11 studies [110]	Experimental and before/after	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
Vitamin A as part of treatment for measles-associated pneumonia for children above 6 months	Vitamin A versus control [65]	**Overall mortality OR 0.70 (95% CI: 0.56, 0.87) 8 studies, n=135609**	Experimental	Serious	serious	Not serious	Serious	-	Moderate ⊕⊕⊕⊖
Vitamin A as part of treatment for non-measles-associated pneumonia for children above 6 months	Vitamin A versus control [111]	Mortality during hospitalisation OR 1.29 (95% CI: 0.63, 2.66) 3 studies, n=1446	Experimental	Serious	Not serious	Not serious	serious	-	Low ⊕⊕⊖⊖
Case management of diarrhoea	Preventive zinc supplementation [66]	All-cause mortality RR 0.91 (95% CI: 0.82, 1.01) 10 studies	Experimental	Serious	Serious	Not serious	Not Serious	-	Low ⊕⊕⊖⊖
Home visits across the continuum of care women's groups	Community-based intervention versus control	**Neonatal mortality RR 0.78 (95% CI: 0.67, 0.92) 5 studies, n=56878** [112]	Experimental	Not serious	Serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		Perinatal mortality RR 0.72 (95% CI: 0.61, 0.85) 3 studies, n=45835 [112]		Not serious	Serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		Stillbirths RR 0.73 (95% CI: 0.67, 0.81) 3 studies, n=45835 [112]		Not serious	Serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖
		Neonatal mortality RR 0.62 (95% CI: 0.44 0.87) 5 studies [113]	Experimental	Serious	Not serious	Not serious	Not serious	-	Moderate ⊕⊕⊕⊖

imprecision, indirectness, and publication bias. We summarised the main results of the included reviews into following categories.

- **What works?**

  Effective interventions: indicating that the review found high quality evidence with the effect likely to be similar to research findings.

- **What might work?**

  Promising interventions (more evidence needed): indicating that the review found moderate quality evidence with the effect expected to be similar to research findings, but with a possibility that it will be substantially different in the future.

- **Insufficient evidence to make judgement**

  Ineffective or probably ineffective interventions: indicating that the review found low or very low quality evidence of effectiveness or lack of effectiveness for an intervention.

  For low quality of evidence, it is likely that the effect will be substantially different from research findings, but that these will indicate what might be expected.

  For very low quality of evidence, the anticipated effect is very uncertain and the research does not provide a reliable indication of what might be expected.

2.4. Funders and their role

This review was part of doctoral thesis which was funded by University of Adelaide, Australia. The funders had no role in the study design, study conduct, data analysis, data interpretation, or writing of the report. All authors take responsibility for the integrity and the accuracy of the data. The corresponding author had final responsibility to submit the report for publication.

2.5. Results

The overview included 61 reproductive (n = 3), maternal (pregnancy: n = 15; childbirth: n = 11; postpartum: n = 4), newborn (n = 12) and child (n = 16) health interventions to assess their impact on neonatal and child survival (Box 2.1). A total of 148 systematic reviews were identified for these 61 RMNCH interventions, of which 92 were Cochrane reviews, 55 were non-Cochrane reviews and one was a WHO guideline on management of unintended pregnancy. Of these 148 reviews, only 57 reviews reported mortality outcomes (Box 2.2). The majority of the reviews included were graded high on AMSTAR criteria.

Using the GRADE approach, we identified six interventions to be clearly effective in reducing neonatal, infant or child mortality (corticosteroids for preventing neonatal

respiratory distress syndrome in preterm infants; early initiation of breastfeeding; hygienic cord care; kangaroo care for preterm infants; provision and promotion of use of insecticide treated bed nets (ITNs) for children; and vitamin A supplementation for infants from six months of age).

Box 2.2: GRADE Interventions according to outcomes		
Mortality (neonatal or infant or child)		
What works	**What might work**	**Insufficient evidence**
Corticosteroid for prevention of neonatal respiratory distress syndrome **Early initiation of breastfeeding** **Hygienic cord care** **Kangaroo mother care for low birth weight babies** **Provision and promotion of use of insecticide treated bed nets for children** **Vitamin A supplementation from 6 months of age**	Tetanus immunization in pregnancy (tetanus toxoid vs. placebo) Prophylactic antimalarial during pregnancy Induction of labour for prolonged pregnancy **Case management of neonatal sepsis, meningitis and pneumonia** **Prophylactic and therapeutic use of surfactant** **Continuous positive airway pressure (CPAP)** Case management of childhood malaria **Case management of childhood pneumonia** vitamin A as part of treatment for measles associated pneumonia for children above 6 months **Home visits across the continuum of care women's groups**	Family planning **Periconceptional folic acid supplementation** Folic acid supplementation during pregnancy * Iron supplementation during pregnancy Tetanus immunization in pregnancy (TT vs. Diphtheria and Influenza) Smoking cessation during pregnancy Prevention and treatment of eclampsia Active management for third stage of labour Induction of labour for PROM Antibiotic for PROM Thermal care for all newborns **Neonatal resuscitation with bag and mask** Presumptive antibiotic therapy for newborns Case management of childhood malaria (Monthly sulfadoxine pyrimethamine (SP) compared to standard 2-dose SP) **Comprehensive care of children infected or exposed to HIV infection** Vitamin A as part of treatment for non-measles-associated pneumonia for children above 6 months Case management of diarrhoea
Perinatal mortality		
	Antenatal care Prophylactic antimalarial during pregnancy **Induction of labour for prolonged pregnancy** **Home visits across the continuum of care women's groups**	**Periconceptional folic acid supplementation vs. placebo** Smoking cessation during pregnancy Calcium supplementation Prevention and treatment of eclampsia (MgSO4 vs. none or other) External cephalic version Induction of labour for PROM Antibiotic for PROM** Corticosteroid for prevention of neonatal RDS (Dexamethasone versus betamethasone)
Stillbirths		
	Provision and promotion of ITNs*** Prophylactic antimalarial during pregnancy Induction of labour for prolonged pregnancy **Home visits across the continuum of care women's groups**	Periconceptional folic acid supplementation vs. no treatment/placebo Folic acid supplementation during pregnancy* Smoking cessation during pregnancy
*Stillbirths + neonatal mortality ** perinatal mortality or death before discharge ***fetal loss (miscarriage and stillbirths) Interventions in bold indicate that the outcomes estimates were statistically significant.		

We identified 11 promising interventions for reducing neonatal, infant, child or perinatal mortality (antenatal care; tetanus immunization in pregnancy; prophylactic antimalarial during pregnancy; induction of labour for prolonged pregnancy; case management of neonatal sepsis, meningitis and pneumonia; prophylactic and therapeutic use of surfactant; continuous positive airway pressure; case management of childhood malaria; case management of childhood pneumonia; vitamin A as part of treatment for measles associated pneumonia for children above 6 months; and home visits across the continuum of care) and a further four interventions were rated as promising for reducing stillbirths (prophylactic antimalarial during pregnancy; provision and promotion of ITNs during pregnancy; induction of labour for prolonged pregnancy; and home visits across the continuum of care). Eighteen interventions showed insufficient evidence of benefit in one or more of the mortality categories (Table 2.1).

2.5.1. Effective interventions

2.5.1.1. Corticosteroids for preventing neonatal respiratory distress syndrome (RDS)

This overview identified three reviews [61-63], of which two [62, 63] reviewed the impact of antenatal corticosteroids on the mother before anticipated preterm birth (with additional analysis for women in LMICs) [62]. Brownfoot and colleagues [61] assessed different corticosteroid regimens. Two reviews reported the impact of corticosteroids on neonatal mortality [62, 63]. Roberts and Dalziel pooled 18 trials on 3956 women at risk of preterm birth and found a 31% (Risk Ratio (RR) 0.69; 95% Confidence Interval (CI): 0.58, 0.81) reduction in neonatal mortality (high GRADE rating) in women who were given antenatal corticosteroids compared to women who were not given any corticosteroids or given placebo [63]. Mwansa-Kambafwile and colleagues [62] reported a 31% (RR 0.69; 95% CI: 0.58, 0.81) reduction (high GRADE rating) in preterm-specific mortality on pooling 18 trials on 3956 women mostly from high-income countries and 53% (RR 0.47; 95% CI: 0.35, 0.64) reduction in preterm-specific mortality on pooling a subset of four trials on 672 women from middle-income countries who were given antenatal corticosteroids.

2.5.1.2. Early initiation of breastfeeding

The overview identified six reviews [93, 112, 114-117] that reported the impact of different interventions on improving early initiation of breastfeeding. Lewin and colleagues [115], and Lassi and colleagues [112] assessed the impact of interventions delivered through lay health workers and in the form of packages, respectively, on

improving breastfeeding rates. These reviews reported reductions in mortality; however, reduction in deaths may have been achieved by other parts of the intervention package and therefore the reduction does not necessarily reflect the impact of a breastfeeding intervention alone. Dyson and colleagues [114], Imdad and colleagues [116], and Lumbiganon and colleagues [117] did not report outcomes on mortality. The review by Debes and colleagues [93] identified 18 studies, of which three prospective cohort studies (including 44,249 newborns) with moderate GRADE quality showed neonatal mortality was reduced by 44% (RR 0.56; 95% CI: 0.40, 0.79) with early initiation of breastfeeding (within less than 24 hours of birth).

2.5.1.3. Hygienic cord care

The overview identified two reviews, of which Zupan and colleagues assessed topical cord care [118] and the other two by Imdad and colleagues assessed chlorhexidine application alone and other application for cord care and included almost similar studies [94, 95]. The latter two reported neonatal mortality [94, 95]. Pooled analysis of three studies (n=54561) found a moderate GRADE quality and significant 23% (RR 0.77; 955 CI: 0.63, 0.94) reduction in neonatal mortality with the application of chlorhexidine when compared with no application to the umbilical cord (dry cord care) [94, 95]. However the Cochrane review by Imdad and colleagues also compared washing the cord with dry care, reporting no difference in all-cause mortality (RR 1.00; 95% CI: 0.76, 1.32, moderate GRADE quality) [95].

2.5.1.4. Kangaroo mother care for preterm infants

The overview identified two reviews [99, 100] that assessed the impact of kangaroo mother care (KMC) on preterm and low birth weight infants (<2000g) and reported mortality outcome. Pooled analysis of 11 studies from 2167 infants reported a significant 33% reduction in mortality (moderate GRADE quality) at the latest follow up (RR 0.67; 95% CI: 0.48, 0.95) [99]. The meta-analysis of three randomized controlled trials (RCTs) (n=1075) – a subset of those pooled in the latest Cochrane review[99] - that provided KMC to infants in the first week of life showed a significant 51% reduction in neonatal mortality (RR 0.49; 95% CI: 0.29, 0.82 – high GRADE quality) when compared to standard care.[100] This review also pooled three observational studies and found a similar beneficial impact on neonatal mortality (RR 0.68; 95% CI: 0.58, 0.79) [100].

2.5.1.5. Provision and promotion of use of ITNs for children

The overview identified one review that pooled five studies on 149,221 children and compared ITNs with control and found a significant 18% reduction in child mortality (RR 0.82; 95% CI: 0.76, 0.89 – moderate GRADE quality) [105].

2.5.1.6. Vitamin A supplementation from 6 completed months of age

The overview identified three reviews from the same review authors who assessed the impact of vitamin A supplementation from six months of age, and reported neonatal mortality [108, 119, 120]. In the latest of these, pooling of 17 trials including 194,795 children found that vitamin A supplementation is effective in reducing all-cause mortality by 24% (RR 0.76; 95% CI: 0.69, 0.83) when compared with no treatment or placebo [108]. The quality was high on GRADE analysis.

2.5.2. Promising interventions

2.5.2.1. Antenatal care

The overview identified two reviews [48, 121] assessing the impact of fewer than usual antenatal care visits. This review of five trials including 108,002 pregnant women identified that reduced number of antenatal care visits (ranged 4-9) was associated with 14% higher risk of perinatal mortality (RR 1.14; 95% CI: 1.00, 1.31) when compared with standard antenatal care visits (ranged 12-14+) [48], indicating that fewer antenatal visits than the standard number may be harmful. Another review, comparing group with standard antenatal care did not detect significant differences in perinatal mortality (RR 0.59; 95% CI: 0.22, 1.52; 2 trials, n=1315) [122].

2.5.2.2. Tetanus immunization in pregnancy

The overview identified two reviews on tetanus toxoid (TT) vaccination versus placebo: Demicheli and colleagues [50] compared TT vaccination with influenza and cholera vaccination, whereas Blencowe and colleagues [51] compared TT immunization with no immunization. The comparison of TT with influenza and cholera was judged as low quality and therefore included in “insufficient evidence interventions” section. The meta-analyses from Blencowe and colleagues [51] displayed a significant impact of TT immunization on reducing neonatal mortality when compared with no immunization (RR 0.06; 95% CI: 0.02, 0.20; two studies, n=2146). This review pooled two studies, of which one was an experimental trial and the other was an observational study.

2.5.2.3. Prophylactic antimalarials during pregnancy

The overview identified four reviews on prophylactic antimalarial and intermittent preventive treatment (IPT) in pregnancy [52, 81]. Two reviews reported outcomes on neonatal mortality and perinatal mortality [52, 81], whereas one reported stillbirths [81].

2.5.2.3.1. Neonatal mortality. Radeva-Petrova and colleagues assessed antimalarial drug prophylaxis (e.g. chloroquine given weekly) or IPT (typically sulfadoxine-pyrimethamine given two to three times during pregnancy) with no regular or routine antimalarial or comparator IPT and found a non-significant 7% reduction in neonatal and infant mortality (RR 0.93; 95% CI: 0.76, 1.14 – low GRADE quality) on pooling nine trials including 10,486 women in their first or second pregnancy [81]. The review by Eisele and colleagues compared IPT with control and found a non-significant 17% reduction in neonatal mortality (RR 0.83; 95% CI: 0.52, 1.20 – moderate GRADE quality) [52].

2.5.2.3.2. Perinatal mortality. Radeva-Petrova and colleagues pooled six trials on 6836 women in their first or second pregnancy and found a non-significant 1% reduction in perinatal mortality (RR 0.99; 95% CI: 0.81, 1.22 – low GRADE quality) [81]. Eisele and colleagues found a non-significant 17% reduction in perinatal mortality (RR 0.83; 95% CI: 0.52, 1.20 – moderate GRADE quality) [52].

4.2.3.3. Stillbirths. Radeva-Petrova and colleagues pooled seven trials on 9833 women in their first or second pregnancy and reported a non-significant increase in stillbirths (RR 1.01; 95% CI: 0.79, 1.28 – low GRADE quality) [81].

2.5.2.4. Provision and promotion of ITNs during pregnancy

The overview identified two reviews by Gamble and colleagues [53, 82] that studied the effect of ITN on pregnant women and reported moderate GRADE quality fetal loss. Pooled analysis of five trials reported a significant 32% reduction in fetal loss (miscarriage or stillbirths) (RR 0.68; 95% CI: 0.48, 0.98) [53]. A subset of those trials pooled in the Cochrane review reported a significant 32% reduction in fetal loss (miscarriage or stillbirths) (RR 0.68; 95% CI: 0.48, 0.89; three studies, n=4557) [82].

2.5.2.5. Induction of labour for prolonged pregnancy

The overview identified two reviews that evaluated the benefits and harms of a policy of labour induction at term or post-term compared with awaiting spontaneous labour or later induction of labour [64, 92]. Both of the reviews included almost the same set of studies

and reported outcomes on perinatal mortality and stillbirths [64, 92], while only Gulmezoglu and colleagues reported neonatal mortality [64].

2.5.2.5.1. Neonatal mortality. The meta-analysis by Gulmezoglu and colleagues found a moderate GRADE quality non-significant 63% (RR 0.37; 95% CI: 0.10, 1.38; 17 studies, n=7407) reduction in neonatal deaths within seven days when compared with labour induction at term or post-term with awaiting spontaneous labour or later induction of labour [64].

4.2.5.2. Perinatal mortality. The meta-analysis of 17 studies on 7407 women by Gulmezoglu and colleagues found a significant 69% (RR 0.31; 95% CI: 0.12, 0.81 – moderate GRADE quality) [64] and meta-analysis of 14 studies on 6597 women by Hussain and colleagues found a significant 69% (RR 0.31; 95% CI: 0.11, 0.88 – moderate GRADE) [92] reduction in perinatal mortality with induced labour at term or post-term.

2.5.2.5.3. Stillbirths. The meta-analysis of 17 studies on 7407 women by Gulmezoglu and colleagues found a non-significant 70% (RR 0.30; 95% CI: 0.08, 1.08 – moderate GRADE quality) [64] and meta-analysis of 14 studies on 6597 women by Hussain and colleagues found a 71% (RR 0.29; 95% CI: 0.06, 1.38 – moderate GRADE quality) [92] reduction in stillbirths.

2.5.2.6. Case management of neonatal sepsis, meningitis and pneumonia

The overview identified four reviews that assessed the impact of case management of diagnosed sepsis, meningitis and pneumonia among neonates [68, 98, 123, 124]. Among these, two reviews reported an impact on mortality which was moderate on GRADE quality [68, 98]. Case management of neonatal infectious diseases reported 27% (RR 0.73; 95% CI: 0.65, 0.82) [98] and 25% (RR 0.75, 95% CI: 0.64, 0.89; 4 studies) [68] reduction in all-cause mortality. Similarly, the reviews also reported reduction in pneumonia specific mortality by 42% (RR 0.58; 95% CI: 0.43, 0.78) [98] and (RR 0.58; 95% CI: 0.41, 0.82; 3 studies) [68].

2.5.2.7. Prophylactic and therapeutic use of surfactant

The overview identified three reviews on the impact of prophylactic and therapeutic use of surfactant and reported moderate quality GRADE outcomes on neonatal mortality [69, 101, 102]. Soll pooled six studies on 2352 newborns that compared synthetic surfactant with placebo and found a significant 27% reduction in neonatal mortality (RR 0.73; 95% CI: 0.61, 0.88) [101]. Soll and Ozek assessed the impact of multiple doses of surfactant with

single dose from three trials on 1220 newborns with severe RDS and found a significant 41% reduction in neonatal mortality (RR 0.59; 95% CI: 0.44, 0.78) [69]. Bahadue and Soll compared early versus delayed selective surfactant treatment for RDS from six studies (n=3577) and found a significant 16% reduction in neonatal mortality (RR 0.84; 95% CI: 0.74, 0.95) [102].

2.5.2.8. Continuous Positive Airway Pressure (CPAP)

The overview identified three reviews [70, 103, 104, 125], of which two reported mortality as an outcome [70, 103, 104]. Greenough 2008 compared high frequency positive pressure ventilation (HFPPV) with conventional ventilation (CMV) and reported a non-significant 20% reduction in neonatal mortality (RR 0.80; 95% CI: 0.62, 1.03; three studies, n=585 – moderate GRADE) [103]. Ho and colleagues compared continuous distending pressure (CDP) with standard care and found a significant 48% reduction in neonatal mortality (RR 0.52; 95% CI: 0.32, 0.87; six studies, n=355 – moderate GRADE) [70]. Subramaniam and colleagues, compared prophylactic CPAP with control and reported an increase in neonatal deaths with prophylactic use (RR 1.29; 95% CI: 0.45, 3.67 – low GRADE) [104].

2.5.2.9. Case management of childhood malaria

The overview identified four reviews [52, 71, 106], of which Thwing and colleagues reported a reduction in malaria mortality in children 1 to 23 months (RR 0.01; 95% CI: 0.00, 0.06) and in children 24 to 59 months of age (RR 0.03; 95% CI: 0.01, 0.14 – moderate GRADE quality) [71]. Meremikwu and colleagues compared IPT versus placebo or no IPT and reported a non-significant reduction in child mortality (RR 0.66; 95% CI: 0.31, 1.39; six studies, n=9533 – moderate GRADE quality) [106].

2.5.2.10. Case management of childhood pneumonia

The overview identified four reviews [109, 110, 124, 126], of which two reviews reported mortality as an outcome. Both of these reviews reported a significant reduction in acute lower respiratory tract infections (ALRI) specific mortality (RR 0.65; 95% CI: 0.52, 0.82; nine studies) [109]; (RR 0.65; 95% CI: 0.52, 0.82) [110] and all-cause mortality (RR 0.79; 95% CI: 0.70, 0.82; nine studies) [109]; (RR 0.68; 95% CI: 0.53, 0.86) [110] with case management of pneumonia when compared to standard or no care. The evidence was moderate quality on GRADE analysis.

2.5.2.11. Vitamin A as part of treatment for measles-associated pneumonia for children above 6 months

The overview identified two reviews [65, 127], of which one reported mortality [65]. This review pooled eight studies on 135,609 children and compared vitamin A supplementation with none for measles associated pneumonia and reported a significant 30% reduction in child mortality (RR 0.70; 95 CI: 0.56, 0.87 – moderate GRADE quality) [65].

2.5.2.12. Home visits across the continuum of care women's groups

The overview identified four reviews [112, 113, 128, 129]. Only two reviews [112, 113] assessed home visitation as part of delivery strategy. Both of these reviews reported outcome on neonatal mortality [112, 113], whereas only one reported outcomes on perinatal mortality and stillbirths [112].

2.5.2.12.1. Neonatal mortality. The review by Lassi and colleagues reported a 22% reduction in neonatal mortality (RR 0.78; 95% CI: 0.67, 0.92 – moderate GRADE quality) on pooling five studies on 56,878 participants [112]. On the other hand, Gogia 2010 pooled five studies and reported a 38% reduction in neonatal mortality (RR 0.62; 95% CI: 0.44, 0.87 – moderate GRADE quality) [113].

2.5.2.12.2. Perinatal mortality. The review by Lassi and colleagues pooled three studies on 45,835 participants and reported a 28% reduction in perinatal mortality (RR 0.72; 95% CI: 0.61, 0.85 – moderate GRADE quality) [112].

2.5.2.12.3. Stillbirths. The review by Lassi and colleagues pooled three studies on 45,835 participants and reported a 27% reduction in stillbirths (RR 0.73; 95% CI: 0.67, 0.81 – moderate GRADE quality) [112].

2.5.3. Ineffective or probably ineffective interventions

Panel 2 reports the list of interventions which were low or very low on GRADE quality and thus were categorized as interventions with insufficient evidence. Some of those interventions reported their impact on stillbirths, perinatal or neonatal mortality and those includes family planning [45], periconceptional folic acid supplementation [46, 47], folic acid supplementation during pregnancy [49, 80], smoking cessation during pregnancy [54, 83], calcium supplementation during pregnancy [55, 56], magnesium sulphate compared to phenytoin for prevention and management of pre-eclampsia [57, 58, 84, 85], external cephalic version [59, 86-88], induction of labour for PROM [89], antibiotics for PROM [60, 90], active management for third stage of labour [91], thermal care [67], neonatal

resuscitation with bad and mask [96], presumptive antibiotic therapy for newborn [97], comprehensive care of children infected or exposed to HIV infection [107], Vitamin A as part of treatment for non-measles-associated pneumonia for children above 6 months [111], and case management of diarrhoea [66].

2.6. Discussion

There have been many great successes in reducing neonatal mortality as part of the MDGs, however, the current rates are still too high since each year 2.9 million newborns do not live to their first month of life [130]. In order to accelerate the progress towards reaching the targets set for 2015, this overview aimed to identify key interventions for neonatal and later survival. Review of all the recent Cochrane and other reviews on pre-pregnancy, pregnancy, neonatal and child health interventions which have reported perinatal or neonatal and child mortality identified six highly effective and 11 promising interventions which are likely to improve health and survival among babies. During the past decade, notable advances have been made in reviewing the evidence base for newborn interventions [21, 22], especially in the context of essential interventions, packages of care and their interconnections [131].

The key effective interventions for improving the survival identified in this overview include antenatal corticosteroids for preventing neonatal RDS in preterm infants; early initiation of breastfeeding; hygienic cord care; KMC for preterm infants; provision and promotion of use of ITNs for children; and vitamin A supplementation for infants from six months of age. Among these, four are particularly effective for neonates, while two had clear implications for improving the survival among infants and children. Most of the interventions identified are very effective for premature infants, as deaths from preterm births complications are the leading cause for neonatal deaths [22]. Every year, an estimated 15 million babies are born preterm. Of these over one million die. The common cause of neonatal mortality is RDS which is related to prematurity. The incidence of mortality due to prematurity is highest in LMIC [132] where even moderately preterm babies strive for survival. Preventing deaths from preterm births, is therefore of the utmost importance. Administration of antenatal corticosteroids to women at risk of preterm birth can prevent deaths among babies related to RDS. This overview further suggests that the risk of deaths among those who are born too soon can be halved (50%) by encouraging

KMC which not only ensures skin-to-skin contact, but promotes breastfeeding and early recognition of danger signs and illnesses in newborns. Similarly, the benefits of breastfeeding have been well documented; with studies suggesting much greater benefits of early vs. late feeding [93]. Early initiation of breastfeeding can reduce neonatal deaths by 44%. At the same time hygienic cord care can further reduces mortality by 23%. For children under the age of five years, infections accounts for a large number of deaths. Prevention of malaria particularly in malaria endemic countries can ensure 18% reduction in mortality. Provision of vitamin A for children above 6 months of age, which decreases the susceptibility towards infection, can also improve survival and health.

Despite the clear evidence of these interventions, coverage is still low and therefore their impact to reduce mortality among newborns and children is very poor. The recent Lancet every newborn series [21, 22] has clearly highlighted that approximately three-quarters of deaths under five years can be averted if countries implement interventions at a coverage of 70-90% by 2025 [22]. Considering the example of TT immunization, it is quite evident that 60% increase in coverage in last 25 years has led to 90% reduction in tetanus mortality in babies [51]. However, the coverage for insecticide treated bed nets in 2011 is still low 35.3% (5.2%–75.5%) and countries should prioritize mechanisms to increase coverage [133]. Moreover, effective interventions such as hygienic cord care, which includes chlorhexidine cord cleansing, and adopting antenatal corticosteroids for preventing neonatal respiratory distress syndrome in preterm infants have very low coverage according to surveys with less than a third of women and neonates in need receiving them [134]. Therefore, integrating these interventions into existing neonatal and childhood programs whereby mothers may also receive interventions such TT immunization, ITNs and corticosteroids when at risk at the same time may be an effective way to increase coverage.

High coverage of available interventions by 2025 can prevent almost three-quarters of neonatal deaths, and can save around 2 million lives per year [21]. Interventions delivered in packages, especially for the care of small and ill neonates have the potential to save 1.9 million newborn infants [21]. Estimate suggests that available interventions can reduce neonatal deaths related to prematurity by 58%, intrapartum by 79% and infections by 84% among neonates [21]. Therefore, the implementation of the interventions identified in this overview will be of paramount importance for improving neonatal and child survival

especially in the countries with the highest burden of mortality. It is vital to understand that these interventions are central for LMIC where neonatal and child health indicators are still not up to a high standards and many lives are either lost or their quality compromised due to a dearth of simple and effective actions [135]. These interventions need to be deployed to all and promoted from the very outset, including the preconception period, which is vital to ensuring that women of child bearing age understand the importance of these interventions for their babies' health and survival.

A step forward to seeing improvements in annual reductions in neonatal mortality rates would be to pay more attention to the target group for the interventions; funding and resources may need to be reallocated to include stillbirth prevention which has received very little attention so far [136]. High fertility rates may also be adding to the problem. Care and resources in LMICs may be inadequate to cover already existing newborns; and increasing numbers of neonates will lead to strains on existing health care systems. Improved access to family planning, contraceptive methods, awareness and education will decrease the disparity and help efforts to achieve decreased neonatal mortality rates [21].

Community-based delivery strategies to increase access to needed care must be foremost to bringing about a positive change in the LMICs because appropriate education and awareness needs to precede interventions. Empowerment of women, removing barriers to accessibility to health care services, increased education and awareness in communities, and shifting the focus to evidence based interventions may help in adopting healthy practices among mothers and improve child survival rates [21]. Appropriate, culturally sensitive education and awareness provided to the communities, followed by timely implementation of discussed interventions which can be integrated with existing healthcare practices, will definitely bring the required improvement in child health and survival.

Several limitations do however need to be recognised. First, it is important to consider that many of the interventions assessed in this review demonstrated important reductions in morbidity but may have been underpowered to show differences in neonatal and later survival. Second, it is also important to be aware that some clearly effective interventions, such TT immunisation during pregnancy for reducing tetanus related mortality in neonates do not rate highly on GRADE, due to the study designs required to address this issue. Third, it is not possible to account for all the biases involved in the individual primary

studies during the conduct of an overview of systematic reviews, where only systematic reviews and not individual primary studies are included. In addition, the high level synthesis of an overview may not always capture important contextual factors, such as educational attainment, socio-economic status, and access to care.

2.7. Conclusion

The implementation of these interventions will help in achieving the targets set for MDGs 4 and 5. Adoption of effective interventions promises a much needed improvement in neonatal and child outcomes around the world, especially if selected depending on the clinical indications and keeping in mind the need for cost-effectiveness in view of the limited resources in LMICs.

Research in Context

The synthesis of findings from 148 reviews on interventions for mothers and babies showed that steroids for pregnant mothers at risk of delivering babies early, breastfeeding, cord care, kangaroo care for babies born early, treated bednets for children, and vitamin A for babies from six months of age, are effective interventions for improving survival among babies and children. Antenatal care, tetanus injection during pregnancy, drugs to prevent malaria during pregnancy, inducing labour during prolonged pregnancy, use of surfactant and resuscitation to improve breathing among babies, management of infections among babies and children, and home visits during pregnancy and postnatal period, are the promising interventions for their survival.

Statement of Authorship

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Principal Author

Name of Principal Author (Candidate)	Zohra S Lassi
Contribution to the Paper	ZSL conceptualised the review in consultation with other authors and wrote the first draft. Also contributed to the scientific literature search, screening, collection, and analysis of data for all the included interventions. Finalised the paper and is the overall guarantor.
Overall percentage (%)	100%
Signature	Date: September 03, 2015

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

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Chapter 3: Strategies on health care seeking for maternal and newborn health from low and middle income countries: systematic review

3.1. Abstract

Background: Lack of appropriate care seeking for ill mothers and neonates contributes to high mortality rates; therefore, a major challenge is the appropriate mix of strategies for demand creation as well as provision of services.

Methods: Systematic review and meta-analysis of experimental trials (last search: Jan 2015) to assess the impact of different strategies to improve maternal and neonatal health care seeking; and a systematic review of observational and qualitative studies to identify factors and barriers associated with delays in health care seeking.

Findings: Fifty seven experimental (randomized controlled trials (RCTs), non-RCTs and before after studies) with 310,652 participants and 151 observational and qualitative studies met the inclusion criteria. Meta-analysis from 29 RCTs with a range of different interventions (e.g. mobilization, home visitation) indicated significant improvement in health care seeking for neonatal illnesses when compared with standard/no care (RR 1.47; 95 CI: 1.24-1.75, 8 studies), whereas, no impact was seen on health care seeking for maternal illnesses (RR 1.06; 95% CI: 0.92-1.22, 5 studies).

Further analysis based on intensity of interventions suggested that care seeking for both maternal illnesses (RR 1.15; 95% CI: 1.11-1.20, 1 study) and sick newborn (RR 1.65; 95% CI: 1.46-1.86, 4 studies) improved when birth preparedness counselling was combined with recognition of illnesses and provision of referrals by community health workers.

Based on strategies employed for enhancing health care seeking, it was found that home visiting by CHWs alone had a significant impact on improving health care seeking for neonatal illnesses (RR 1.61; 95% CI: 1.43-1.81, 3 studies). The combination of home visitation with community mobilization was successful in improving health care seeking for both maternal (RR 1.15; 95% CI: 1.11-1.20, 1 study) and newborn illnesses (RR 1.71; 95% CI: 1.27-2.29, 1 study). These interventions also had a significant impact on reducing stillbirths (RR 0.82; 95% CI: 0.73-0.93, 11 studies), perinatal deaths (RR 0.84; 95% CI:

0.77-0.90, 15 studies) and neonatal mortality (RR 0.79; 95% CI: 0.71-0.89, 20 studies). On GRADE approach, evidence was high quality except for the outcome of maternal health care seeking, which was moderate. The review of observational and qualitative studies identified several social, cultural and health services related factors that contribute to delays in health care seeking.

Interpretation: Community-based interventions integrating strategies such as home visiting and counselling can help to reduce maternal and neonatal mortality. Values, belief systems and resource requirements are important considerations.

3.2. Introduction

Globally, deaths of mothers and newborn babies are far too high. Every year an estimated 289,000 mothers and 2.76 million newborns die globally [1, 2]. Complications during pregnancy and childbirth often lead to emergency situations, with a slim window of time to intervene. Maternal health complications contribute to 1.5 million early neonatal deaths and 1.4 million stillbirths, suggesting that there is a major gap requiring intervention around the time of birth and in the early postnatal period, a time when mothers and babies are most at risk [3].

The past decade has recorded an unmatched recent global commitment in the form of Millennium Development Goals (MDGs), and set ambitious targets for reducing maternal and under-five child mortality. However reductions in maternal and neonatal mortality have not met these goals [1, 2]. There are large inequities across and within regions and countries. With 99% of maternal, newborn, and child deaths occurring in low and middle income countries (LMICs), increasing health resources and appropriate intervention in these countries is an urgent priority and global responsibility for reducing the burden of maternal and child mortality [7, 8].

Delays in health care seeking have been associated with the majority of deaths among mothers and newborns; therefore, improvement in health care seeking can avoid millions of maternal and newborn deaths. Improved health care seeking includes any visit to health care workers for seeking advice to promote, prevent or manage illness. Antenatal care provides an opportunity to not only detect potential complications but also to prevent them. Birth preparedness – an easy to deliver and inexpensive intervention, on the other hand, can avert the brunt of maternal and perinatal mortalities. Birth preparedness is another effective strategy which is easy to deliver and inexpensive. It includes different interventions such as identifying skilled birth attendants (SBA), the closest appropriate health facility, and sometimes funds for emergency transportation and consultation, all of which can reduces delays in obtaining care. One of the major causes of deaths includes maternal haemorrhage, which contributes to 35% of maternal deaths, rapidly leads to death without intervention. With interventions like blood transfusions, oxytocics to prevent stop bleeding, and/or manual removal of the placenta by a SBA, severe bleeding can be averted in time to prevent mortality [8, 11]. Similarly, access to antenatal health visits and medicines can prevent maternal death from hypertensive disorders, while death due to

sepsis can be averted with hygienic infection control measures during birth provided by SBA and screening for prenatal maternal infection and sexually transmitted infections (STIs) through antenatal visits. Other direct causes of maternal deaths, including obstructed labour, complications of anaesthesia or caesarean section, and ectopic pregnancy, can be prevented with access to antenatal care, skilled birth attendance, and basic emergency obstetric care.

Worldwide 50 million births take place at home without a SBA [12]. Skilled attendance at birth remains particularly low in sub-Saharan Africa and southern Asia and there are further wide disparities within countries, across socio-economic status, geographic location, and educational status [13]. In sub-Saharan Africa, in more than half of home births women are alone, with no attendant. Similarly in South Asia, one third of the births take place without traditional birth attendants (TBAs) and the primary caregivers are mothers and their families. Furthermore, within developing regions, 67% and 34% of the urban and rural women respectively, receive the World Health Organization recommended four or more antenatal visits. In some African nations, only 1 in 4 infants are born in the presence of an attendant skilled in neonatal resuscitation with appropriate supplies [14].

Effective interventions to avert maternal mortalities in such scenarios can also prevent neonatal deaths. Decreasing coverage of skilled birth attendance correlates with higher neonatal mortality, with 77% of neonatal mortalities occurring where coverage of skilled birth attendance is 50% or low [14]. More hygienic births through skilled birth attendance (such as simple cleansing of the umbilical cord), and promotion of early and exclusive breastfeeding, can largely prevent infection. Furthermore, providing birth attendants with simple training and equipment (bag and mask) for neonatal resuscitation can reduce intrapartum-related neonatal deaths. Complications from preterm birth and low birth weight (LBW) take the largest toll on neonatal deaths, with more advanced care being required for those born before 33 weeks' gestation. Use of low cost interventions such as kangaroo mother care (KMC) can prevent over half of newborns weighing less than 2000 g [14, 16].

More investment in existing simple cost-effective, low-technology interventions needs to be made to save in the order of 6 million children, 2 million babies, and many of the quarter of a million maternal deaths each year [137]. During the last decade a number of

systematic reviews have been published which have assessed interventions for improving maternal and newborn health [49, 50, 52, 54, 55, 57, 58, 80, 83, 87]. However, none of these have specifically focused on strategies to improve maternal and newborn health care seeking, which is the aim of this review. This review has further assessed the barriers and enablers of health care seeking and their pathways for improving maternal and newborn health.

3.3. Methodology

All experimental, observational and qualitative studies from LMICs that assessed the health care seeking behaviour or pattern for maternal and newborn health care and illnesses were included. The population for this review included pregnant women at any gestation, postpartum women up to 6 weeks after giving birth and neonates less than 28 days of life were included. We included studies that provided range of different interventions (Box 3.3) through information and education for empowerment and change in the form of group meetings or individual one-to-one counselling at home or at primary health care facility and compared them with standard/no care. The primary outcomes assessed were health care seeking for maternal and newborn illnesses. The secondary outcomes included mortality such as maternal, neonatal, perinatal mortality, stillbirths, (Box 3.1), other care seeking outcomes such as antenatal care, institutional births and skilled birth attendance, and maternal and newborn care related outcomes such as early initiation of breastfeeding.

Box 3.1: definitions

- Neonatal death: death of a live born infant within 28 completed days of birth.
- Early neonatal death: deaths arising within 6 completed days of birth.
- Late neonatal death: deaths arising from 7 to 28 completed days of birth.
- Stillbirth: the International Classification of Diseases and Related Health Problems, 10th revision, defines fetal death as death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy.
- Perinatal death: a stillbirth or early neonatal death.
- Maternal death: death of a woman while pregnant or within 42 days of cessation of pregnancy from any cause related to the pregnancy or its management, but not from accidental causes

The protocol for this systematic review and meta-analysis has been registered with PROSPERO2012: CRD42012003236 (http://www.metaxis.com/prospero/full_doc.asp?RecordID=3236). This review was conducted in accordance with methods of the Cochrane Collaboration [138] MEDLINE, EMBASE, the Cochrane Library, and Google Scholar were searched up to January 16, 2013. An updated search was run on January 12, 2015 to look for RCTs only. Search terms were a combination of [('care seeking' OR 'care-seeking' OR 'health care' OR 'health care seeking' OR 'community based intervention*' OR

'community-based intervention*') AND (mother* OR maternal OR women OR newborn* OR neonat*)] used as medical subject headings and keyword terms in the title/abstract. No language restrictions were applied. Grey literature and reference lists of included studies were also searched to identify studies.

ZSL and PM independently reviewed the retrieved articles in two stages; first assessing relevance from the title and abstract and if relevance was still unclear, the full text was read. Any disagreement was referred to a third reviewer (CC and ZAB). Studies were analysed according to their study design i.e. randomized (and cluster) controlled trials (RCTs), non-randomized controlled trials (n-RCTs) and before-after studies. Factors responsible for health care seeking patterns for maternal and newborn health from observational studies and qualitative studies were separately analysed.

ZSL and PM extracted data independently from each included study. Study design, country of study, participants, intervention, comparison, and duration of intervention were recorded for each study. If information was missing, authors were contacted. The methodological quality of studies was evaluated using standardized forms. The quality of controlled trials was assessed according to Cochrane methods [139]. Prospective studies were graded using the methods described by the Effective Practice, Organization and Communication Cochrane review group (EPOC 2009) [140].

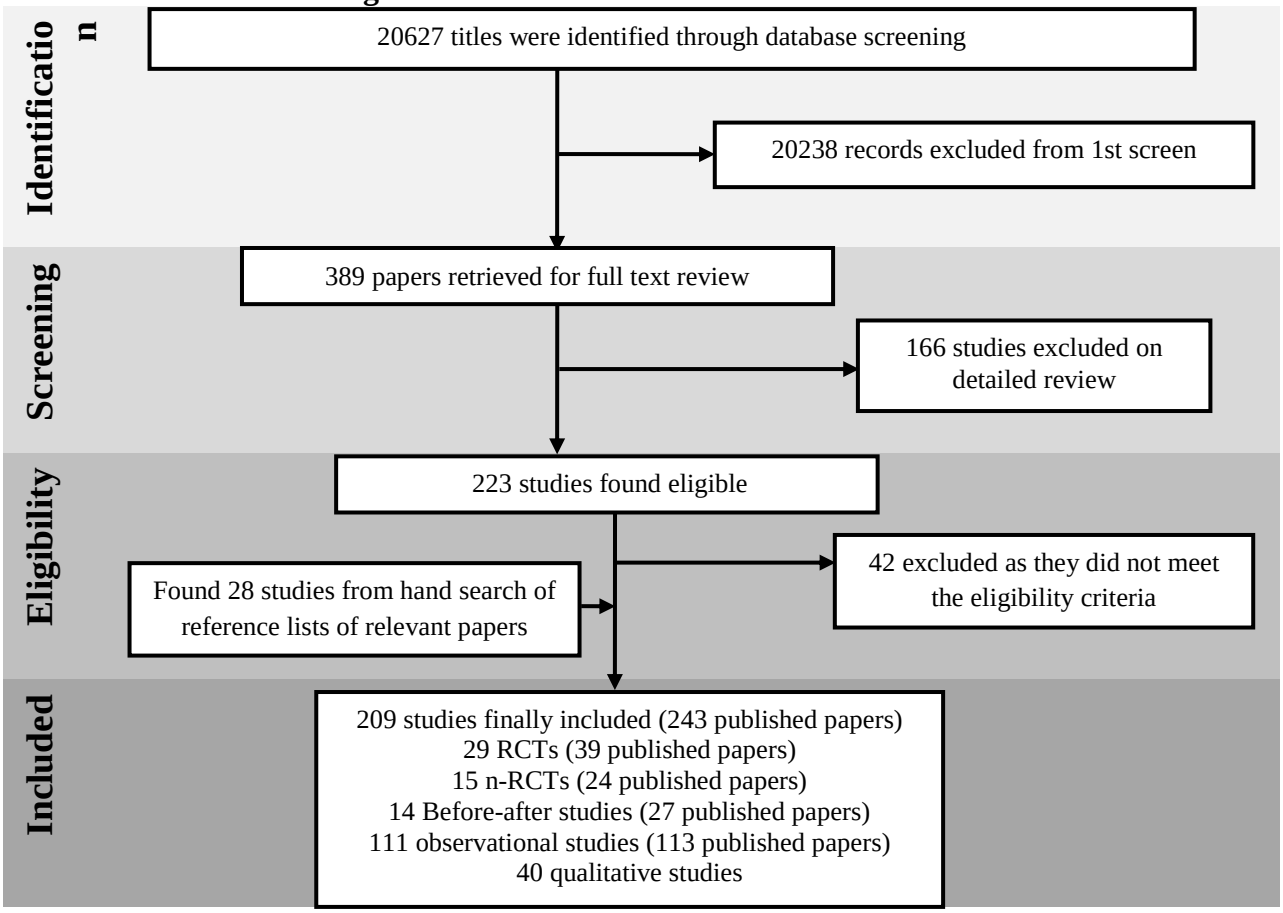
We performed statistical analysis of RCTs, non-RCTs and before-after studies using the Review Manager software [141]. For dichotomous data, we presented results as summary risk ratio (RR) and for continuous data we used mean difference (MD) with 95% confidence intervals (CIs). We included cluster-randomised trials in the analyses along with individually randomised trials and therefore their sample sizes were adjusted by the methods described in the Cochrane Handbook [75] using a design effect reported from the trial.

We have set out the mortality outcomes of the review in summary of findings tables prepared using the GRADE approach [77] using GRADE profiler software. For each of these outcomes, we assessed the quality of the evidence, considering within-study risk of bias (methodological quality), directness of evidence, heterogeneity, precision of effect

estimates and risk of publication bias. We have rated the quality of the body of evidence for each key outcome as "high", "moderate", "low" or "very low".

The level of attrition was noted for each study. Heterogeneity between trials was assessed using the I-squared statistic, P value of <0.1 (chi-square) and by visual inspection of forest plots. When high levels of heterogeneity between trials (I-squared exceeding 50%) were identified, further exploration was conducted by subgroup analysis and was tested by interaction tests. We applied random-effects meta-analysis as an overall summary when substantial methodological heterogeneity between and among the studies was found. A priori subgroup analyses were planned to identify the impact on health care seeking with different strategies (community mobilization, home visitation, combination of two, or perinatal health care/education), the extent of intervention (birth preparedness, birth preparedness and recognition and referrals, or birth preparedness, recognition and referrals and funds for emergency transportation). Potential publication bias was assessed using funnel plots [142]. From the observational and qualitative studies, factors responsible for health care seeking patterns for maternal and newborn health were analysed. Study design, country of study, setting, participants, and results were recorded for each study.

Box 3.2: Search Flow Diagram



3.4. Results

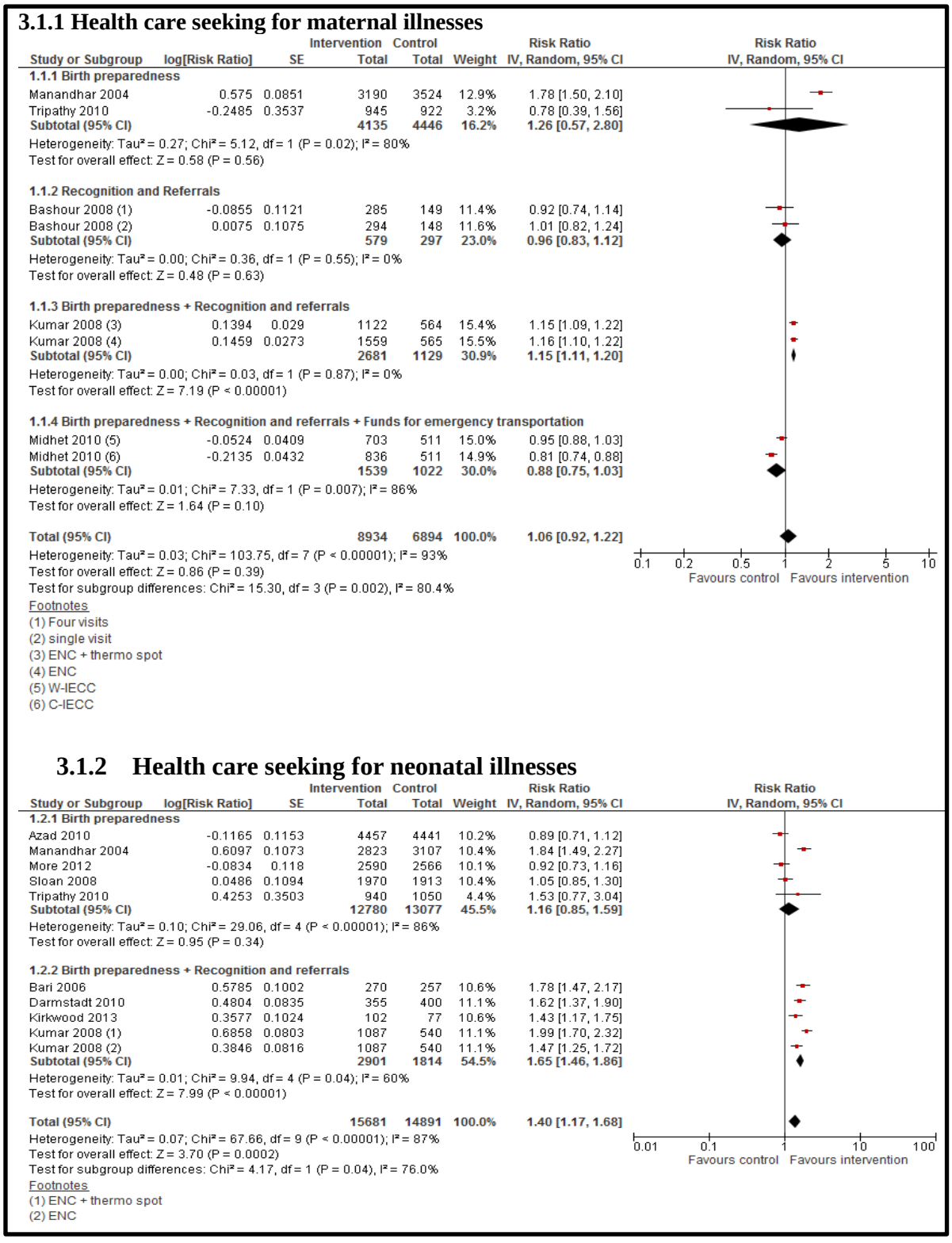
Our initial search yielded 20,627 articles, 389 of which had relevant titles and abstracts. After reading the full text of these, 223 appeared to meet our inclusion criteria (Box 3.2). Forty-two of these were excluded at the stage of data extraction (Figure 3.1). We found and analysed 208 original studies (243 published papers), of which 29 were RCTs, 15 were n-RCTs, 14 were before-after studies, 111 were observational studies and 40 were qualitative studies (characteristics of included studies – Annex 4, 5, 6, 7, 8).

A variety of different interventions and behaviours were assessed in the studies that met the eligibility criteria for inclusion (Box 3.3). These interventions and behaviours ranged from promoting routine antenatal care, institutional deliveries and early breastfeeding, to provision of clean delivery kits, and to training of community health workers (CHWs) or skilled birth attendants (SBA) and health care staff on birth preparedness and provision of maternal and newborn health interventions. In several included studies these interventions were provided in the form of packages of different strategies including community mobilization, home visitation or the combination of two.

Box 3.3. Types of different interventions provided in included studies

Antenatal interventions	Intrapartum interventions	Postnatal interventions	Others
• Promotion of routine antenatal care check-ups • Tetanus toxoid immunization • Nutritional counselling • Iron/folate supplementation • Maternal health education • Promotion of institutional deliveries • Promotion of clean delivery kits • Promotion of breastfeeding • Skin to skin care for newborns • Care for umbilical cord	• Provision of safe delivery kits • Clean delivery practices • Referrals for complications and emergencies	• Promotion of early and exclusive breastfeeding • Kangaroo mother care / thermoregulation • Newborn resuscitation • Case management of pneumonia • Recognition of neonatal danger signs • Referrals for sick newborn • Postnatal visitation	• TBA/ CHW training • Advocacy group meeting • Counselling and one to one session regarding birth preparedness and newborn care • Training staff at health facility • Provision of drugs and supplies at health facilities

Figure 3.1: Health care seeking for maternal and newborn illnesses: intensity of intervention



3.4.1. Primary outcomes: maternal and neonatal health care seeking

Meta-analysis from 27 RCTs (Table 3.1) with a range of different interventions (Box 3.3) indicated promising results in improved health care seeking for neonatal illnesses when

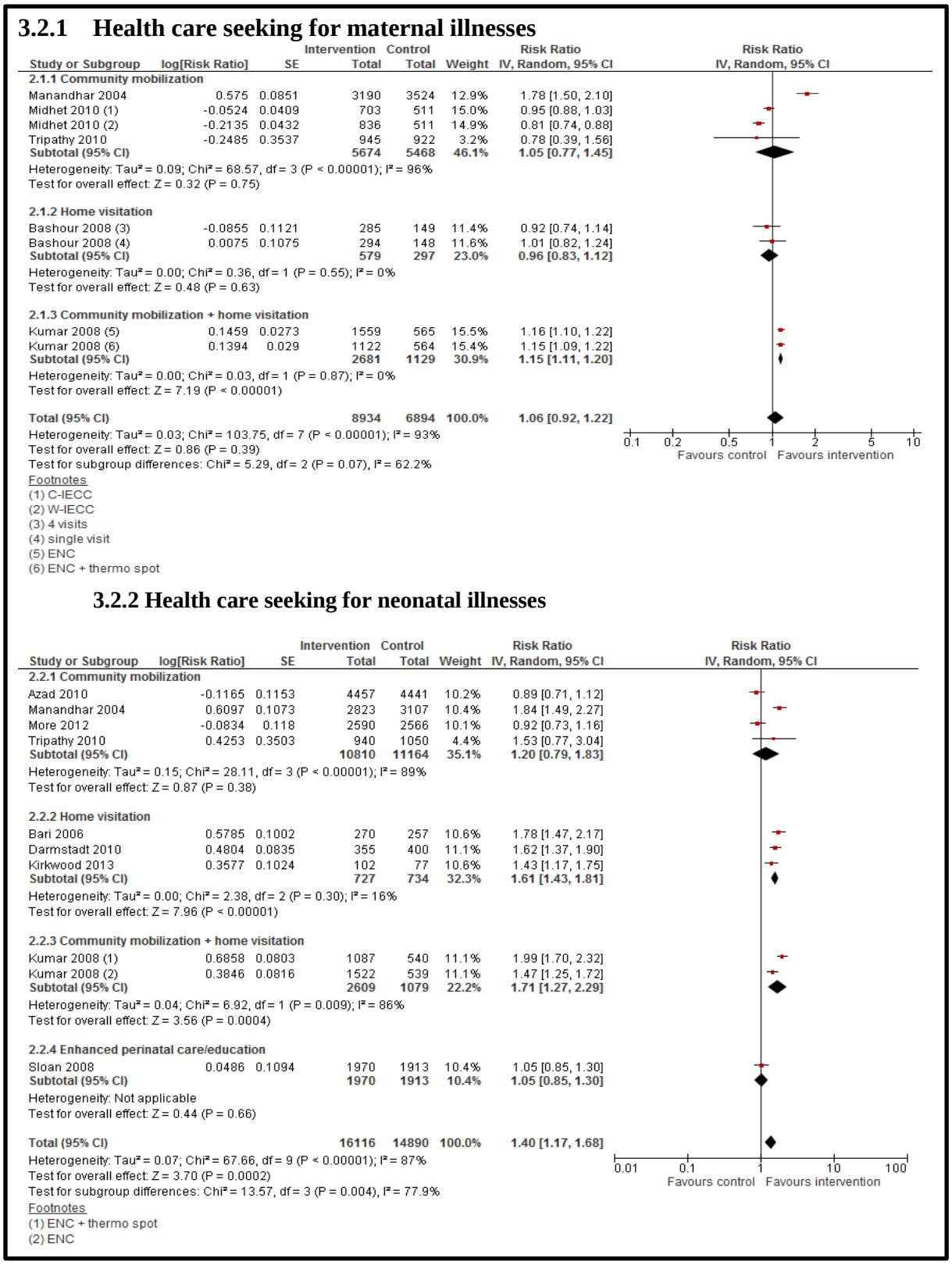
compared with standard/no care (RR 1.40; 95 CI: 1.17, 1.68; 9 studies, n=30572). However, no significant impact was seen in improving health care seeking for maternal illnesses (RR 1.06; 95% CI: 0.92, 1.22; 5 studies, n=15828). Heterogeneity was more than 85% for each of these primary outcomes.

Further analyses based on intensity of interventions suggested that health care seeking for both maternal (RR 1.15; 95% CI: 1.11, 1.20; 1 study, n=3810) and newborn (RR 1.65; 95% CI: 1.46, 1.86; 4 studies, n=4715) illnesses improved when birth preparedness counselling was combined with recognition of illnesses and provision of referrals by CHWs (Figure 3.1).

Table 3.1: Results from randomized controlled trials

Outcomes	Summary estimates	Number of studies and participants	Heterogeneity
Primary outcomes			
Health care seeking for maternal illnesses	RR 1.06; 95% CI: 0.92, 1.22	5 (n=15828)	Tau² 0.03; Chi² P <0.00001; I² 93%
Health care seeking for neonatal illnesses	RR 1.40; 95% CI: 1.17, 1.68	9 (n=31006)	Tau² 0.07; Chi² P <0.00001; I² 87%
Secondary outcomes			
Mortality outcomes			
Maternal mortality	RR 0.80; 95% CI: 0.65, 1.00	8 (n=114196)	Tau² 0.03; Chi² P 0.07; I² 30%
Neonatal mortality	RR 0.80; 95% CI: 0.72, 0.89	21 (n=248848)	Tau² 0.06; Chi² P <0.00001; I² 83%
Early neonatal mortality	RR 0.70; 95% CI: 0.61, 0.81	11 (n=113147)	Tau² 0.05; Chi² P <0.00001; I² 77%
Late neonatal mortality	RR 0.77; 95% CI: 0.64, 0.93	9 (n=108359)	Tau² 0.03; Chi² P 0.08; I² 42%
Stillbirths	RR 0.82; 95% CI: 0.74, 0.92	12 (n=176683)	Tau² 0.03; Chi² P 0.0002; I² 68%
Perinatal mortality	RR 0.84; 95% CI: 0.78, 0.90	16 (n=279618)	Tau² 0.02; Chi² P <0.00001; I² 68%
Morbidity outcomes			
Any perceived maternal illnesses	RR 0.87; 95% CI: 0.65, 1.15	3 (n=26005)	Tau² 0.00; Chi² P 0.55; I² 0%
Any perceived neonatal illnesses	RR 0.61; 95% CI: 0.43, 0.85	2 (n=12019)	Tau² 0.00; Chi² P 0.79; I² 0%
Other care seeking outcomes			
Any antenatal care	RR 1.26; 95% CI: 1.16, 1.37	13 (n=141006)	Tau² 0.02; Chi² P <0.00001; I² 96%
Any tetanus toxoid immunization	RR 1.07; 95% CI: 1.04, 1.11	8 (n=83243)	Tau² 0.00; Chi² P <0.00001; I² 81%
Iron/folate supplementation	RR 1.49; 95% CI: 1.06, 2.11	6 (n=81706)	Tau² 0.23; Chi² P <0.00001; I² 99%
Birthing by Skilled Birth Attendant	RR 1.15; 95% CI: 0.99, 1.34	7 (n=53583)	Tau² 0.04; Chi² P <0.00001; I² 89%
Institutional births	RR 1.15; 95% CI: 1.05, 1.26	16 (n=116848)	Tau² 0.03; Chi² P <0.00001; I² 84%
Initiation of breastfeeding within an hr of birth	RR 1.77; 95% CI: 1.43, 2.19	14 (n=100272)	Tau² 0.16; Chi² P <0.00001; I² 98%

Figure 3.2: Health care seeking for maternal and newborn illnesses: strategies for delivering interventions



Based on strategies employed for enhancing health care seeking, it was found that home visiting by CHWs alone had a significant impact on improving health care seeking for

neonatal illnesses (RR 1.61; 95% CI: 1.43, 1.81; 3 studies, n=1461), as did the combination of home visiting with community mobilization for both maternal (RR 1.15; 95% CI: 1.11, 1.20; 1 study, n=3810) and newborn illnesses (RR 1.71; 95% CI: 1.27, 2.29; 1 study, n=3688) (Figure 3.2).

Estimates from n-RCTs found no impact on improving health care seeking for neonatal illnesses (Table 3.2). However, results from before-after studies were similar to results from RCTs (health care seeking for maternal illnesses RR 1.13; 95% CI: 0.86, 1.48; 1 study, n=1443 and health care seeking for neonatal illnesses RR 1.35; 95% CI: 1.19, 1.53; 4 studies, n=4348) (Table 3.3).

Table 3.2: Results from non-randomized controlled trials

Outcomes	Summary estimates	Number of studies and participants	Heterogeneity
Primary outcomes			
Health care seeking for neonatal illnesses	RR 0.96; 95% CI: 0.71, 1.31	3 (n= 2103)	Tau^2 0.09; Chi^2 P < 0.00001; I^2 94%
Secondary outcomes			
Mortality outcomes			
Maternal mortality	RR 0.97; 95% CI: 0.64, 1.49	5 (n= 119078)	Tau^2 0.19; Chi^2 P < 0.00001; I^2 89%
Neonatal mortality	RR 0.83; 95% CI: 0.54, 1.26	4 (n= 28641)	Tau^2 0.13; Chi^2 P 0.004); I^2 77%
Early neonatal mortality	RR 0.57; 95% CI: 0.30, 1.09	2 (n= 3921)	Tau^2 0.10; Chi^2 P 0.19); I^2 41%
Late neonatal mortality	RR 0.84; 95% CI: 0.12, 5.80	2 (n= 3921)	Tau^2 1.55; Chi^2 P 0.03); I^2 79%
Stillbirths	RR 0.97; 95% CI: 0.71, 1.34	3 (n=6096)	Chi^2 P = 0.01; I^2 77%
Perinatal mortality	RR 0.74; 95% CI: 0.44, 1.23	4 (n=101834)	Tau^2 0.22; Chi^2 P < 0.00001; I^2 89%
Morbidity outcomes			
Any perceived neonatal illnesses	RR 1.12; 95% CI: 0.90, 1.39	1 (n=459)	
Other care seeking outcomes			
Any antenatal care	RR 1.05; 95% CI: 1.04, 1.06	3 (n=31305)	Chi^2 P < 0.00001; I^2 98%
Iron/folate supplementation	RR 24.53; 95% CI: 13.20, 45.59	1 (n=756)	-
Birthing by skilled birth attendant	RR 1.03; 95% CI: 0.97, 1.10	1 (n=13826)	-
Institutional births	RR 1.89; 95% CI: 1.48, 2.41	2 (n=2291)	Tau^2 0.03; Chi^2 P <0.00001; I^2 86%
Initiation of breastfeeding within an hr of birth	RR 6.54; 95% CI: 5.88, 7.27	1 (n = 13826)	-

Table 3.3: Results from before/after studies

Outcomes	Summary estimates	Number of studies and participants	Heterogeneity
Primary outcomes			
Health care seeking for maternal illnesses	RR 1.13; 95% CI: 0.86, 1.48	1 (n= 1443)	-
Health care seeking for neonatal illnesses	RR 1.35; 95% CI: 1.19, 1.53	4 (n= 4348)	Tau^2 0.01; Chi^2 P 0.003); I^2 75%
Secondary outcomes			
Mortality outcomes			
Neonatal mortality	RR 0.55; 95% CI: 0.18, 1.73	2 (n= 60762)	Tau^2 0.66; Chi^2 P < 0.00001; I^2 98%
Early neonatal mortality	RR 1.53; 95% CI: 0.78, 3.01	3 (n= 3418)	Tau^2 P 0.26; Chi^2 P 0.004; I^2 82%
Stillbirths	RR 0.70; 95% CI: 0.60, 0.82	4 (n= 61176)	Chi^2 P 0.03; I^2 65%
Perinatal mortality	RR 0.96; 95% CI: 0.85, 1.09	4 (n= 60944)	Chi^2 P < 0.00001; I^2 90%
Other care seeking outcomes			
Any antenatal care	RR 1.27; 95% CI: 1.24, 1.30	3 (n= 10137)	Chi^2 P < 0.00001; I^2 98%
Iron/folate supplementation	RR 1.29; 95% CI: 1.25, 1.33	1 (n= 3480)	-
Any tetanus toxoid immunization	RR 1.14; 95% CI: 1.10, 1.17	1 (n= 3480)	-
Institutional births	RR 32.76; 95% CI: 0.04, 29028.97	2 (n= 5859)	Tau^2 = 23.02; Chi^2 P < 0.00001; I^2 96%
Initiation of breastfeeding within an hr of birth	RR 1.54; 95% CI: 0.97, 2.44	2 (n = 2474)	Tau^2 = 0.11; Chi^2 P < 0.00001; I^2 99%

3.4.2. Mortality outcomes

Studies included in this review displayed a non-significant reduction in maternal mortality (RR 0.80; 95% CI: 0.65, 1.00; 8 studies, n=114196) (Table 3.1). However, significant impact was observed on total neonatal mortality (RR 0.80; 95% CI: 0.72, 0.89; 21 studies, n=248848) (Annex 9) including both early (RR 0.70; 95% CI: 0.61, 0.81; 11 studies, n=113147) and late neonatal mortality (RR 0.77; 95% CI: 0.64, 0.93; 9 studies, n=108359) (Table 3.1). Impact was also significant for reducing perinatal mortality (RR 0.84; 95% CI: 0.78-0.90; 16 studies, n=279618) and stillbirths (RR 0.82; 95% CI: 0.74, 0.92; 12 studies, n=176683) (Table 3.1). On GRADE analysis, evidence was moderate for maternal mortality; however, it was high quality for the rest of the other morality outcomes (Figure 3.3).

Subgroup analysis

Based on intensity of interventions and strategies employed, no differences were seen for reducing maternal mortality (Table 3.4). However, significant improvements were observed in reducing neonatal mortality (RR 0.73; 95% CI: 0.71, 0.89; 4 studies, n=114509) including both early neonatal mortality (RR 0.69; 95% CI: 0.54, 0.88; 3 studies, n=32263) and late neonatal mortality (RR 0.61; 95% CI: 0.41, 0.92; 3 studies, n=32263);

perinatal mortality (RR 0.78; 95% CI: 0.68, 0.89; 5 studies, n=100553) and stillbirths (RR 0.78; 95% CI: 0.71, 0.86; 2 studies, n=33786) when community mobilization was combined with home visiting (Table 3.4). Similarly, significant reductions were observed on neonatal mortality (RR 0.73; 95% CI: 0.60, 0.88; 8 studies, n=105846) (including both early (RR 0.55; 95% CI: 0.43-0.71; 2 studies, n=7119) and late (RR 0.40; 95% CI: 0.24, 0.68; 1 study, n=3688)), perinatal mortality (RR 0.75; 95% CI: 0.64, 0.89; 5 studies, n=93665) and stillbirths (RR 0.72; 95% CI: 0.61, 0.84; 3 studies, n=4980) when birth preparedness was intensified and paired with danger signs recognition and referrals. When including emergency funds collection for emergency transfers with birth preparedness and recognition of danger and referrals, significant improvements were observed on neonatal mortality (RR 0.78; 95% CI: 0.70, 0.87; 2 studies, n=29927), early neonatal mortality (RR 0.66; 95% CI: 0.50, 0.88; 3 studies, n=30832) and stillbirths (RR 0.78; 95% CI: 0.70, 0.87; 2 studies, n=29927). However, the number of studies that could be pooled reduced with increased intensity of interventions (Table 3.4).

No significant reductions were displayed when mortality outcomes were pooled from non-RCTs (Table 3.2) and before-after studies (Table 3.3) except for stillbirths (RR 0.70; 95% CI: 0.60, 0.82; 4 studies, n=61176) (Table 3.3).

3.4.3. Morbidity outcomes

From RCTs, significant results were observed in reducing any perceived illnesses in newborns (RR 0.61; 95% CI: 0.43, 0.85; 2 studies, n=12019), however, no improvements were observed for maternal illnesses (RR 0.87; 95% CI: 0.65, 1.15; 3 studies, n=26005) (Table 3.1). Results from non-RCTs were non-significant for neonatal illnesses (RR 1.12; 95% CI: 0.90, 1.39; 1 study, n=459) (Table 3.2).

3.4.4. Other care seeking outcomes

The review identified a number of RCTs which, when pooled, displayed a positive impact on care practices; these include antenatal care (RR 1.26; 95% CI: 1.16, 1.37; 13 studies, n=141006), receiving tetanus toxoid immunization (RR 1.07; 95% CI: 1.04, 1.11; 8 studies, n=83243), and iron/folate supplementation (RR 1.49; 95% CI: 1.06, 2.11; 6 studies, n=81706) (Table 3.1). Improved rates of institutional births (RR 1.15; 95% CI: 1.05, 1.26; 16 studies, n=116848) and initiating breastfeeding within an hour of birth (RR 1.77; 95%

Figure 3.3: GRADE analysis

RCTs for maternal and newborn health

Patient or population: patients with maternal and newborn health
Settings:
Intervention: RCTs

Outcomes	Illustrative comparative risks* (95% CI) Assumed risk Control	Corresponding risk RCTs	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
Maternal care seeking - from skilled care provider	**274 per 1000**	**290 per 1000** (252 to 334)	**RR 1.06** (0.92 to 1.22)	15828 (5 studies)	⊕⊕⊕⊖ **moderate**[1]	
Neonatal care seeking - from skilled care provider	**92 per 1000**	**128 per 1000** (107 to 154)	**RR 1.4** (1.17 to 1.68)	25850 (8 studies)	⊕⊕⊕⊕ **high**	
Maternal mortality	**3 per 1000**	**3 per 1000** (2 to 3)	**RR 0.80** (0.65 to 1.00)	113938 (8 studies)	⊕⊕⊕⊕ **high**	
Neonatal mortality	**34 per 1000**	**27 per 1000** (24 to 30)	**RR 0.79** (0.71 to 0.89)	248848 (20 studies)	⊕⊕⊕⊕ **high**	
Stillbirths	**25 per 1000**	**21 per 1000** (19 to 24)	**RR 0.82** (0.73 to 0.93)	154122 (11 studies)	⊕⊕⊕⊕ **high**	
Perinatal mortality	**42 per 1000**	**35 per 1000** (32 to 38)	**RR 0.84** (0.77 to 0.90)	257057 (15 studies)	⊕⊕⊕⊕ **high**	

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

[1] One of the included study provided single intervention, while rest provided package of interventions. On the other hand, the strategies with which intervention was delivered was different in all the studies.

Table 3.4: Mortality outcomes based on intensity of interventions and strategies employed

Strategies employed

	Community mobilization	**Home visitation**	**Community mobilization and home visitation**	**Enhanced perinatal care/education**	**Subgroup differences (P value of Chi^2)**
Maternal mortality	RR 0.81 95% CI: 0.54, 1.21 6 studies, n=79203 Tau² 0.13; Chi² P 0.04; I² 56%	RR 0.62; 95% CI: 0.35, 1.09 2 studies, n=10021 Tau² 0.00; Chi² P 0.50; I² 0%	RR 0.82; 95% CI: 0.46, 1.46 1 study, n=6230	RR 0.74; 95% CI: 0.45, 1.22 1 study, n=18699	P 0.16
Neonatal mortality	**RR 0.79; 95% CI: 0.70, 0.89** **10 studies, n=123047** **Tau² 0.03; Chi² P 0.0001; I² 71%**	RR 0.87; 95% CI: 0.57, 1.32 4 studies, n=21214 Tau² 0.12; Chi² P 0.01; I² 70%	**RR 0.73; 95% CI: 0.71, 0.89** **4 studies, n=114509** **Tau² 0.05; Chi² P 0.74; I² 83%**	RR 0.90; 95% CI: 0.57, 1.41 4 studies, n=12455 Tau² 0.19; Chi² P <0.0001; I² 94%	P 0.78
Early neonatal mortality	**RR 0.69; 95% CI: 0.57, 0.82** **6 studies, n=73288** **Tau² 0.05; Chi² P <0.00001; I² 81%**	-	**RR 0.69; 95% CI: 0.54, 0.88** **3 studies, n=32263** **Tau² 0.04; Chi² P 0.02; I² 68%**	RR 0.81; 95% CI: 0.44, 1.50 2 studies, n=7596 Tau² 0.14; Chi² P 0.01; I² 70%	**P <0.0001**
Late neonatal mortality	RR 0.83; 95% CI: 0.67, 1.03 5 studies, n=71931 Tau² 0.02; Chi² P 0.22; I² 31%	-	**RR 0.61; 95% CI: 0.41, 0.92** **3 studies, n=32263** **Tau² 0.10; Chi² P 0.04; I² 63%**	RR 1.09; 95% CI: 0.55, 2.18 1 study, n=4165	P 0.28
Stillbirths	RR 0.94; 95% CI: 0.83, 1.06 7 studies, n=136646 Tau² 0.01; Chi² P 0.09; I² 45%	-	**RR 0.78; 95% CI: 0.71, 0.86** **2 studies, n=33786** **Tau² 0.00; Chi² P 0.74; I² 0%**	**RR 0.62; 95% CI: 0.49, 0.79** **2 studies, n=6251** **Tau² 0.01; Chi² P 0.16; I² 50%**	**P 0.004**
Perinatal mortality	**RR 0.88; 95% CI: 0.82, 0.95** **10 studies, n=205843** **Tau² 0.01; Chi² P 0.08; I² 41%**	RR 0.82; 95% CI: 0.62, 1.08 1 study, n=6376	**RR 0.78; 95% CI: 0.68, 0.89** **5 studies, n=100553** **Tau² 0.02; Chi² P 0.002; I² 73%**	RR 0.84; 95% CI: 0.61, 1.16 3 studies, n=27326 Tau² 0.07; Chi² P 0.005; I² 88%	P 0.41

Intensity of intervention

	Birth preparedness	**Birth preparedness + recognition and referrals**	**Birth preparedness + recognition and referrals + Funds for emergency transportation**	
Maternal mortality	RR 0.81 95% CI: 0.54, 1.21 6 studies, n=80040 Tau² 0.13; Chi² P 0.04; I² 56%	RR 0.73; 95% CI: 0.51, 1.05 3 studies, n=29454 Tau² 0.00; Chi² P 0.63; I² 0%	-	P 0.71
Neonatal mortality	RR 0.91; 95% CI: 0.76, 1.09 11 studies, n=129937 Tau² 0.08; Chi² P <0.00001; I² 85%	**RR 0.73; 95% CI: 0.60, 0.88*** **8 studies, n=105846** **Tau² 0.07; Chi² P <0.00001; I² 79%**	**RR 0.78; 95% CI: 0.70, 0.87** **2 studies, n=29927** **Tau² 0.03; Chi² P 0.0001; I² 0%**	P 0.11
Early neonatal mortality	**RR 0.79; 95% CI: 0.66, 0.95** **6 studies, n=75196** **Tau² 0.03; Chi² P 0.010; I² 67%**	**RR 0.55; 95% CI: 0.43, 0.71** **2 studies, n=7119** **Tau² 0.00; Chi² P 0.98; I² 0%**	**RR 0.66; 95% CI: 0.50, 0.88** **3 studies, n=30832** **Tau² 0.08; Chi² P <0.0001; I² 90%**	**P 0.06**
Late neonatal mortality	RR 0.85; 95% CI: 0.70, 1.04 6 studies, n=76096 Tau² 0.01; Chi² P 0.28; I² 21%	**RR 0.40; 95% CI: 0.24, 0.68** **1 study, n=3688** **Tau² 0.00; Chi² P 0.43; I² 0%**	RR 0.80; 95% CI: 0.60, 1.06 2 studies, n=28575 Tau² 0.01; Chi² P 0.23; I² 30%	**P 0.03**
Stillbirths	**RR 0.85; 95% CI: 0.74, 0.96** **10 studies, 171703** **Tau² 0.03; Chi² P 0.0002; I² 72%**	**RR 0.72; 95% CI: 0.61, 0.84** **3 studies, n=4980** **Tau² 0.00; Chi² P 0.067; I² 0%**	**RR 0.78; 95% CI: 0.70, 0.87** **2 studies, n=29927** **Tau² 0.03; Chi² P 0.0001; I² 0%**	P 0.28
Perinatal mortality	**RR 0.91; 95% CI: 0.84, 0.98** **9 studies, n=149079** **Tau² 0.01; Chi² P 0.05; I² 48%**	**RR 0.75; 95% CI: 0.64, 0.89** **5 studies, n=93665** **Tau² 0.03; Chi² P 0.003; I² 72%**	RR 0.81; 95% CI: 0.64, 1.01 3 studies, n=32184 Tau² 0.03; Chi² P 0.008; I² 75%	P 0.11

*Only Bashour 2008 (with 2 subgroups – single visit and 4 visits) did not had birth preparedness component in the intervention

CI: 1.43, 2.19; 14 studies, n=100272) were also seen. However, no improvements were seen for skilled birth attendance (RR 1.15; 95% CI: 0.99, 1.34; 7 studies, n=53583).

Similarly, significant improvements from non-RCTs were observed on uptake of antenatal care (RR 1.05; 95% CI: 1.04, 1.06; 3 studies, n=31305), iron/folate supplementation (RR 24.53; 95% CI: 13.20, 45.59; 1 study, n=756), institutional births (RR 1.89; 95% CI: 1.48, 2.41; 2 studies, n=2291) and initiation of breastfeeding within an hour of birth (RR 6.54; 95% CI: 5.88, 7.27; 1 study, n=13826). However, no improvements were observed for women birthing with a SBA (RR 1.03; 95% CI: 0.97, 1.10; 1 study, n=13826) (Table 3.2).

From before-after studies, significant impact was observed for uptake of any antenatal care (RR 1.27; 95% CI: 1.24, 1.30; 3 studies, n=10137), tetanus toxoid immunization (RR 1.14; 95% CI: 1.10, 1.17; 1 study, n=3480), and iron/folate supplementation (RR 1.29; 95% CI: 1.25, 1.33; 1 study, n=3480) after an intervention was delivered but not for institutional deliveries or early initiation of breastfeeding (Table 3.3).

3.4.5. Delays in seeking care and pathways for approaching care

We reviewed 151 observational and qualitative studies from low and middle income countries to identify factors associated with delays that lead to serious morbidity and mortality. These delays occur at three levels; 1) delay in making the decision to seek care when there is a complication; 2) delay in reaching a health centre once the decision to seek care has been made; and 3) delay in receiving adequate care once a facility has been reached [143]. It is often suggested that overwhelming maternal and neonatal mortalities and morbidities are closely linked with a number of interrelated delays that prevent a pregnant women or neonate from accessing the health care she/he needs [18]. Each delay is closely related to services, logistics, facilities and conditions, which are important elements for their health (Figure 3.4). Similarly our review identified pathways for seeking help for maternal and newborn illnesses and reasons for their choices during the time of illness. Qualitative and observational studies included in this review showed a similar pattern across the studies reviewed (Figure 3.5). Although, the pathways of seeking care were not similar across all the studies, choices usually followed the same pattern. Depending on the predisposing factors (be it God's will, past experiences, user affordability, accessibility, availability and acceptability), the first choice of seeking care remained for spiritual

Figure 3.4: Factors associated with delays in seeking care for maternal and newborn

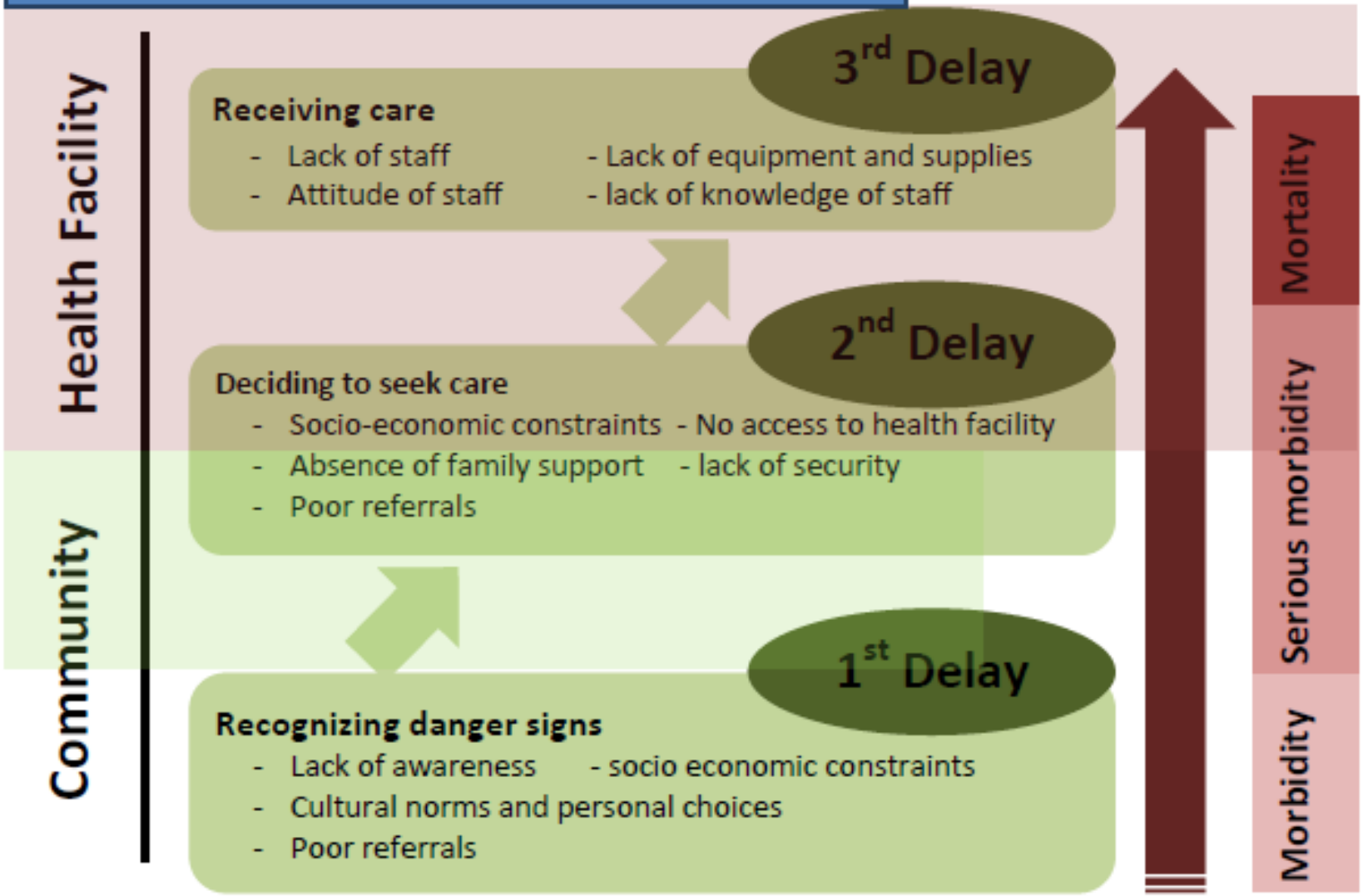
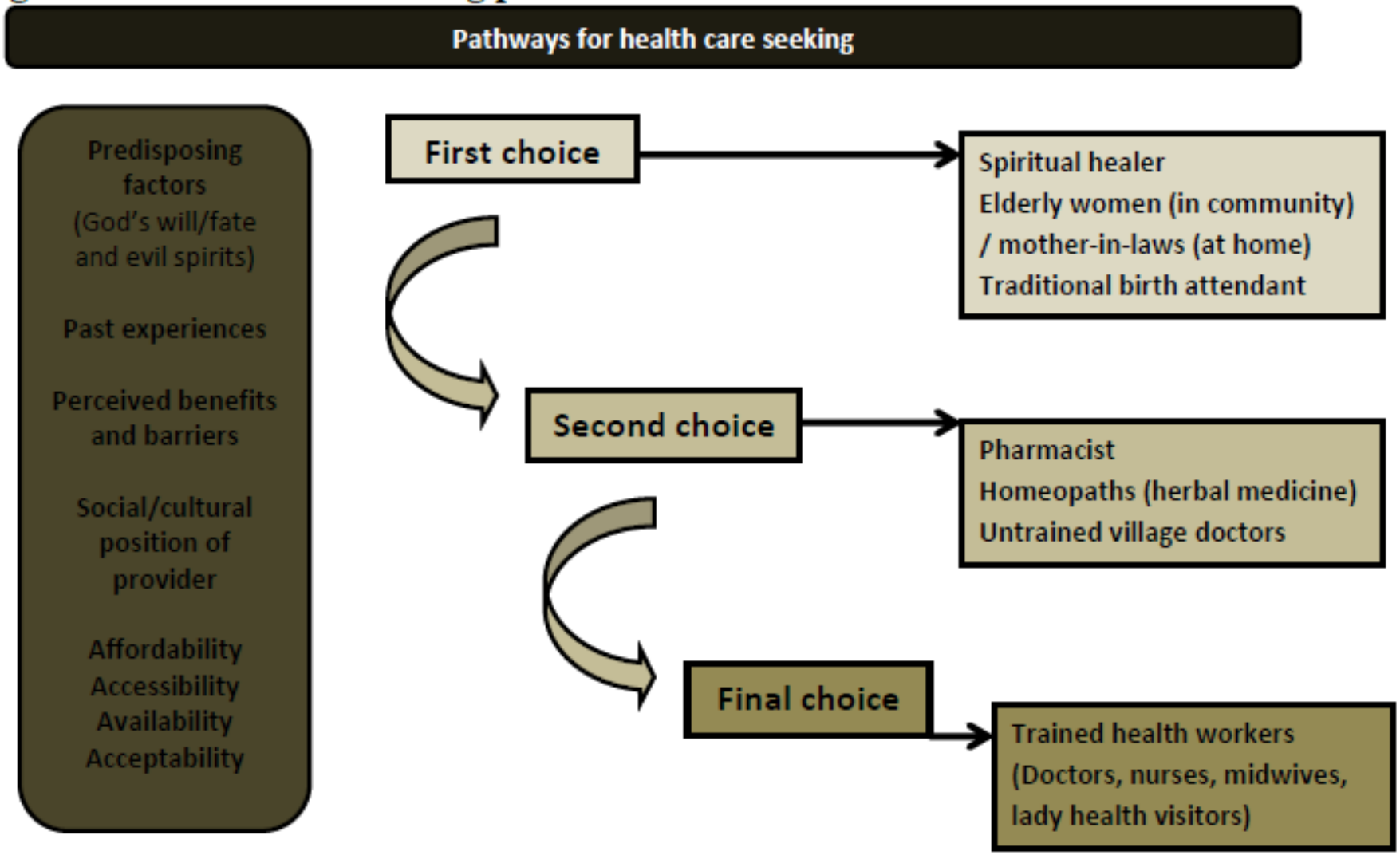


Figure 3.5: Health care seeking pattern



healers and immediate elder members of the family and community such as mother-in-laws, and TBAs who not only hold a respectable position in the community but are generally considered as experienced and knowledgeable people. On not gaining any benefits from the care received from the first level, women then consult pharmacists, homeopaths and fake healers or untrained village doctors. However, the last choice is usually the trained doctors, nurses or lady health visitors in health facilities.

Qualitative findings for delays in care and pathways of care seeking

Health care seeking patterns are complex phenomena, often confounded by several interlinked factors such as education of mothers, their parity and age. More than half of the observational studies reported that maternal health care utilization and giving birth at home is linked to lack of antenatal care (ANC), age, parity, education and employment status of women [144-201]. On the other hand, seeking care for newborn illnesses depends on the severity of illness [202-207] and gender of the baby – preference being given to the male child [176]. Studies have reported that adequate health care seeking from skilled health care providers leads to fewer deaths and morbidities [208-210]. It has also been reported that when a women had a good marital relationship with her husband, she was most likely to receive antenatal care and give birth at health facilities [183, 184, 211-216]. Nevertheless, poor communication and relationships between mothers-in-law and daughters-in-law were reported as barriers to receipt of antenatal care [217].

We identified several qualitative themes that describe the reasons for delays in health care seeking and associated pathways.

Identifying the illness and first preferred level of care

Primary caregivers for mothers and their babies in all included studies were usually mothers; however, mothers-in-law, grandmothers, fathers, neighbours, traditional healers and opinion leaders in the community were among the many people involved as caregivers for mothers and babies. Across the studies, it was observed that mothers/families do seek care for neonatal illness [207], however, complications during pregnancy is not considered as an illness and many signs that appear are considered as normal even when painful and constant [218-228]. There was a similar, though subtly different perception reported in some studies that while people knew how to prevent illness, they also believed that illness just happens and preventive effort is not effective [220-222, 227]. Furthermore in certain

studies, bleeding was not considered as a complication [229], and in such situations the decision to take the woman to facility is often delayed. Women who expressed pain verbally were considered as disobedient and therefore, maintaining silent was considered appropriate [230]. Avoiding antenatal care visits were reported to be due to heavy and unavoidable workloads at home [217]. Few studies reported that mothers-in-law prioritized household work over their daughters-in-law's health [217, 225]. It may be perceived that some common neonatal symptoms should or cannot be treated at health facilities and therefore traditional care should be sought [231].

Some cultural specific practices also lead to complications and hence delays. In India, women during pregnancy are usually advised to be cautious while eating "hot" or "cold" food, and to eat less otherwise the baby can grow too large and therefore lead to a difficult birth [218]. A qualitative study from Pakistan (Baluchistan) [232] described that *dai* (TBA) usually place mustard oil on her fingers and massage vaginal walls with mustard oil to ease the birth, and insert vaginal and anal pessaries to help shrink the uterus and to provide support for the uterus and backbone. They also prefer eating *Goandh* combined with turmeric powder, and dried dates in milk to bleed heavily which ensures that all unclean blood is drained from the body; thus prefer postpartum haemorrhage. In situation when placenta doesn't expel normally, the *dai* enters her bare hands in the uterus or puts hair into the mother's mouth to induce vomiting [229]. Eating vegetables rather than meat during pregnancy is preferred as it increases the production of breastmilk and freshens its taste [233]. During infant illnesses, mothers prefer to give '*rabadi'* (local preparation made from millet flour and yogurt), '*khichchadi'* (a semi-liquid preparation from the mixture of rice and pulses) and *'mateera'* (water melon-like fruit) to their febrile children in conjunction with breastmilk [234].

While illnesses, particularly in women who are not pregnant, are considered unimportant, evil spirits' and fate (Allah's will) are reported to be the cause of such illnesses [229, 235]. Faith healing is important in many cultures. The study from Ghana [236] named three major religions that practised faith healing with substantial overlap among the three in terms of beliefs about witchcraft and the nature of God and each religion has a specific healer. On the other hand, most of the communities in Asia and Africa believe that certain precautions during pregnancy or immediately after birth will ward off the evil eye and will prevent the infant from getting sick [218, 237]. This includes isolating women and their

baby in a room for a certain period of time after childbirth and lighting a fire at the entrance where they are confined [218]. In a few studies people reported keeping the pregnancy secret, with only close family members being informed because of the fear of being bewitched [222].

In cases where the symptoms are unusually severe or the diagnosis particularly unclear, mothers may consult family members, neighbours, and peers [232, 238]. In severe illness, decision-making power can be switched to more experienced members from the extended family, which can cause significant delays in decision making. Several studies reported that when women had access to money, they hurried to pursue treatment options despite several familial pressures. A study from Tanzania reports [221] that having an option of home birth was found to be a hurdle to emphasize the importance of skilled birth care [226, 230, 239-241]. Trust - being part of the community, speaking the local language, living in the community and sharing the same culture, is the other factor that encouraged women to give birth at home and with a TBA [166, 242]. However, it was apparent from the studies that if women continue to suffer, then they do seek care from western trained care providers [232].

Barriers on deciding to seek care for illnesses and choice of care

Decision making emerged as a complex issue. Once a woman decided to seek help, she has to overcome a second barrier. Decision making power is less likely to be with the woman and mostly rests with the mother-in-law and husband. Women, who depended on their husbands for financial support, were usually those who had no rights for decision making [243]. One of the most consistent findings across all of the studies, and a major barrier to care seeking beyond the home, is the needing to gain permission of husbands to seek care outside of the home [218, 219, 230, 244-249]. The power men hold over their partners is a very important factor in the provision of healthcare for women. Women do, or refrain from doing, a considerable number of things related to their health depending on their partners' approval or lack thereof. Men's dominance of women includes not only controlling their health but also using violence—emotional, psychological, or physical. If husbands' are absent, women face difficulties in receiving permission from husband's parents or other elders for seeking care and this results in even greater delays.

Husbands and elders often have control over seeking financial support to women in the house and therefore sometimes overrule women's decision to seek care. Being short of resources is one of the most important reasons why many women do not seek care when danger signs appear in herself or in her baby [166, 219, 225, 233-235, 242, 246, 247, 250-256]. Deciding to seek care can incur transportation costs, user fees, cost of medicines, and possibilities and ensuing costs of misdiagnosis and treatment failures [219]. Considering all these barriers, women often postpone seeking help, with the hope that problem will subside on its own.

When a family is willing to seek care and arranges the money required, other challenges such as physical transferring of mothers and newborns to a health facilities becomes a problem. The situation is even worse if complications arise at night, when loss of property, and death, and disabilities arising from attacks by criminals make referrals difficult or when transport providers raise their taxi or car-hire charges [243, 250, 252, 255, 257-265] [222, 246, 247, 256, 266]. A few studies mentioned factors such as distance to the clinic and transport problems, financial constraints, difficulties in crossing big rivers during the rainy season; fear of encountering wild animals; shame about too many pregnancies or being of advanced age and pregnant, as some of the critical reasons for not seeking care [243, 250, 252, 260]. Other reasons were negative attitudes of service providers, long hours of waiting and poor quality of care [222]. Fear of operative procedures was reported as a factor hindering care-seeking [267]. Apart from lack of decision making power, fear of doctors and a bad impression of health services are other factors preventing women from seeking care. These are usually based on previous experience and contact with health care staff and the health care service received [219, 247, 250, 268].

Another important barrier of seeking care from trained health professional is cost. A study from rural Mexico reported that cost of care from TBAs is sometimes higher than facility birth but women prefer them because they can give birth at home [269]. Many women prefer to give birth in a squatting position, which TBAs not only permit but often promote [269]. Therefore, women express a strong preference for giving birth in their own homes, rather than in medical institutions. Several women criticized hospital services for excluding relatives from being present during labour and the birth [269].

Successful prior experience with a particular mode of treatment is described as a key factor in decision making, regardless of whether these experiences were consistent with broader health beliefs and practices [270]. In some cases, symptoms are interpreted as signs of a traditional disease rather than as signs of pregnancy-related complications [166, 207, 234, 238, 242, 243, 271] and thus seek help from traditional healers, CHWs or drug sellers. Households often regard accessible and less expensive care such as herbal and home remedies or locally available drugs more highly [272]. Workers from these types of care were often praised as they give time to patients and consider their social and cultural aspects as well.

Receiving adequate care when facility is reached

Women and family usually opt for medically qualified birth attendants where women have possible complications. If no complications are found, they choose to have their babies with TBAs. Complications encountered during the course of labour, such as prolonged labour and poor position of the baby, may lead women to seek a physician-attended birth. In most cases, when women encountered such problems, TBAs refer women to a doctor. In addition to addressing birth complications, another reason that some women opt for SBA is in order to have a tubal ligation performed [269].

There is an evidence that long waiting times in hospitals negatively affect health seeking behaviours [219, 230, 273, 274]. Families and women often hesitate to go to hospital for fear of the hospital environment and also may fear that a woman would be "torn" if a C-section was required [230]. Clinic structures and practices make it difficult for women to discuss their healthcare concerns with nursing staff. There is little privacy in clinics and usually examinations are conducted in open rooms. This lack of privacy is sometimes further compounded by the tendency of nurses to interview women in loud voices, making it easy for those who are waiting to hear their concerns. This lack of privacy was prominent in studies and usually has a profound effect on women's health-seeking patterns [275].

Most of the included studies cited that health professionals have poor attitudes towards poor or pregnant women. Staff are perceived to be rude, uncaring, poorly trained and sometimes actively stigmatizing [243, 256, 267, 268, 276]. Studies pointed out that nurses spend very little time with women and ignore their questions. They scold women for not

seeking care earlier, for not practising birth control, or for asking questions. They also threaten women with treatment withdrawal or denial if they do not comply with instructions from nurses, and are treated like children, disregarded, and disrespected [275]. Staff behaviour is therefore a major barrier for accessing care [277]. Furthermore, there was general agreement across studies that hospital maternity procedures induce fear, specifically vaginal examinations and urinary catheterizations [277].

Even after arriving at a health facility, women may then be referred on to better equipped facilities, which lead to further delays. Women may be asked to pay for fuel for the ambulance to take them to the other facility. They then may be required to pay for medicines and other supplies, and when stocks of these run out, there are further prolonged delays in receiving care [243].

3.5. Discussion

Adequately addressing women's and children's health would resolve a considerable proportion of global health problems. Improving health care seeking for the health of mothers and newborns can prevent many avoidable deaths. While, there was a paucity of experimental studies reporting health care seeking as an outcome, the systematic review found promising results of the interventions for improving health care seeking for maternal and newborn illnesses. Though the impact was not significant for health care seeking for maternal illnesses, but care seeking for neonatal illnesses substantiality improved by 40% for several interventions. The impact was large when the intervention was delivered by CHWs though home visiting (45% increase) or when combined with community mobilization (62%). Impact was significant when promotion of birth preparedness was combined with interventions where CHW recognized illnesses and provided referrals (65% increase). Qualitative studies indicated that mothers place a lower priority on seeking care for themselves than they do for seeking care for their sick newborn.

The included studies did not find any impact of these interventions on improving maternal mortality. Probably these studies were not powered to detect the difference. However, significant improvements were observed for neonatal mortality (21% reduction) including both early (30%) and late neonatal mortality (23%). Impact was also significant for stillbirths (18%) and perinatal mortality (18%). Similar direction of effects, although not significant, was found from non-RCTs and before/after studies. While impact on mortality

was more convincing when interventions were delivered in the form of community mobilization and home visiting, the level of heterogeneity was high. Mortality substantially improved when birth preparedness was combined with recognition of illnesses and provision of referrals; and was even more effective when interventions involved collection of funds for emergency transportation. However, the number of studies with increasing intensity of intervention decreased and there were too few studies in the highest level of intensity to make robust claims.

The review found positive impacts for these interventions on improving antenatal care (27%), uptake of tetanus toxoid immunization (8%), iron/folate supplementation (49%), institutional births (16%) and initiation of breastfeeding (85%). Similar direction of effects was observed from other less rigorous study designs.

The subgroup analyses suggest that the impacts on health care seeking, mortality and morbidity were greater when interventions included recognition of illnesses and provision of referrals. However, the qualitative findings from these trials were scarce and little or no information was provided to relate these findings with the contextual factors of delays in those scenarios. Literature suggests health service demand is not determined by recognition of problems and perceived seriousness alone; there are underlying beliefs which play a vital role in determining health care utilization patterns [278-280]. The observational studies and other qualitative studies identified the barriers responsible for seeking health care for maternal and newborn illnesses. Ineffective or inequitable health decision making at the household level is a major hindrance in accessing health care. Decision making is a complex affair, and is confounded by cultural, societal, and health system factors. Timely recognition of danger signs, autonomy of decision making, availability of finances, accessibility of the health facility, and perceived quality of care are necessary considerations when making the decision to seek formal care. Distance and cost were highlighted as the two main reasons for causing delays in decision making. Incompetently equipped facilities cause delays in receiving appropriate care or necessitates additional referrals to better-equipped facilities [281]. These barriers, although, were similar but varied geographically. Therefore, improvement in qualified medical care seeking can be achieved if behaviour change communication interventions are need specific contextualized socio-economically.

This paper highlights the reasons for delays and ramifications of these delays on morbidity and mortality outcomes. The review reveals that delays at each level serve as barriers and strategies to overcome these may help and empower the communities to select and make early decisions. Our review also illuminates certain social and cultural hurdles (such as values, norms, health beliefs and family resources). These social structures influence the decisions and choices of women in selecting the health care services. We recommend that since the decision and choices of women are influenced by the social structures and the health system, it is vitally important that discussions on maternal and neonatal health planning and policy ought to encompass the entire health system and social structures that ensure government approaches on gender equity and girls education in order to improve overall health care seeking for maternal and newborn health outcomes. Recent debates and discussions on maternal and neonatal health outcomes in LMICs must address the entire health system, as well as the social structures. Even though modest improvement in maternal and neonatal health outcomes has been achieved in the last decade, with a closer look at these perspectives and strategies these can be further improved. A major obstacle is women's lack of autonomy to make decisions about their lives, including whether to bear children. A change brought about in the attitude of the family members and emphasis on the need for women's autonomy in making these crucial health decisions will lead to an immediate positive impact. Women should have the right to choose their place of birth; although it is important to help her comprehend the risks associated with these options. This could be achieved by proper mobilization of the entire family. The use of strong advocacy groups both at community level and also by advertisement campaigns can also help to maximize the implementation of these strategies. Meanwhile, health system should invest in training the community and facility health staff and equip them with essential supplies. Health care professionals should be trained to plan and manage high risk pregnancy as well as respond to any emergency that may arise. At the same time, it is crucial for local health care workers to be trained and well equipped for dealing with maternal, newborn and child health issues. A specific implementation strategy could be the provision of birthing kits to the TBAs which will ensure access to this facility to those residing in remote areas. This will reduce mortality arising from delay in the provision of emergency medical aid during childbirth. In addition, indirect health care cost such as transportation and certain petty charges at the facility should be minimized. These changes will go a long way to improve not only maternal and neonatal health-seeking behaviour, but also their health outcomes.

3.7. Conclusion

Implication for practice

To achieve the globally defined goal of attaining a state of a reduction in maternal and neonatal mortality, provision of community-based interventions with integration of the basic strategies with the global healthcare settings will be an effective strategy. Unfortunately, the global picture of maternal and neonatal mortality shows a dismal picture in many LMICs. The global cost for maternal disability is very high; therefore, ensuring the prompt and effective delivery of these interventions will be an effective strategy. This will help on moving towards the achievement of the development and would also lead to a much needed decrease in the burden of disease related to chronic complications of pregnancy and childbirth.

This systematic review identified that strategies such as mobilization and home visitation can improve health care seeking for neonatal illnesses. Further analysis based on strategies that combined birth preparedness counselling with recognition of illnesses and provision of referrals by community health workers showed an improvement in both maternal and neonatal health care seeking. Similarly, strategies that employed mobilization with home visitation showed an improvement in both maternal and newborn health care seeking. These interventions also had a significant impact on reducing stillbirths, perinatal deaths and neonatal mortality. The review of observational and qualitative studies identified several social, cultural and health services related factors that contribute to delays in health care seeking. Effective implementation of identified strategies after controlling for other factors of delays would lead to significant improvement in mortality, morbidity and care seeking outcomes.

Implications for research

Most of the included studies were conducted in Asia, with very limited number of studies from other developing countries such as Africa. Thus, there is a clear need for additional high quality research from other developing regions. There is also need to identify the cost-effectiveness of identified strategies to deliver interventions in affordable ways to hard-to-reach communities to prevent illnesses and promote health.

Statement of Authorship

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Name of Principal Author (Candidate)	Zohra S Lassi		
Contribution to the Paper	ZSL conceptualised the study. ZSL contributed to data entry, analysis, synthesis and write up of the drafts. Finalised the paper and is the overall guarantor.		
Overall percentage (%)	100%		
Signature		Date	September 03, 2015

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

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Chapter 4: Health care seeking for maternal and newborn illnesses in rural community of Pakistan – a qualitative study nested within a randomised trial

4.1. Abstract

Background: Maternal and neonatal mortality in Pakistan is alarmingly common. A number of delays that prevent women to seeking care for herself or her newborn are thought to be contributing to these high death rates. This study examines the factors that influence these delays in Pakistan.

Methods: A qualitative study was conducted within a trial of emergency obstetric and neonatal care (EmONC). Ten focus group discussions and 36 in-depth interviews were conducted with pregnant women, women who had given birth, lady health workers, traditional birth attendants, lady health visitors, community midwives, health facility midwives, community leaders, general practitioners, obstetrician and gynaecologists, and paediatricians using a purposive sampling approach in Rahimyar Khan District of Punjab, Pakistan in 2013. The information was collected on common causes of maternal morbidity and mortality; and determinants of care seeking behaviour; knowledge, perception and recognition of danger signs during pregnancy, childbirth and in newborns.

Findings: We identified several factors that inhibit families, particularly women, from seeking care for themselves and their baby. The most important factor which leads to initial delays is lack of women's autonomy to decide to seek care. Other factors which cause or increase delays include lack of money, workload at home, and the attitude and treatment women receive when they visit health facilities.

Conclusion: In order to improve maternal and newborn health in Pakistan, strategies need to be implemented urgently to prevent delays in seeking health care. These include not only in the provision of health supplies and improvement in practices of health care professionals but also at the demand level, by addressing factors that prevent women's use of health facilities.

4.2. Introduction

Like many other low income countries, Pakistan has high maternal and neonatal mortality rates. Maternal mortality in Pakistan is 276 per 100,000 live births [282], whereas neonatal, infant and under-five mortality is 55, 74 and 89 per 1000 live births respectively [33]. The disparity is higher in rural areas where maternal, infant and child mortality is 1.5 times that in urban areas [282]. These overwhelming numbers of deaths are linked to interrelated delays that prevent a woman or child accessing the care he/she needs. This in turn increases the severity of complications for many and leading to deaths in some cases. This is commonly described as the three delay model [17]: delay in making the decision to seek care when there is a complication; delay in reaching a health centre once the decision to seek care has been made; and delay in receiving adequate care once a facility has been reached [283]. Evidence suggests that the majority of maternal and neonatal deaths occur from avoidable causes related to socioeconomic and cultural factors, as well as biomedical and reproductive health service related factors which are more prevalent in rural areas.

A recent analysis of the verbal and social autopsy data from Pakistan Demographic and Health Survey 2006 reports that more than half of neonatal deaths and three quarter of maternal and child deaths are due to delay in receiving appropriate care at facilities [35]. The review also reported that 80% of maternal deaths are due to delays in availability of transport and cost [35]. A recent demographic survey in Pakistan suggests that approximately 63% of the women face at least one problem in seeking health care for themselves when they are sick [33]; these include getting permission from husband or other decision maker from the family to go for treatment, finding money for advice or treatment, the distance to a health facility, not wanting to go alone, and management of transportation. A better understanding of the processes involved in these delays will inform policy makers and help to find ways to prevent or reduce delays. This study was conducted to understand the pathways for health care seeking in rural communities of Pakistan and the barriers which cause delays and ultimately increase morbidity and mortality.

4.3. Methods

This qualitative study was carried out from January to March 2013 in Rahimyar Khan District of Punjab, Pakistan as part of an emergency obstetrics and neonatal care (EmONC) trial to improve perinatal and neonatal health and mortality. Protocol of the larger trial is detailed elsewhere [292]. The ethical approval for the trial was received from the Ethics

Review Committee (ERC) of the Aga Khan University (Ref No. 2146-Ped-ERC-12) and National Bioethics Committee (NBC) of Pakistan (Ref No. 4-87/12/NBC-84/RDC/2031). The qualitative study conducted in-depth interviews and focus group discussions with pregnant women, women who had recently given birth, lady health workers (LHWs), traditional birth attendants (TBAs), lady health visitors (LHVs), community midwives, male/female decision makers of the household, community leaders, general practitioners, obstetricians and gynaecologists, and paediatricians (Table 4.1).

Table 4.1: Respondents for focus group discussions and interviews

Respondents	Research Methods	No. of Interviews / Discussions
Recently Delivered Women	IDIs	6
Currently Pregnant Women	IDIs	6
Community Midwives	IDIs	6
Midwives	IDIs	4
Lady Health Workers	FGDs	4
Lady Health Visitors	IDIs	2
Traditional Birth Attendants	FGDs	3
	IDIs	2
Community Leaders	IDIs	4
Male decision makers in household	FGDs	2
Female decision makers in household	FGDs	1
General Physicians	IDIs	2
Paediatricians	IDIs	2
Gynaecologists	IDIs	2
Each FGD involved 8-12 participants		

The qualitative data was collected by female field officers, who were not from the community but had command on local language, and were trained in conducting interviews and focus group discussions. An interview guide was prepared (Annex 1) to collect information on key areas (Box 4.1). The interview guide was prepared by primary research team members and was discussed within the team to check for its completeness. The information was collected on common causes of maternal morbidity and mortality; and determinants of care seeking behaviour; knowledge, perception and recognition of danger signs during pregnancy, childbirth and in newborns. Participants, who gave verbal consent, were selected by snowball method from each village through liaising with LHWs/health care workers, who knew of pregnant women or women who had given birth or other health care workers/professionals. Participants were not remunerated for these interviews.

Box 4.1: Key areas addressed

- Common causes of maternal morbidity in pregnancy
- Determinants of care seeking behaviour during pregnancy, childbirth and for newborns
    - Domiciliary versus hospital births
    - Selection of care givers by families
    - Knowledge, perception and recognition of danger signs during pregnancy, childbirth and neonatal period by families and care givers

All interviews were tape-recorded and transcribed in Urdu by a field officer. After reading the transcripts and field notes for overall understanding, these were transcribed verbatim and translated into English by a research assistant who was not involved in collecting data. The translated transcripts were then thoroughly reviewed to check for overall comprehension and meaning by the same field officer who conducted the interviews. The overall procedure of transcription and translation was supervised by ZL. The interview transcripts were then exported to NVIVO 10 [284], the qualitative software used for coding and analysis, by ZL.

Coding helped to organize the data, and in creating the linkages within and between the perceptions and experiences presented in the data. The data coding was continued until the theoretical saturation was reached and no new concepts emerged from successive reviewing and coding. The codes were then considered complete and emerging themes were then developed. Where appropriate, we used verbatim quotations from interview transcripts to illustrate responses related to relevant themes. We used a deductive approach for content analysis of our in-depth interviews. Main themes and categories were then identified. The process involved familiarization with the material, identifying a thematic framework, indexing, charting, mapping and interpretation [285].

4.4. Results

A total of 10 focus group discussions and 36 in-depth interviews were conducted by two field officers (Table 1). Important findings from these discussions and interviews are presented below.

The following themes emerged:

- Decision-making for health-care seeking
- Barriers to health-care seeking (and sub-themes)
- Arrangements for childbirth
- Preference for home birth (and sub-themes)

4.4.1. Decision-making for health care seeking: Almost all interviewees discussed the traditional need for women to gain permission from their husband or mother-in-law to seek health care. A community midwife reported that some husbands acted aggressively, making women fearful of leaving the house without their husband's permission. However, the mother-in-law often replaced his role. During the day, when their husbands might be

absent, mothers-in-law often acted in this capacity and controlled whether or not a woman would be granted permission to leave the house. If the reason for leaving the house is to access care, a woman needs to convince her mother-in-law that the illness requires a visit to a health care worker or facility. If her mother-in-law is convinced, she either informs her son that the visit to health facility is necessary and/or gives permission on her own. In general, a mother-in-law's advice is respected as she has had experience of these illnesses in her own life and she can persuade her son to take the woman to the health centre.

4.4.2. Barriers for health care seeking

4.4.2.1. Pregnancy is a natural process: From the testimonies it was identified that pregnancy is considered a natural process and women are supposed to bear pain. The complications and illnesses related to pregnancy are considered a part of this natural process and women and their families believed that medical management is not necessary. Health care is only sought when women or their families want to identify the gender of the baby or when they fear having a miscarriage. However, few women considered seeking care to identify blood or micronutrient deficiencies in themselves or growth restriction in their fetus.

4.4.2.2. Illness is given by God: The analysis of testimonies revealed that many people in the community believed that illness is a result of sin or evil spirits which cannot be treated or handled by health workers. A community leader stated:

> *"Some women think they get illnesses because of evil spirit… and health workers can't handle them, and therefore, they don't refer to them."*

A paediatrician stated:

> *"Yes there are few people in community who believe that it is all up to Allah (God). He has given this problem and only He can protect….These people keep their sick babies at home even if the baby grunts or faces difficulty in breathing…."*

One community leader stated:

"Most of the people take their sick women and children for damm[1]. With damm they feel fine and then they don't require any medicine….."

4.4.2.3. Lack of financial resources: Lack of money is another major constraint in seeking care. It was reported that people are poor and cannot afford even three meals a day for their family. A pregnant woman stated:

> *"On my visit to hospital, I was prescribed with medicines and I was advised to consume fruits, but these are expensive …I initially followed the advice but later I stopped."*

The money is not only required to meet fee-for-service payments but also to arrange transport. Therefore, families prefer buying food for their children than investing in something which is regarded as a natural process. However, their approach is different if a child is sick. A mother reported:

> *"My baby was prescribed with expensive medicines and his treatment costed PKR 21000 (USD 210). We sold our cow to pay for treatment. The four days of treatment used all our entire saving."*

4.4.2.4. Unable to leave the house alone: Women are not allowed to leave house without their husbands or another male member from the family. If permission to seek care is given, the next challenge for a woman is to see if a male is available to escort her; when a male family member is not available, women are not allowed to seek care. Husbands also fear that their wife is seeking to have an abortion or to get contraceptives. Husbands hold considerable authority over their wives and not following their husband's orders often results in emotional, psychological, or physical violence being directed to the woman.

4.4.2.5. Workload: Workloads also prevent women from seeking care. Women not only take care of the household chores, but they also work in the fields to relieve the burden of their husbands. During the harvesting months, the family give priority to field work and never allow women time to seek care, even in case of illness. A pregnant woman stated:

[1] *an act of reciting verses from Quran and blowing a breath over a body or in water to make it sacred or of pious quality*

"People are poor and deprived but women are more deprived, they work at home and at fields even up to the last trimester of pregnancy."

4.4.2.6. Lack of awareness: Lack of awareness contributes to the first delay in health care seeking. Most of the respondents reported that women are unaware of the danger signs during pregnancy. The family also often ignore illness in the women. A pregnant woman stated:

"Women and her illnesses are usually ignored… their family members realize her illnesses when severe complications appear."

4.4.2.7. They prescribe tests and give medicines: Women stated other reasons for avoiding their visits to health care professionals during pregnancy and that includes prescribing diagnostic tests and medicines. A few women in the community considered that an ultrasound may harm the child, as it carries electrical energy. Women also fear having an ultrasound as it can reveal the gender of the baby. The fear of carrying a baby girl has been explained by a community midwife described the fear of carrying a baby girl:

"When I asked her to get ultrasound done to know the position of the baby … she got scared and said ultrasound will also reveal the gender of the baby … and if it is a girl then her in-laws will treat her badly."

4.4.2.8. Mistreated at hospital and staff attitudes: Poor staff attitudes and long waiting times were also reasons for not seeking care from health facilities. Moreover, women's previous negative experiences with health care professionals, such as their health condition worsening, particularly in public care facilities, were stated as reasons for not referring to health facilities. A pregnant woman stated:

"My sister was ill and we took her to a hospital, but instead of managing they made her worse and her health deteriorated. That day I decided that I will never go to hospital. Even though my mother is in favour of receiving care from hospital but I will never go."

Because of the fear of being maltreated, women prefer going to private facilities. A woman stated:

"Although private health care is expensive, I prefer going there to receive proper care. I fear going to public facilities where you are not treated well."

Women also stated that even after waiting for a long time, they were sent home with no reasons given. A mother stated:

"Those who are rich and literate, they go to government hospitals because they receive adequate treatment. However, poor people are treated as animals… they keep us away because our sandals are torn and our clothes smell."

Women stated that the hospitals are short of equipment and supplies and sometimes they place two women in one bed. Some women fear that they may be kept naked in hospital. They reported that doctors get annoyed if they bring along their other children with them to hospital when they can't leave them home alone. They also feared that the doctor might prescribe the wrong medicine. However, doctors believed that this was a misconception which has been inculcated in them by TBAs who do not want to lose their income.

4.4.3. Arrangements for childbirth

Preparing for childbirth includes pre-arranging money and transport. The testimonies here indicate that families face difficulties in doing this. In some traditions the woman's parents are asked to arrange for all the expenses for the first child; and in cases when they cannot arrange money, cattle or other assets such as gold are given in exchange. All women, community leaders and health professionals urged that the community should be encouraged to collect emergency funds to seek management in case of crises.

Apart from money and transport, uncertain electricity supply has been reported as a hurdle. Frequent electricity outages in hospitals or at home requires arranging for an electricity generator to cover unforeseen power interruptions.

4.4.4. Preference for home birth

4.4.4.1. Money: Lack of money and access to transportation were reported as the main reasons for deciding to have a home birth. In addition, the charges for TBAs are less than

expenses incurred for facility births which are further a motivation for choosing to birth at home. A woman who had recently given birth said:

> *"The best place to give birth is home. It is cheap and involves less financial and other arrangement."*

4.4.4.2. Fear: Women stated their fear about having a caesarean section and believed that doctors often perform surgery even in cases where women can give birth spontaneously. A pregnant woman stated:

> *"Allah (God) does the best. Doctors can only make a big cut in abdomen."*

4.4.4.3. Previous experiences or experiences of others: All multiparous women interviewed believed that vaginal birth was safer for their babies and they preferred to have this method in their current pregnancy. However, some of them had had previous negative experiences. A woman who recently given birth stated:

> *"There was one case that LHW couldn't handle so she took the woman to hospital. Neither the woman or the family was in favour of taking her to hospital but LHW forced her to go to hospital. She survived the operation but baby died. This case scared me and many others in our community… therefore we avoid going to hospitals."*

4.4.4.4. Trust in TBA: TBAs have been working in the community for many decades, with a reputable standing in the community. People have trust in TBAs because of their long experience.

4.4.4.5. Other factors: Other factors for choosing a home birth include lack of availability of TBAs at night when the health care facility is closed and times (usually at night) when the community midwives prefer not to conduct births. Some women insist on having a home birth because they do not want to leave their other children at home alone or when their husband refuses to take care of them.

4.5. Discussion

This study has identified barriers for health care seeking by women for themselves and their babies which have direct influences on maternal and newborn health in Pakistan. The

analysis of testimonials identified several factors that dissuade, and sometimes prohibit families, particularly women, from seeking care for themselves and their babies. The perceptions of health care seeking among community members and health care workers at facility were comparable.

The most important factor which leads to the first delay in care seeking is the lack of woman's autonomy to decide for herself, particularly in times of illness. Lack of education, awareness and empowerment leave women in a weakened position where someone else makes decisions about her health and her care. Decision-making processes about use of a health facility to access skilled care are mainly controlled by the woman's husband, his parents (mother- or father-in-law) or other elders in the family. The importance of the mother-in-law in this process is critical as she is considered head of women in the family. She is regarded as the most respected member of the family and her viewpoints do matter in terms of decision making. Generally concerns related to reproduction are taken care of by the mother-in-law and women usually share these types of problems with their mother-in-law. If the mother-in-law perceives the illness to be severe, women are then readily granted permission to seek care with their husband giving consent as well. These findings have been reported previously in other countries such as Nepal and China [217, 225].

Socio-cultural factors related to gender clearly impact on a woman's status within her family and in society. Women are given fewer opportunities for education and choice of occupation, influencing their social and economic position and making them increasingly dependent on their spouses. Pakistan has a patriarchal society and women are expected to carry out domestic chores, help in fields, and take care of livestock. In most families, men are the decision makers, even deciding matters related to reproduction and family planning. Women are usually treated as minors [286]. Husband or other males in the family are regarded as the manager of the household income and thus control all matters concerning finances. This situation has been traditional and prevails equally amongst well educated groups as well as poor communities within the country. Non-obedience often results in emotional, psychological, or physical violence being directed to the woman. Therefore, access to health care is usually avoided because of the fear of divorce or abandonment. However, Pakistan is not the only state where women have this low status. These findings are also reported from other countries within south Asia and Africa [218-228, 287, 288].

The second most highly reported barrier was poverty and lack of money that leads to the inability to arrange for transport when complications occur and payments for an institutional birth or arranging for a skilled birth attendant need to be covered. Women and others interviewed frequently reported that the process of deciding to seek care is influenced by the seriousness of the condition, the distance of the health care facility from the home and cash in hand. Even those who can overcome these financial barriers, still end up needing to face problems concerning the quality of care in many health facilities.

Women voiced their hesitance to go to the hospital mostly because of their fear of being torn there, if a caesarean section is required, consistent with a report from Bangladesh [230]. Women fear that doctors avoid spontaneous vaginal birth and surgically intervene for no medical reason. Accommodating two women on one bed further aggravates their fear, and is disrespectful of their privacy. Testimonials have provided evidence on the poor attitude of staff at health care facilities with other reports describing staff behaviour as a major barrier for accessing care [277]. Even on arriving at a health facility, women are often referred on to better equipped facilities because of a local lack of supplies and medicine, which leads to further delays. Women reported ending up with more expenses for ambulance, transport, and drugs on reaching the facility which further prolongs the delay in receiving care [243].

Women and other members of community realize the importance of women's and children's health. Awareness raising sessions need to involve men, elders and religious leaders of the community who often are resistant to change in this area. Previous studies have identified lack of time and lack of health information being available (such as awareness of pregnancy or awareness of dangers of late health care access and infrequent visits) as two of the most important barriers to care-seeking behaviour by pregnant women [289]. Empowerment of women is an opportunity to overcome these barriers and thus play a vital role in improving health care outcome for mothers and their babies. This needs to involve women and men as gender inequality prevails in societies like Pakistan and male family members generally make all decisions [290].

4.6. Conclusion

Urgent strategies have to be implemented not only in reinforcing demand but also in the supply of quality health care. This study has shown that the decision to seek care is mainly made by men and their mothers; therefore, any initiatives to increase the use of maternal and newborn care will need to involve the husbands and mothers-in-law. Use of skilled care and facility care are important pre-requisites for health care seeking to minimize the risk of maternal or neonatal death. To increase the use of health facilities, men as well as women must have information regarding the importance of seeking skilled care during pregnancy and childbirth. Creating demand is one strategy to disseminate information to people particularly men and mothers-in-law on the advantages of using health facilities. Women could help with this if they were empowered with the means to make more money. It is important that women participate in the decision-making process on questions related to their life, their health and that of their babies.

Furthermore, government should ensure health workers at health care facilities have ongoing training to improve the quality of care to women. Health care facilities should be adequately equipped to deal with complications. Health care workers should be supervised and monitored to assess how well they treat women and children in their care. Furthermore, community midwives, LHWs and TBAs should be well trained and they should be provided with equipment, supplies, supervision, and adequate remuneration to work in their community without charging women and their family any fees.

Statement of Authorship

Title of Paper	Improvement of maternal and newborn care seeking in rural Pakistan through Emergency Obstetric and Newborn Care interventions: nested within a cluster randomized trial
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Principal Author

Name of Principal Author (Candidate)	Zohra S Lassi
Contribution to the Paper	ZSL conceptualised the study. ZSL contributed to data analysis, interpretation and write up of the drafts. Finalised the paper and is the overall guarantor.
Overall percentage (%)	100%
Signature	Date: September 03, 2015

Co-Author Contributions

By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);

ii. permission is granted for the candidate in include the publication in the thesis; and

iii. the sum of all co-author contributions is equal to 100% less the candidate's stated contribution.

Name of Co-Author	Philippa F Middleton
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Chapter 5: Can maternal and newborn care seeking in rural Pakistan be improved through Emergency Obstetric and Newborn Care interventions? – A study nested within a cluster randomized trial

5.1. Abstract

Background: Pakistan has one of the highest rates of neonatal mortality. While the potential of community-based interventions to reduce newborn morbidity and mortality is well documented; training community health workers (CHW) in basic and comprehensive emergency obstetric and newborn care (EmONC) for improving the health care seeking for maternal and newborn illnesses has not been addressed.

Methods: We undertook a cluster randomised trial in district Rahimyar Khan, Punjab, Pakistan with the aim of reducing perinatal and neonatal mortality. Twenty clusters were randomised to either intervention or control areas. The intervention package consisted of community mobilization, and enhanced training of CHWs, and maternal and newborn health pack that contained chlorhexidine for the umbilical cord, emollient, clean delivery kits and health messages brochures. Quarterly household surveys were conducted by independent data collectors on births, deaths, and maternal and newborn health care practices. In this paper we focus on health care seeking for maternal and newborn health. Analysis was by intention to treat. This trial is registered with clinicaltrials.gov (NCT01751945).

Findings: The intervention did not show any improvement in overall health care seeking for maternal (RR 0.97; 95% CI: 0.93, 1.01) or newborn illnesses (RR 1.00; 95% CI 0.98, 1.02). Improvements were seen in uptake of any antenatal care (RR 1.06; 95% CI: 1.04, 1.08), tetanus toxoid immunization (RR 1.16; 95% CI: 1.13, 1.20), use of clean delivery kits (RR 1.49; 95% CI: 1.45, 1.54), skilled birth attendance (RR 1.07; 95% CI: 1.04, 1.10), home visits by LHWs (RR 1.11; 95% CI: 1.07, 1.16), application of chlorhexidine to the umbilical cord (RR 211.87; 95% CI: 135.16, 332.12) and emollient use (RR 282.43; 95% CI: 167.29, 467.82).

Conclusion: Although the results did not show a direct impact of EmONC package on improving maternal and neonatal health care seeking during illnesses, improvements were

observed in the uptake of antenatal care attendance, institutional births, skilled birth attendance, and other important pregnancy and newborn care practices including use of clean delivery kits, application of chlorhexidine and use of emollient.

5.2. Introduction

Pakistan still has one of the highest rates of mortality for under five year olds in South Asia (86 deaths per 1000 live births) despite an annual child mortality reduction of 2% [1]. The majority of these deaths occur in the first 28 days of life and the risk of death is 1.3 times higher if a newborn is born in a rural area compared to an urban area (47 newborn deaths per 1000 live births in urban areas *vs* 62 per 1000 in rural areas) [33]. Many deaths occur as a result of avoidable causes and delays in health care seeking [21]. Delays occur at three levels: delay in making the decision to seek care in case of illness; delay in reaching a health centre once the decision to seek care has been made; and delay in receiving adequate care once a facility has been reached [283]. The recent Pakistan Demographic and Health Survey (PDHS) suggests that approximately 63% of women face one or more such delays in health care seeking during illness [33].

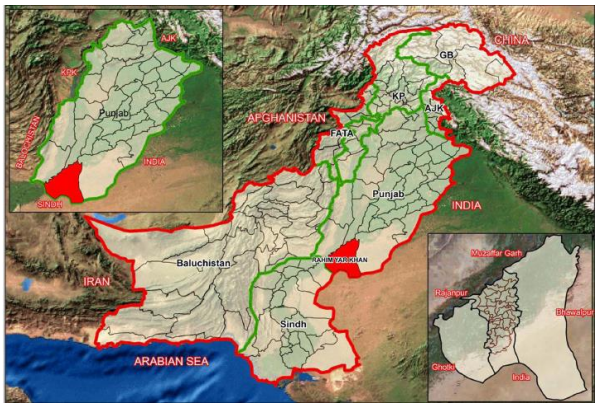
The health care infrastructure of Pakistan comprises a network of basic health units (BHU) and rural health centres (RHC) at community level, staffed with qualified medical doctors and nurses who can provide basic and/or comprehensive emergency obstetric and newborn care (EmONC) services [291]. At the community level, over 100,000 lady health workers (LHW), who are part of the LHW program, are providing basic maternal and newborn health care services [291]. LHWs are not trained for childbirth care and therefore, the Ministry of Health has recently trained and deployed community midwives (CMWs) to replace untrained traditional birth attendants (TBAs) working in communities to provide care during pregnancy and childbirth.

While the potential of community-based interventions to reduce newborn morbidity and mortality is well documented [72, 113, 135]; training LHWs, CMWs and TBAs on basic and comprehensive EmONC for improving perinatal and neonatal mortality has not been well assessed, particularly in Pakistan. We undertook a community-based cluster-randomised trial in rural Pakistan to assess the effectiveness of an EmONC package on reducing perinatal and neonatal mortality [292]. The aim of this study nested within the cluster randomised controlled trial was to assess the effectiveness of the EmONC package on improving health care seeking for maternal and newborn illnesses. We hypothesised that the EmONC package would aid in improving the health care seeking for maternal and newborn health.

5.3. Methods

This study was conducted in district Rahimyar Khan (RYK) of Punjab province during November 2012 to October 2013. Rahimyar Khan is predominantly a rural district and administratively sub-divided into Sadiqabad, Rahimyar Khan, Khanpur and Liaqatpur Tehsils (Figure 1). This study was implemented in Tehsil Rahimyar Khan further sub-divided into 40 Union Councils. Twenty Union Councils were selected for implementation of the trial (10 each for intervention and control sites). The target population was all pregnant women (15 – 49 years) or those who conceived during the course of study, and their newborns. Full methods for the trial are detailed elsewhere [292].

Figure 5.1: Map of Pakistan showing the study site in district Rahimyar Khan, Province Punjab



Briefly, the study was designed as a cluster randomized controlled trial to evaluate the effectiveness of an EmONC package. Qualitative research which was undertaken at the outset of this trial aided in refinement of the intervention package which consisted of community mobilization, maternal and neonatal health pack, and enhanced trainings of community-based health care providers (Box 5.1). Informed verbal consent was sought from representatives of all participating communities involved in the study prior to implementation.

Community mobilization at intervention sites: to create awareness and promote maternal, neonatal and child health in the community, women and their families received awareness sessions. These sessions, conducted by LHWs, provided information on antenatal care, birth preparedness, essential and immediate newborn care, recognition of danger signs, and appropriate referral. An emergency fund was established through local resources for transportation of high risk and complicated cases to health facilities. Expected mothers

were also sent standard health messages related to birth preparedness, antenatal care, institutional births, skilled birth attendance (doctors and nurses), and neonatal care on their mobile phones during pregnancy, and postnatal period to create awareness on issues related to maternal and newborn health.

<table>
<tr><th colspan="4">Box 5.1: Emergency Obstetric and Newborn Care (EmONC) Package [292]</th></tr>
<tr><th></th><th colspan="3">Interventions</th></tr>
<tr><td rowspan="6">For intervention sites</td><td>Community Mobilization</td><td colspan="2">• Advocacy sessions and community mobilization for women of reproductive age, pregnant women, mothers, mother-in-laws, husband, and elders.
• Mobile messages in Urdu for women and families on important events in pregnancy, childbirth and postnatal for maternal and newborn health.
• Funds for emergency transportation.</td></tr>
<tr><td rowspan="5">Maternal and neonatal health pack

Enhanced training of LHW/CMWs/ TBAs</td><td colspan="2">All LHWs, TBAs and CMWs were trained and sensitized through extensive trainings program to recognize, manage and refer high risk pregnancies and early neonatal problems.</td></tr>
<tr><td>Chlorhexidine</td><td>Chlorhexidine was dispensed as 4% solution in 15 ml dispensing bottles to be applied on umbilical cord once daily up to 10 days starting from the first day of life.</td></tr>
<tr><td>Emollient</td><td>50 ml of emollient (sunflower seed oil) in dispensing bottles for newborn massage. The mothers were advised to massage their newborns once a day from third day of life up to twenty eighth day.</td></tr>
<tr><td>Clean delivery kits</td><td>Clean delivery kits include a hotel-size bar of soap for the birth attendant to wash hands both before delivery and prior to cutting the umbilical cord, and to clean the mother’s perineum. The clean delivery kits also had a pair of clean disposable gloves for reducing disease transmission, a square yard of clean plastic sheeting for provision of a clean surface to deliver the baby and one clean single use razor blade for clean cutting of the cord and a sterile thread and cord clamp.</td></tr>
<tr><td>Health messages brochure</td><td>Women were given a brochure containing messages on birth preparedness, awareness and recognition of danger signs in mothers and newborns, acute obstetric and neonatal emergencies and information on immediate care of newborn (prevention of hypothermia in low birth weight babies, immunization and exclusive breast feeding).</td></tr>
<tr><td>All sites</td><td>Health Facility Strengthening</td><td colspan="2">• Strengthening of public health facilities to manage pregnancy, childbirth and newborn complications.
• Development of effective linkage between the field staff, community and health facilities.
• Training of health care workers in BHU and RHC and THQ, DHQs on basic and comprehensive EmONC.
• Provision of emergency tray at all the health care facilities to prepare and equip them with essential lifesaving drugs (such as adrenalin, hydrocortisone and crystalloids) and equipment (such as laryngoscope and endotracheal tubes).</td></tr>
<tr><td colspan="4">Abbreviations: BHU: Basic Health Unit; CMW: Community Midwives; DHQ: District Head Quarter; EmONC: Emergency Obstetric and Newborn Care; LHW: Lady Health Workers; RHC: Rural Health Centre; TBA: Traditional Birth Attendant; THQ: Tehsil Head Quarter</td></tr>
</table>

Maternal and neonatal health pack at intervention sites: LHWs explained and provided women and their families with the pack containing chlorhexidine solution, emollient (sunflower seed oil), clean delivery kit, and the health messages brochure.

Enhanced training at intervention sites: LHWs, CMWs and TBAs received training on basic obstetric and newborn care, recognition of danger signs, and early referral. The LHWs and CMWs were provided with adult and neonatal weighing scales to record the

mother's weight during antenatal visits and their newborn's weight at birth or soon after birth. In addition, the LHWs were provided with amoxicillin drops, to be administered to newborn and infants with suspected sepsis/pneumonia as a first dose (domiciliary care) prior to referral to the nearest health facility for further management.

Women at all study sites received standard care through the existing health system and LHW program that continued to function as usual. However, health facilities of both the intervention and control clusters were strengthened to facilitate EmONC services by building effective linkages with BHUs and RHCs and by equipping them with essential drugs and supplies to manage critical cases. Physicians, lady health visitors and nurses of BHUs and RHCs received training in basic emergency obstetric care, essential newborn care and neonatal resuscitation; and where infrastructure allowed they received training on comprehensive EmONC.

Each Union Council was considered as one cluster and usually contained a BHU or RHC. Each Union Council served between 15,000 – 20,000 people. Each LHW take care of 1000 households. Stratified and computerized block randomization was performed to allocate 20 clusters (10 each) randomly to the intervention and control groups. Baseline covariates used for stratification were maternal and infant mortality rates and access to health centres and the number of health workers, which were considered to be associated with differences in care practices. Due to the nature of intervention, blinding was not possible; however, to ensure reduced measurement bias, data on the effect of the intervention were collected by separate research teams who were not involved in providing the intervention.

Identification of pregnant women was a pre-requisite for seeking consent and enrolling them into the program and providing timely interventions. Therefore, 3-monthly surveillance was conducted in the intervention and control arms in which each household was visited once. Data from baseline and end line surveys were compared using the SPSS 19.0 (SPSS Inc., Chicago, Illinois, USA). Baseline data on socio-demographic characteristics, health seeking patterns, and maternal and neonatal morbidities and mortalities were collected by a team of data collectors who worked independently from LHWs.

Information on knowledge, practices and attitudes regarding maternal and newborn care was collected from mothers who had given birth in all study clusters. Semi-structured questionnaires were used to collect information to minimise the respondent bias by limiting the structured choices to choose from. Other outcomes included health care seeking for maternal and newborn illnesses, antenatal care, tetanus toxoid immunization, use of clean delivery kit, institutional births, birth attendance, complications during and after childbirth (including pre-eclampsia, high blood pressure, perineal problems, preterm labour and birth), application of chlorhexidine to the umbilical cord, emollient use, home visits by LHWs and babies born low birth weight.

The sample size was calculated considering the primary outcomes of mortality for the main trial. Based on national estimates and average cluster size of 15000, we assumed a crude annual birth rate of 20 per 1,000 population and estimated an average perinatal mortality rate of 60 per 1,000 births with a coefficient of variation (k) between clusters of 0.125. The corresponding estimate of an intra-cluster correlation was 0.05 [293]. In order to detect a 20% difference in the mortality rates between intervention and control clusters for over three years with 90% power at 5% significance level, we estimated a sample size requirement of 10 clusters per study arm. For this nested study, we estimated a 10% improvement in health care seeking, however, the post-hoc power calculation for the maternal and neonatal health care seeking outcomes was detected as 100%.

We analysed the primary outcome of this paper (health care seeking for maternal and newborn illnesses) at cluster level. Analysis was by intention to treat. For each cluster, the health care seeking during the intervention phase was calculated and adjusted standard error was calculated using the intra-cluster correlation to provide an estimate of the health care seeking rate associated with the intervention and its 95% confidence interval, while accounting for the cluster randomisation. The study is registered at clinicaltrials.gov, number NCT01751945. The Ethics Review Committee of the Aga Khan University (Ref No. 2146-Ped-ERC-12) and the National Bioethics Committee of Pakistan (Ref No. 4-87/12/NBC-84/RDC/2031) approved the study protocol.

5.4. Results

Key baseline and household characteristics in the intervention and control clusters were similar (Table 5.1). Approximately 40% of the head of the households were literate and 15%

were involved in skilled occupations. Most families owned their own house (>87%) and belonged to the middle wealth quintile. The majority of households had improved toilet facilities (~70%) and water supply (>95%) but only 2% treated their water for drinking; firewood was the main source of fuel for cooking.

Table 5.1: Baseline characteristics of population: Number (%)		
	Intervention (10 clusters)	Control (10 clusters)
Population	234674	229163
Household	234674	229163
Household density	6.6	6.7
Education level of head of household		
Illiterate	20405 (59.5)	20572 (62)
Literate	13892 (40.5)	12605 (38)
Up to Primary	4529 (13.2)	3912 (11.8)
High School	8496 (24.8)	8012 (24.1)
Graduation & above	867 (2.5)	681 (2.1)
Occupation of head of household		
Professional / Technical/ Managerial	1205 (3.5)	972 (2.9)
Skilled Manual	5180 (15.1)	4162 (12.5)
Unskilled Manual	15340 (44.7)	14661 (44.2)
Agriculture	4656 (13.6)	6163 (18.6)
Business	2499 (7.3)	2108 (6.4)
Unemployed	2342 (6.8)	1938 (5.8)
Retired	2111 (6.2)	2158 (6.5)
Housewife	389 (1.1)	340 (1)
Other	592 (1.7)	686 (2.1)
Wealth quintile		
Lowest	6024 (17.6)	7476 (22.5)
Second	6260 (18.2)	7242 (21.8)
Middle	6907 (20.1)	6593 (19.9)
Fourth	7394 (21.5)	6107 (18.4)
Highest	7730 (22.5)	5771 (17.4)
Families owning their own house	30176 (87.9)	29744 (89.6)
Firewood for cooking	25126 (73.2)	20502 (61.8)
Improved source of drinking water	33599 (97.8)	32815 (98.9)
Treat water in any way to make it safer to drink	971 (2.8)	853 (2.6)
Improved toilet facilities	25064 (73)	21410 (64.5)

Among all eligible women, uptake of antenatal care during their last pregnancy was approximately 50%; of these, 90% received antenatal care from a doctor. Only 20% of women suffered from a complication during their last pregnancy and 10% during their last childbirth. Almost 80% of these women consulted a nurse and/or doctor during those complications. Around 13% of the newborns suffered from ill health. Of these, 90% had a consultation with a doctor (Table 5.2).

Table 5.2: Baseline health care seeking pattern		
Any antenatal care received during last pregnancy	11015 (55.7)	10436 (56.2)
From whom was the antenatal care sought?		
LHW	89 (0.8)	80 (0.8)
TBA	156 (1.4)	118 (1.1)
CMW	17 (0.2)	16 (0.2)
LHV/Nurse	965 (8.8)	1125 (10.8)
Private Doctor	8018 (72.8)	7132 (68.4)
Government Doctor	1727 (15.7)	1927 (18.5)
Other	36 (0.3)	30 (0.3)
Any complications during last pregnancy	3826 (19.4)	3847 (20.9)
In case of complications during last pregnancy whom did you visit to seek care		
LHW	53 (1.5)	64 (1.7)
TBA	6 (0.2)	4 (0.1)
CMW	230 (6.4)	357 (9.7)
LHV/Nurse	2610 (72.9)	2566 (70)
Private Doctor	611 (17.1)	614 (16.8)
Government Doctor	40 (1.1)	24 (0.7)
Other	29 (0.8)	36 (1)
Any complications during last childbirth	1685 (10.8)	2140 (14.4)
In case of complications during childbirth whom did you visit to seek care		
LHW	30 (1.8)	32 (1.5)
TBA	52 (3.1)	66 (3.1)
CMW	3 (0.2)	1 (0)
LHV/Nurse	77 (4.6)	122 (5.8)
Private Doctor	967 (58.1)	1223 (57.9)
Government Doctor	495 (29.7)	637 (30.2)
Other	30 (1.8)	31 (1.5)
Any illness in newborn after birth	1983 (13.2)	1893 (13.2)
In case of illness where did you take him/her to seek care		
LHW	9 (0.5)	11 (0.6)
TBA	6 (0.3)	11 (0.6)
CMW	1 (0.1)	3 (0.2)
LHV/Nurse	14 (0.8)	23 (1.3)
Private Doctor	1313 (67)	1282 (68.8)
Government Doctor	471 (24)	424 (22.7)
Homeopathic Doctor	7 (0.4)	5 (0.3)
Religious Healer	45 (2.3)	36 (1.9)
Other	14 (0.7)	13 (0.7)
Self-Medication	11 (0.6)	8 (0.4)
Didn't Seek	70 (3.6)	48 (2.6)

During the trial, a total of 69,538 households were visited to look for eligibility and 97% of these were enrolled for this trial. A total of 18,615 pregnancies in the intervention clusters and 16,799 pregnancies in the control clusters were reported. All pregnancy and newborn care practices and related outcomes were determined through self-reporting in the quarterly household surveillance system. Information about household practices was available for 35,414 pregnancies (Table 5.3). Significantly more women in the intervention clusters compared to control clusters reported seeking health care from unskilled health workers (18% vs 14%; RR 3.17; 95% CI: 2.64, 3.81; P<0.001). However no clear differences were observed in health care seeking from skilled workers between the intervention and control

clusters for maternal (82% vs 86%; RR 0.97; 95% CI: 0.93, 1.01; P=0.062) or neonatal illnesses (98% vs 98.4%; RR 1.00; 95% CI: 0.98, 1.02; P=0.39) (Table 5.3).

Table 5.3: Summary outcomes of practice indictors from quarterly surveillance (Four, 3-monthly quarterly survey between Nov 2012-Oct 2013)

	Intervention clusters	Control clusters	Risk Ratio (95% CI)	Adj Risk Ratio (95% CI)
Number of pregnancies	18615	16799		
Any antenatal care	10389 (55.8%)	8817 (52.5%)	1.06 (1.04, 1.08)*	1.06 (0.88, 1.27)
Tetanus Toxoid Immunization	6980 (37.5%)	5421 (32.3%)	1.16 (1.13, 1.20)*	1.16 (0.83, 1.90)
Use of clean delivery kit	5113 (64.5%)	3224 (43.2%)	1.49 (1.45, 1.54)*	1.49 (1.24, 1.81)*
Institutional birth	4249 (53.6%)	3973 (53.2%)	1.01 (0.98, 1.04)	1.01 (0.83, 1.21)
Skilled birth attendance	4725 (59.6%)	4166 (55.8%)	1.07 (1.04, 1.10)*	1.07 (0.90, 1.26)
Complications during childbirth	1079 (13.6%)	1382 (18.5%)	0.74 (0.68, 0.79)*	0.74 (0.46, 1.16)
Complications after childbirth	815 (10.3%)	819 (11.0%)	0.94 (0.86, 1.03)	0.94 (0.52, 1.67)
Health care seeking for maternal illnesses				
Skilled	671 (82.3%)	702 (85.7%)	0.97 (0.93, 1.01)	0.97 (0.88, 1.06)
Unskilled	144 (17.7%)	117 (14.3%)	3.17 (2.64, 3.81)*	3.17 (2.09, 4.79)*
Low birth weight	314 (29.3%)	164 (28.3%)	1.03 (0.88, 1.21)	1.03 (0.72, 1.48)
LHW visited home after birth	2980 (39.0%)	2523 (35.0%)	1.11 (1.07, 1.16)*	1.11 (0.85, 1.44)
Application of chlorhexidine	4271 (55.9%)	19 (0.3%)	211.87 (135.16, 332.12)*	211.87 (13.25, 7167.91)*
Emollient use	4195 (54.9%)	14 (0.2%)	282.43 (167.29, 467.82)*	282.43 (11.12, 467.82)*
Any newborn illnesses	1567 (20.5%)	1564 (21.7%)	0.94 (0.89, 1.00)	0.94 (0.64, 1.38)
Health care seeking for neonatal illnesses				
Skilled	1423 (98.0%)	1435 (98.4%)	1.00 (0.98, 1.02)	1.00 (0.56, 1.75)
Unskilled	29 (2%)	23 (1.6%)	1.27 (0.74, 2.18)	1.27 (0.26, 5.93)

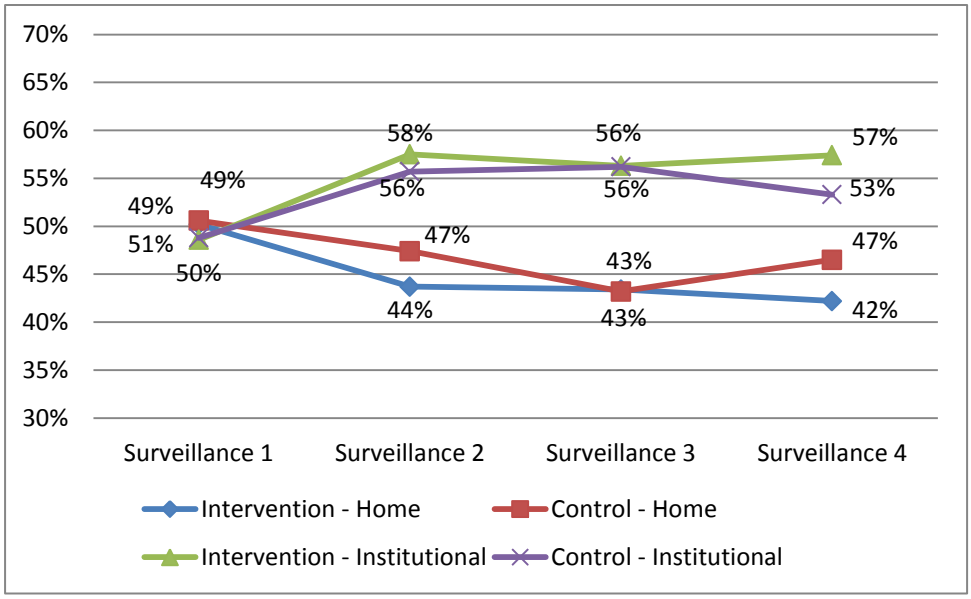
*Significant at 95% Confidence Interval
Adj Risk Ratio: the risk ratios were adjusted for clusters only

More women in the intervention than control clusters reported attendance for any antenatal care (56% vs 53%; RR 1.06; 95% CI: 1.04-1.08; P=0.002), and receiving tetanus toxoid immunization (38% vs 32%; RR 1.16; 95% CI: 1.13-1.20; P=0.002). Among women giving birth at home, the use of clean delivery kits was more likely in the intervention clusters compared with the control clusters (65% vs 43%; RR 1.49; 95% CI: 1.45-1.54; P<0.0001) (Table 5.3).

In the study overall, the presence of a skilled birth attendant at the birth was higher in the intervention compared to control clusters (60% vs 56%; RR 1.07; 95% CI: 1.04-1.10; P<0.0001). Women in the intervention clusters were more likely to report birthing in a facility (54% vs 53%; RR 1.01; 95% CI: 0.98-1.04; P=0.06), although it did not reach the statistical significance (Table 5.3). However, there was clear evidence of an increasing trend towards institutional birth over time in the intervention clusters compared with the

control clusters; and the rate of institutional births at the end of the trial was higher in intervention clusters compared to control clusters (test for difference in trends, P=0.003; Figure 5.2). Similarly, the rates of home births decreased in both the intervention (50% to 42%) and control (51% to 47%) clusters during the trial period; however the rate of reduction was greater in the intervention clusters compared to control clusters (test for difference in trends, P<0.001; Figure 5.2).

Figure 5.2: Institutional and home births during the trial period



Significantly fewer women in the intervention clusters than control clusters reported complications during childbirth (14% vs 19%; RR 0.74; 95% CI: 0.68-0.79; P<0.001). After the birth there was no difference in complications between the clusters (10% vs 11%; RR 0.94; 95% CI: 0.86-1.03; P=0.179 (Table 5.3).

The primary analysis of the surveillance data identified important differences in newborn care practices between the two cluster groups. Women in intervention clusters were more likely than women in control clusters to report applying chlorhexidine to the newborn umbilical cord (56% vs 0.3% RR 211.87; 95% CI: 135.16-332.12; P<0.0001), use emollient (55% vs 0.2%; RR 282.43; 95% CI: 167.29-467.82; P<0.0001), and to receive a postnatal visit from the LHW after birth (39% vs 35%; RR 1.11; 95% CI: 1.07-1.16; P=0.002) (Table 5.3).

After cluster-adjustment, use of a clean delivery kit, application of chlorhexidine to the umbilical cord and use of emollient remained significant between the clusters (Table 5.3). Health care seeking for maternal illnesses from unskilled health worker remained significant on cluster-adjusted secondary analysis.

5.5. Discussion

This community-based EmONC trial did not show improvement in health care seeking rates for maternal and newborn illnesses when the EmONC package was compared with standard care. However, improvements were observed in the uptake of beneficial maternal and newborn care practices. Failure to see an improvement in health care seeking was mainly because it was already high in the both intervention and control clusters at the start of the trial (for maternal illnesses: 81% in intervention vs. 78% in control; and neonatal illnesses: 89% in both the intervention and control clusters). These baseline health care seeking rates were even higher than those reported in national health surveys [33]. According to the PDHS, 63% of the women face problems in accessing health care during illness [33]. We could not compare our findings with an earlier trial on EmONC package from Pakistan because they did not report health care seeking as an outcome; this trial did not show any improvement in fetal and neonatal mortality rates [294].

Effectiveness trials on community-based intervention packages to improve maternal and newborn health through community mobilization and home visitation have shown similar findings on health care seeking for mothers and babies [43, 44, 214, 295]. The pooled analysis from the latest Cochrane systematic review on community-based intervention package showed no significant improvement in health care seeking for maternal illnesses (RR 1.63; 95% CI: 0.39-6.85) [72]. However, increased likelihood for health care seeking for neonatal illnesses was reported (RR 1.42; 95% CI: 1.14-1.77) in this systematic review [72].

In our trial, higher health care seeking rates from unskilled health workers for maternal illnesses were seen at sites where the EmONC package was available compared to control sites. From the qualitative findings it was evident that women and their families consider pregnancy a natural process, and any associated illnesses a part of this normal process

(Refer chapter 4). Therefore, they do not seek care and if a complication arises during pregnancy, they attribute it to spiritual, social or supernatural causes and do not consider them as life threatening. Therefore, women rarely seek biomedical care and generally prefer and refer to traditional birth attendants or other culturally traditional care-givers, such as elderly women in their community, for assistance.

Significant improvements were seen in the uptake of important aspects of pregnancy and newborn care such as use of clean delivery kits, chlorhexidine, and emollient. These interventions have proven effectiveness in reducing the incidence of neonatal morbidity and mortality from earlier trials [295-301]. However, in this trial, the increased uptake was due to the provision of clean delivery kits, sun flower oil and chlorhexidine as part for maternal and neonatal health pack in the intervention clusters only. Improvement in institutional births over the study period was observed and the evidence is consistent with a recent pooled Cochrane meta-analysis which found 20% increase in institutional births with community based intervention packages that involves community mobilization and home visitation by CHWs [72].

Although a cluster randomised controlled trial is considered the most appropriate design for studies of this nature, there are methodological limitations. Firstly, improvement in health care seeking could be the result of a Hawthorne effect as the surveillance research team monitored each household every three months. However health care seeking rates were already high at the start of the trial. Nonetheless, we had anticipated greater impact on maternal and neonatal health care seeking, due to time and funding constraints, implementation could not be extended beyond a year. Secondly, considering the geographical boundaries, the issue of contamination between intervention and control clusters should be considered because there is a possibility of exchange of information between intervention and control clusters through LHWs who have possibly exchanged information through public interactions. Thirdly, the data on women on household practices were based on verbal reports, rather than observed behaviours; therefore, over-reporting of recommended practices in the intervention clusters cannot be excluded. Lastly, the interventions were complex and were delivered utilizing LHWs from Pakistan's biggest primary health care program. The study, therefore, had other challenges such as human resource constraints, the competing demands of other routine activities, and some

weaknesses in system functionality which may affect LHW job stress and performance [302].

Although significant improvement in uptake of effective care practices was identified, we could not quantify the most attributed mechanism for health care seeking because the package involved multiple interventions and strategies. Nevertheless, LHWs played a key part in the implementation of all the components of the EmONC package and therefore the pathway for effectiveness was largely through improved antenatal contact with LHWs leading to improved childbirth care with the use of clean delivery kits and promotion of facility births, and improvements in some elements of immediate newborn care. Similarly, community mobilization for addressing the delays for accessing health care have also been shown to be effective in improving maternal and newborn health care outcomes in recent trials [43, 44, 214, 303, 304]. The pooled analysis from the latest Cochrane systematic review on community-based intervention package showed significant improvement in the uptake of institutional births (RR 1.20; 95% CI: 1.04-1.39), and use of clean delivery kits (RR 1.82; 95% CI: 1.10-3.02) with community mobilization as an strategy for delivery of intervention package [72].

In resource limited settings, a large number of births take place at home generally without a skilled attendant. In these regions, poverty, lack of awareness, and lack of infrastructure often prevents the access to health care facilities. It is, therefore, important to underscore those delays in accessing medical care during emergencies, which are strongly associated with maternal and neonatal deaths. These can be addressed in a number of ways, i.e. through increasing awareness of danger signs, birth preparedness, and arrangement of transportation mechanisms [35]. However, availability of good quality health services plays a major role as well [35].

Community mobilization for behaviour change has long been associated with beneficial impacts on health care seeking behaviour. However, there is growing recognition that providing education and knowledge at the individual level is not sufficient in itself to promote health care seeking which involves complex pathways [305]. Health care seeking is a dynamic, collective, and interactive element. Therefore, engaging decision makers of the households in health promotion, usually husbands and mothers-in-law, may be an effective approach to facilitate change. In addition, improvements in factors such

as literacy, geographic access and service availability may increase families appropriately seeking care from health facilities. This requires a better understanding of the causes of poverty and related problems so that communities can be empowered to take control over resources and decision making.

5.6.Conclusion

The findings from this cluster randomised controlled trial on community mobilization, provision of maternal and newborn health packs, and enhanced training of community health workers offers encouraging evidence of EmONC package in improving health care seeking outcomes for maternal and newborn health. Although it did not show a direct impact on improving health care seeking for maternal and newborn illnesses at univariate level; improvements were observed in the uptake of antenatal care attendance, institutional births, skilled birth attendance, and other important pregnancy and newborn care practices including use of clean delivery kits, application of chlorhexidine to the umbilical cord and use of emollient. In low-resource settings, it is important to develop a sustainable and functioning maternal and newborn care system to avoid delays, improve health care seeking and reduce morbidity and mortality at large.

Chapter 6: Overall conclusions

Significant progress has been made over the decade for reducing maternal and newborn deaths, and improving access to facility services for pregnancy and childbirth in low and middle income countries (LMICs). However the risk of mortality and morbidity for pregnant women and their newborns remain unacceptably high; with 99% of all deaths among women and babies still occurring in LMICs.

Interventions for improving neonatal and later survival

The synthesis of findings from 148 systematic reviews on interventions for mothers and babies found six effective interventions for improving survival among babies and children; these were corticosteroids for pregnant mothers at risk of giving birth early, breastfeeding, hygienic cord care, kangaroo care for babies born early, treated bednets for children, and vitamin A for babies from six months of age. There were 11 promising interventions for babies and children survival; these were antenatal care, tetanus injection during pregnancy, drugs to prevent malaria during pregnancy, inducing labour for prolonged pregnancy, management of sepsis, meningitis and pneumonia in babies, use of surfactant, continuous positive airway pressure for resuscitation among babies, management of malaria and pneumonia among children, vitamin A for measles associated pneumonia for children above 6 months of age and home visits during pregnancy and postnatal period (Table 6.1).

Table 6.1: Effective and promising interventions for improving neonatal and later survival

Effective interventions	Promising interventions
• Corticosteroids for pregnant mothers at risk of preterm birth • Early initiation of breastfeeding • Hygienic cord care • Kangaroo care for preterm babies • Insecticide treated bednets for children • Vitamin A for babies more than six months of age	• Antenatal care • Tetanus toxoid immunization during pregnancy • Prophylactic antimalarials during pregnancy • Induction of labour for prolonged pregnancy • Management of neonatal sepsis, meningitis and pneumonia • Prophylactic and therapeutic use of surfactant • Continuous positive airway pressure for neonatal resuscitation • Management of childhood malaria • Management of childhood pneumonia • Vitamin A as part of treatment for measles associated pneumonia for children above 6 months • Home visits across the continuum of care

Strategies for improving maternal and newborn health care seeking in low and middle income countries (LMICs)

The systematic review of strategies to improve health care seeking, such as home visitation and community mobilization, included a range of different community-based interventions. The review found a significant improvement (47%) in health care seeking for neonatal illnesses; however, no impact was seen on health care seeking for maternal illnesses. Home visitation alone improved health care seeking for newborn illnesses by 61%. However, home visitation in combination with community mobilization showed a significant improvement in health care seeking for maternal (15%) and newborn (71%) illnesses. On the other hand, when birth preparedness counselling was combined with recognition of illnesses and provision of referrals by community health workers (CHWs), significant improvement was seen in health care seeking for maternal (16%) and newborn (65%) illnesses. These strategies also found improvement in stillbirths, perinatal mortality, and neonatal mortality. The review of qualitative studies identified several social, cultural and health services related factors that contribute to delays in health care seeking (Table 6.2).

Table 6.2: Strategies for improving maternal and newborn health care seeking in low and middle income countries

- **Community mobilization** alone is effective for improving health care seeking for neonatal illness.
- **Community mobilization in combination with home visitation** is effective in decreasing neonatal and perinatal mortality.
- **Birth preparedness in combination with recognition of illness and provision of referrals** are effective in improving health care seeking for maternal and newborn illnesses.

Emergency Obstetric and Neonatal Care (EmONC) Package Trial

A community-based cluster randomized controlled trial was conducted in 40 union councils of district Rahimyar Khan of province Punjab, Pakistan to evaluate the impact of an EmONC package on reducing perinatal and neonatal mortality. For the thesis work, we focused on the impact of EmONC package on improving health care seeking for maternal and newborn illnesses.

Health care seeking pathways in rural communities of Pakistan – a qualitative study nested within a cluster randomised trial

The qualitative findings from health care seeking pathways for maternal and newborn illnesses in rural communities of Pakistan suggested several factors that lead to delays.

These include poverty, lack of autonomy, lack of awareness regarding illnesses, workload at home, and poor attitude of health workers at facilities (Table 6.3).

Table 6.3: Barriers for health care seeking in rural communities of Pakistan
Barriers for health care seeking
• Lack of autonomy • Lack of awareness • Lack of money and transport • Absence of male escort • Workload • Attitude of staff at facilities • Procedures and medications

Effectiveness of EmONC package on health care seeking pathways – nested within a cluster randomised trial

The EmONC package that consisted of community mobilization, enhanced training of CHWs, and provision of maternal and newborn pack that contained a clean delivery kit, chlorhexidine for the umbilical cord, emollient, and a health messages brochure showed no overall impact on health care seeking for maternal and newborn illnesses. However, improvements were observed in the uptake of antenatal care (6%), tetanus toxoid immunization (16%), clean delivery kits (49%), skilled birth attendance (7%), home visits by LHWs (11%) and newborn care practices such as application of chlorhexidine to the umbilical cord (211%) and emollient use (282%).

Implications for clinical practice

The implementation into clinical practice of six effective and 11 promising interventions will not only improve neonatal and child survival but also will help in achieving the targets set for Millennium Development Goals (MDG) 4 and 5, which is to reduce child mortality by two-thirds and maternal mortality by three-quarters, respectively. Adoption of effective interventions promises a much needed improvement in neonatal and child outcomes around the world, especially if selected depending on the clinical indications and keeping in mind the need for cost-effectiveness in view of the limited resources in LMICs.

While implementation of effective and promising interventions can improve neonatal and child survival, community-based intervention strategies such as home visitation and community mobilization can increase the awareness, and improve the accessibility of those interventions. These interventions have shown impact on improving the health care seeking

pathways and reducing stillbirths and neonatal deaths. Effective implementation of identified strategies, after addressing other factors causing delays, would lead to significant improvement in mortality, morbidity and care seeking outcomes. Therefore, countries with high burdens of stillbirths, neonatal and child deaths should consider adopting such strategies for implementation.

In Pakistan, strategies are required to prevent delays at all three levels: from decision to seek care, through to recognition of danger signs and illnesses to receiving quality care. Engaging decision makers of the households in health promotion, usually husbands and mothers-in-law, may be an effective approach to facilitate change. Their involvement in health education of other community members may serve to minimize delays in the decision to seek care in the community at large. In addition, improvements in factors such as maternal literacy, coupled with improved geographic access and service availability, may increase families seeking care from health facilities. Home visits by CHWs have also shown improvements in long-standing potentially harmful practices around newborn care, early recognition of symptoms and referrals. However, there is a gap between utilization and quality of care that they receive on approaching facilities. Moreover, CHW strategies need to be integrated with health system strengthening processes, especially in settings with high and increasing demand for facility-based services. Therefore, strategies that can increase health supplies and improve practices of health care professionals need to be mandatory alongside approaches that can help in improving the utilization of health facilities by women. Although the EmONC package did not show any overall impact on improving health care seeking during illnesses, significant improvements were seen in the uptake of other health care seeking related outcomes.

Implications for research

To achieve global goals of reducing maternal, fetal and neonatal mortality, provision of community-based interventions with integration of the basic strategies would be an effective strategy. Unfortunately, the maternal and neonatal mortality rates around the world show a dismal picture in many LMICs. The cost for maternal disability is very high; therefore, ensuring the prompt and effective delivery of these interventions will be an effective strategy. Although the overview has identified interventions for reducing neonatal and later mortality, future research is required to identify the effective interventions for reducing stillbirths and neonatal and child morbidity and improving other health related

outcomes. Cost-effectiveness evaluation of the identified effective and promising interventions would help to further prioritize implementation in resource-limited settings.

The majority of the earlier evidence on strategies for improving health care seeking pathways came from studies conducted in South East Asia, with very limited number of studies from other LMICs such as Africa and Latin America. Thus, there is a clear need for additional high quality research from other developing regions. To prevent illnesses, promote health and to deliver interventions in affordable ways to hard-to-reach communities, there is a need to identify the cost-effectiveness of these strategies.

Health care seeking usually involves a complex behavioural process in response to demographic and socioeconomic factors, perceived need, and service availability. Therefore, it will be important to assess the maternal and newborn health care seeking pathways in other communities of Pakistan. This will highlight the disparity, if any, in health care seeking across different geographical, cultural and socio-economical groups within the country. The assessment of EmONC package in a community setting is relatively new, therefore, randomised trials of longer duration may aid in determining its effectiveness in countries like Pakistan. Moreover, it will be important to assess the impact of different intervention mixes within the package. Future research should focus on optimal content of different strategies and messages for mothers and community health workers and the optimal delivery of these messages to improve recognition of symptoms requiring medical attention.

Overall significance of the work

This thesis work has not only identified the key effective interventions for neonatal and child survival, but has also highlighted the strategies through which interventions can be delivered in communities for improving maternal and newborn health care seeking.

The finding from my thesis work can guide countries with high burden of child mortality to prepare a package that may consists of effective and promising interventions for improving neonatal and child survival. The findings from this thesis work can further aid in designing strategies for delivery of those interventions through the cadre of CHWs. While we do understand that CHWs may not replace the need for skilled care workers, they can play an important role in increasing access to health care and services by creating

an effective link between the community and the formal health system. It is also important to empower community especially women to take part in decision making of matters related to their health and their babies. The best could be to involve husbands in those sessions where they can also take part in understanding the importance of woman's health and issues around pregnancy and childbirth, so that they can prioritize their illnesses and make financial and logistic arrangements for emergency situations. It is also important to raise awareness in community related to the advantages of using health facilities.

Appendix 1: Search Strategy for each intervention reviewed – Chapter 2

Annex 1: Search Strategy for each intervention reviewed				
Interventions	**Search Strategy** **Limited to species (Human), publication date (last 10 years), article type (systematic review, meta-analysis, review, practice guideline), search fields (title/abstract)**	**Date of search**	**# of hits PubMed**	**# of hits Cochrane Library**
Family planning	("birth spacing" OR "Family planning" OR "interval" OR contracept*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 13, 2012	587	2513
Prevention and management of Sexually Transmitted Infections (STIs), including HIV	("sexually transmitted infection*" OR "sexually transmitted disease*" OR STI OR STD OR HIV OR AIDS OR PMTCT OR "prevention of mother to child transmission") AND (Neonat* OR Perinat* OR Stillbirth)	Nov 13, 2012	327	352
Periconceptional folic acid fortification and/or supplementation	("folic acid" OR folate OR "neural tube defects") AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 13, 2012	77	11
Antenatal Care	("Antenatal care" OR ANC) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 13, 2012	37	17
Management of maternal anaemia with iron and folic acid supplementation during pregnancy.	(iron OR "folic acid" OR folate OR "iron-folic acid") AND (pregnan*) AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 13, 2012	89	14
Tetanus immunization in pregnancy for preventing neonatal tetanus.	(tetanus) AND (pregnan*) AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 13, 2012	17	2
Prevention and management of malaria in pregnancy -Prophylactic antimalarial -Provision and promotion of Insecticide Treated Nets	(malaria) AND (pregnan*) AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 13, 2012	49	7
Interventions for smoking cessation during pregnancy	(smok*) AND (pregnan*) AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 13, 2012	128	7
Screening and treatment of syphilis	(syphilis) AND (pregnan*) AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 16, 2012	25	1
Prevention and management of HIV and prevention of mother to child transmission in Pregnancy.	(HIV OR AIDS) AND (pregnan*) AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 16, 2012	148	14
Prevention and management of hypertension in pregnancy -Use of calcium -Low-dose aspirin (anti platelet agents) -Use of antihypertensive drugs -Prevention and treatment of eclampsia	(hypertension OR pre-eclampsia OR preeclampsia OR heart OR aspirin OR calcium OR hypertensive*) (pregnan*) AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 16, 2012	703	103
Reduce malpresentation at term using External Cephalic Version (> 36 weeks)	(external cephalic version) AND (pregnan*) AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 16, 2012	8	4
Induction of labour for management of premature rupture of membranes at term.	("induction of labor" OR "induction of labour") AND (pregnan*) AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	60	30
Antibiotics for management of preterm rupture of membranes.	("preterm rupture of membrane*" OR PROM) AND (antibio*) AND (pregnan*) (Neonat* OR Perinat* OR Stillbirth)	Nov 30, 2010	23	22
Corticosteroids for prevention of neonatal respiratory distress syndrome	(steroid* OR cortisteroid*) AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	68	16
Prophylactic antibiotic for caesarean-section.	(antibio* OR antimicro*) AND (caesarean OR "C- section" OR caesarean OR LSCS) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 30, 2010	9	8
Prophylactic uterotonic to prevent postpartum haemorrhage	(uteroto*) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	14	6
Active management of third stage of labour to prevent postpartum haemorrhage	("third stage" OR "active management") AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	28	10
Induction of labour for prolonged pregnancy	(induction) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	258	37
Caesarean section for maternal indication	(Caesarean OR LSCS OR C- section) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	318	125
Management of post-partum haemorrhage e.g. Uterine massage, uterotonics	(haemorrhage OR "Postpartum haemorrhage") AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	187	114
Advice and provision of family planning	("birth spacing" OR "Family planning" OR "interval" OR contracept*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 13, 2012	587	2513

Prevent, measure and treat maternal anaemia	(iron OR anaemia OR anemia) AND (pregnan*) AND (pregnan*) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 13, 2012	133	22
Detection and management of postpartum sepsis.	(Sepsis OR infection*) AND (Postpartum) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	50	16
Screening and initiation or continuation of Antiretroviral therapy for HIV	(HIV OR ART OR "Antiretroviral therapy") AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	412	23
Promotion and provision of thermal care	("therm*" OR "thermoregulation" OR "skin to skin" OR "skin-to-skin") AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	51	10
Promotion and support for early initiation and exclusive breastfeeding (within the first hour)	(breastfeed* OR "breast feed*") AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	233	51
Promotion and provision of hygienic cord and skin care	(cord OR "cord care" OR hygiene* OR chlorhexidine) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	360	44
Neonatal resuscitation with bag and mask	(resuscitation OR "bag and mask" OR neonatal resus*) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	303	33
Presumptive antibiotic therapy for the newborns at risk of bacterial infection.	(infection OR sepsis) AND (newborn OR neonate* OR baby OR babies) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	905	203
Case management of neonatal sepsis, meningitis and pneumonia.	(sepsis OR infection OR meningitis OR pneumonia) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	1919	231
Kangaroo mother care for preterm and for < 2000g babies.	("kangaroo mother care" OR KMC or "skin to skin" OR "thermal care") AND (Neonat* OR Perinat* OR Stillbirth)	Nov 30, 2010	37	40
Prophylactic and therapeutic use of surfactant to prevent respiratory distress syndrome in pre-term babies	(Surfactant) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	199	37
Continuous positive airway pressure (CPAP) to manage pre-term babies with respiratory distress syndrome	("airway pressure" OR "continuous positive airway pressure" OR CPAP OR "respiratory distress syndrome") AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	399	77
Management of newborn with jaundice	(jaundice) AND (Neonat* OR Perinat* OR Stillbirth)	Nov 28, 2010	147	20
Promotion and support for exclusive breastfeeding for 6 months	(breastfeed* OR "breast feed*") AND (Child* OR Neonat* OR Perinat* OR Stillbirth)	Jan 13, 2013	774	117
Continued breastfeeding up to 2 years and beyond	(breastfeed* OR "breast feed*") AND (Child* OR Neonat* OR Perinat* OR Stillbirth)	Jan 13, 2013	774	117
Appropriate complementary feeding starting at 6 months	(complement* OR "complementary food" OR "complementary feeding") AND (Child* OR Neonat* OR Perinat* OR Stillbirth)	Jan 13, 2013	924	185
Provision and promotion of use of ITN for malaria in children	(malaria OR ITN OR "bed net" OR bednets OR "insecticide") AND (Child* OR Neonat* OR Perinat* OR Stillbirth)	Jan 13, 2013	588	77
Case management of childhood malaria	(malaria) AND (Child* OR Neonat* OR Perinat* OR Stillbirth)	Jan 13, 2013	568	74
Comprehensive care of children infected or exposed to HIV infection	(HIV) AND (child*)	Jan 13, 2013	1261	108
Promote and provide routine immunization plus H. Influenza, meningococcal, pneumococcal, and rotavirus vaccines	(diarrhoea OR Diarrhea OR Pneumonia OR "rotavirus" OR meningi*OR influenza) AND (vaccine* OR immunization) AND (Child* OR Neonat*)	Jan 13, 2013	533	31
Vitamin A supplementation from 6 months of age in Vitamin A deficient populations	("vitamin A") AND (Child*)	Jan 13, 2013	194	43
Management of severe acute malnutrition	(malnutrition OR SAM OR stunting) AND (Child*)	Jan 13, 2013	548	31
Case management of childhood pneumonia	(pneumonia OR ARI OR "acute respiratory infection8")AND (Child*)	Jan 13, 2013	1322	101
Vitamin A as part of treatment for measles-associated pneumonia for children above 6 months	("vitamin A") AND (measles OR Pneumonia) AND (Child*)	Jan 13, 2013	31	13
Vitamin A as part of treatment for non-measles-associated pneumonia for children above 6 months	("vitamin A") AND (measles OR Pneumonia) AND (Child*)	Jan 13, 2013	31	13
Case management of diarrhoea: Acute watery diarrhoea	(diarrhoea OR diarrhea) AND (Child* OR Neonat*)	Jan 13, 2013	790	151
Dysentery	(dysentery) AND (Child* OR Neonat*)	Jan 13, 2013	18	4
Home visits across the continuum of care and women's groups	("community health worker* OR CHW OR "home visit*" OR "community mobile*" OR community) AND (Neonat* OR Perinat* OR Stillbirth)	Dec 4, 2012	265	30

Appendix 2: Characteristics of included reviews – (Chapter 2)

Web Annex 2: Characteristics of included reviews.					
Reviews	**Objective**	**Type of Studies (number)**	**Cochrane/non-Cochrane**	**Pooled Data (Y/N)**	**Outcomes reported**
Conde-Agudelo 2007 [306]	To explore the association between birth spacing and risk of adverse maternal outcomes	Observational studies = 22	Non-Cochrane	Yes	Preeclampsia, maternal outcomes
Conde-Agudelo 2007 [307]	To examine the association between birth spacing and relative risk of adverse perinatal outcomes.	Observational studies = 67	Non-Cochrane	Yes	Preterm birth, low birth weight, and small for gestational age
Kozuki 2013 [45]	To examine the association between short/long birth intervals and adverse neonatal outcomes by calculating and meta-analysing associations using original data from cohort studies conducted in low-and middle-income countries.	Cohort =5	Non-Cochrane	Yes	Small for gestational age, infant mortality, preterm births
Anglemyer 2013 [308]	To determine if ART use in an HIV-infected member of an HIV-discordant couple is associated with lower risk of HIV transmission to the uninfected partner compared to untreated discordant couples.	Observational studies = 7	Cochrane	Yes	Episodes of HIV transmission, index partner's CD4 cell count.
Ng 2011 [309]	To determine the impact of population-based biomedical STI interventions on the incidence of HIV infection.	RCT: 4	Cochrane	Yes	Incident HIV infection, prevalence of syphilis
Blencowe 2010 [46]	To review the evidence for, and estimate the effect of, folic acid fortification/ supplementation on neonatal mortality due to NTDs, especially in low-income countries.	RCT: 3 Observational studies: 8	Non-Cochrane	Yes	NTD recurrence, NTD incidence, congenital abnormalities, neonatal deaths
De-Regil 2010 [47]	This review examined whether folate supplementation before and during early pregnancy can reduce neural tube and other birth defects (including cleft palate) without causing adverse outcomes for mothers or babies.	RCTs: 5	Cochrane	Yes	Prevention of NTDs, incidence of NTDs, reoccurrence of NTDs, cleft palate, cleft lip, congenital cardiovascular defects, miscarriages or any other birth defects.
Imdad 2011 [310]	To evaluate the effectiveness of periconceptional folic acid supplementation in reducing neural tube defects (NTD), related stillbirths and balanced protein energy and multiple micronutrients supplementation during pregnancy in reducing all-cause stillbirths.	RCTs: 18	Non-Cochrane	Yes	NTDs, stillbirths
Carrolli 2001 [121]	A systematic review of randomised trials assessing the effectiveness of different models of antenatal care.	RCTs: 7	Non-Cochrane	Yes	Preeclampsia, urinary-tract infection, postpartum anaemia, maternal mortality, low birth weight
Dowswell 2010 [48]	To compare the effects of antenatal care programmes with reduced visits for low-risk women with standard care.	RCTs: 7	Cochrane	Yes	Perinatal mortality, admission to neonatal intensive care
Homer 2012 [122]	The first objective was to compare the effects of group antenatal care versus one-to-one care on outcomes for women and their babies.	RCTs and q-RCTs : 2	Cochrane	Yes	Preterm birth, low birth weight, small-for-gestational age and perinatal mortality.
Pena-Rosas 2012 [80]	To assess the effects of daily oral iron supplements for pregnant women, either alone or in conjunction with folic acid, or with other vitamins and minerals as a public health intervention.	RCTs and q-RCTs : 43	Cochrane	Yes	low birth weight, mean birth weight, maternal anaemia, iron deficiency at term, side effects, haemoglobin (Hb) concentrations
Pena-Rosas 2012 [311]	To assess the benefits and harms of intermittent supplementation with iron alone or in combination with folic acid or other vitamins and minerals to pregnant women on neonatal and pregnancy outcomes.	RCTs: 21	Cochrane	Yes	Low birth weight, birth weight, premature birth, congenital anomalies, including neural tube defects
Yakoob 2011 [312]	To address the impact of iron with and without folate supplementation on maternal anaemia and provides outcome specific quality according to the Child Health Epidemiology Reference Group (CHERG) guidelines.	RCTs and q-RCTs : 31	Non-Cochrane	Yes	incidence of anaemia at term, iron deficiency anaemia at term
Lassi 2013 [49]	To assess the effectiveness of oral folic acid supplementation alone or with other	RCTs and q-	Cochrane	Yes	Preterm birth, stillbirths/neonatal deaths, mean birth

	micronutrients versus no folic acid (placebo or same micronutrients but no folic acid) during pregnancy on haematological and biochemical parameters during pregnancy and on pregnancy outcomes.	RCTs : 31			weight, anaemia, pre-delivery haemoglobin level, pre-delivery serum folate levels, pre-delivery red cell folate levels, incidence of megaloblastic anaemia
Demicheli 2013 [50]	To assess the effectiveness of tetanus toxoid, administered to women of childbearing age or pregnant women, to prevent cases of, and deaths from, neonatal tetanus	RCTs: 2	Non-Cochrane	No	vaccine effectiveness was 43%
Blencowe 2010 [51]	To review the evidence for and estimate the effect on neonatal tetanus mortality of immunization with tetanus toxoid of pregnant women, or women of childbearing age.	RCT: 1 CT: 1	Non-Cochrane	Yes	mortality from neonatal tetanus
Radeva-Petrova 2014 [81]	To assess drugs given to prevent malaria infection and its consequences in pregnant women living in malarial areas. This includes prophylaxis and intermittent preventive treatment (IPT).	RCTs and q-RCTs : 16	Cochrane	Yes	antenatal parasitaemia, placental malaria, perinatal deaths
Gamble 2007 [82]	To compare the impact of ITNs with no nets or untreated nets on preventing malaria in pregnancy	RCTs: 5	Non-Cochrane	Yes	low birth weight, stillbirths/ abortions in the first to fourth pregnancy
Gamble 2006 [53]	To compare the impact of ITNs with no nets or untreated nets on preventing malaria in pregnancy.	RCTS: 6	Cochrane	Yes	low birth weight, stillbirths/abortions in the first to fourth pregnancy
Eisele 2010[52]	To estimate the effect of ITNs and IRS on preventing malaria-attributable mortality in children 1–59 months, and to estimate the effect of ITNs and IPTp on preventing neonatal and child mortality through improvements in birth outcomes.	RCTs: 14	Non-Cochrane	Yes	protective efficacy, malaria-attributable mortality 1–59 months, prevention interventions in pregnancy
Chamberlain 2013 [83]	To assess the effects of smoking cessation interventions during pregnancy on smoking behaviour and perinatal health outcomes.	RCTs: 86	Cochrane	Yes	reduction in smoking in late pregnancy, relapse
Coleman 2012 [54]	To determine the efficacy and safety of smoking cessation pharmacotherapies, including NRT, varenicline and bupropion (or any other medications) when used to support smoking cessation in pregnancy.	RCTs: 6	Cochrane	Yes	smoking cessation in later pregnancy
Blencowe 2011 [313]	This review sought to estimate the effect of detection and treatment of active syphilis in pregnancy with at least 2.4MU benzathine penicillin (or equivalent) on syphilis-related stillbirths and neonatal mortality.	Observational studies: 25	Non-Cochrane	Yes	Stillbirth, preterm delivery, neonatal deaths
Walker 2001 [314]	To identify the most effective antibiotic treatment regimen (in terms of dose, length of course and mode of administration) of syphilis with and without concomitant infection with HIV for pregnant women infected with syphilis.	RCTs and q-RCTs : 26	Cochrane	No	None matched predetermined criteria for comparison
Wiysonge 2011 [315]	To assess the effects of antenatal and intrapartum vitamin A supplementation on the risk of MTCT of HIV infection and infant and maternal mortality and morbidity, and the tolerability of vitamin A supplementation.	RCTs: 4	Cochrane	Yes	MTCT of HIV infection, birth weight, stillbirths, preterm births, death by 24 months among live births
Read 2005 [316]	To assess the efficacy (for prevention of MTCT of HIV-1) and the safety of elective Caesarean section among HIV-1-infected women.	RCT: 1	Cochrane	No	HIV-1 infection in infants; Postpartum morbidity in women
Shey 2002 [317]	To estimate the effect of vaginal lavage on the risk of MTCT of HIV and infant and maternal mortality and morbidity, as well as tolerability of vaginal lavage in HIV infected women.	RCT: 1	Cochrane	No	Vaginal disinfection on MTCT of HIV
Kesho Bora 2009 [318]	Triple-antiretroviral (ARV) prophylaxis during pregnancy and breastfeeding compared to short-ARV prophylaxis to prevent mother-to-child transmission of HIV-1 (PMTCT): the Kesho-Bora randomized controlled clinical trial in five sites in Burkina Faso, Kenya	1 study in five different location	Non Cochrane	No	Extended triple ARV regimen
Imdad 2011 [55]	To evaluate preventive effect of calcium supplementation during pregnancy on gestational hypertensive disorders and related maternal and neonatal mortality in developing countries.	RCTs: 10	Non-Cochrane	Yes	Gestational hypertension, preeclampsia, neonatal mortality
Hofmeyr 2014 [56]	To assess the effects of calcium supplementation during pregnancy on hypertensive disorders of pregnancy and related maternal and child outcomes.	RCTs: 14	Cochrane	Yes	High blood pressure, preeclampsia, preterm birth, stillbirth or death before discharge from hospital,

					maternal death or serious morbidity
Jabeen 2011 [319]	To review the effect of aspirin, calcium supplementation, antihypertensive agents and magnesium sulphate on risk stillbirths.	RCTs: 82	Non-Cochrane	Yes	Stillbirths
Duley 2007 [320]	To assess the effectiveness and safety of antiplatelet agents for women at risk of developing preeclampsia.	RCTs: 59	Cochrane	Yes	Preeclampsia, maternal risk, preterm birth, foetal or neonatal deaths, small-for-gestational age babies
Askie 2007 [321]	To assess the use of antiplatelet agents for the primary prevention of preeclampsia and to explore which women are likely to benefit most.	RCTs: 31	Non-Cochrane	Yes	preeclampsia, of delivering before 34 weeks, serious adverse outcome
Duley 2013 [322]	To compare different antihypertensive drugs for very high blood pressure during pregnancy.	RCTs: 24	Cochrane	Yes	HELLP, hypotension, eclampsia, respiratory difficulties, postpartum haemorrhage
Magee 2003 [323]	to assess whether oral beta-blockers are overall better than placebo, or no beta-blocker, for women with mild-moderate hypertension during pregnancy, and to assess whether oral beta-blockers have any advantages over other antihypertensive agents for women with mild-moderate hypertension during pregnancy.	RCTs; 27	Cochrane	Yes	Both maternal outcomes (e.g., the incidence of severe hypertension) and perinatal outcomes
Duley 2010 [58]	The objective of this review was to assess the effects of magnesium sulphate compared with diazepam when used for the care of women with eclampsia. Magnesium sulphate is compared with phenytoin and with lytic cocktail in other Cochrane reviews.	RCTs: 7	Cochrane	Yes	Recurrence of seizures, maternal morbidity, perinatal mortality, neonatal mortality, Apgar score
Duley 2010 [57]	The objective of this review was to assess the effects of magnesium sulphate compared with phenytoin when used for the care of women with eclampsia.	RCTs: 7	Cochrane	Yes	Recurrence of seizures, maternal morbidity, perinatal mortality, neonatal mortality, Apgar score
Duley 2010 [84]	To assess the effects of magnesium sulphate, and other anticonvulsants, for prevention of eclampsia.	RCTs: 15	Cochrane	Yes	Eclampsia, maternal death, serious maternal morbidity, placental abruption, caesarean section, stillbirths
Duley 2010 [85]	To assess the effects of magnesium sulphate compared with lytic cocktail (usually chlorpromazine, promethazine and pethidine) when used for the care of women with eclampsia	RCTs: 3	Cochrane	Yes	Maternal deaths, seizures, respiratory depression , coma, pneumonia
Cluver 2012 [86]	To assess interventions such as tocolysis, fetal acoustic stimulation, regional analgesia, trans abdominal amnio infusion or systemic opioids on ECV for a breech baby at term.	RCTs and qRCTs: 25	Cochrane	Yes	Cephalic presentations in labour, caesarean sections
Hutton 2006 [59]	To assess the effectiveness of a policy of beginning ECV before term (before 37 weeks' gestation) for breech presentation on fetal presentation at birth, method of delivery, and the rate of preterm birth, perinatal morbidity, stillbirth or neonatal mortality.	RCTs: 3	Cochrane	No	non-cephalic presentation at birth
Hofmeyr 2012 [324]	The objective of this review was to assess the effects of postural management of breech presentation on measures of pregnancy outcome. We evaluated procedures in which the mother rests with herpelvis elevated. These include the knee-chest position, and a supine position with the pelvis elevated with a wedge-shaped cushion	RCTs: 6	Cochrane	Yes	non-cephalic births, Caesarean section and Apgar score below 7 at one minute
Hofmeyr 2012 [88]	The objective of this review was to assess the effects of ECV at or near term on measures of pregnancy outcome. Methods of facilitating ECV, and ECV before term are reviewed separately	RCTs: 7	Cochrane	Yes	non-cephalic presentation at birth, Caesarean section
Hofmeyr 2003 [87]	To assess the effects of planned caesarean section for singleton breech presentation at term on measures of pregnancy outcome.	RCTs: 3	Cochrane	Yes	Caesarean delivery, perinatal or neonatal death or serious neonatal morbidity, urinary incontinence, abdominal pain, perineal pain
Coyle 2012 [325]	To examine the effectiveness and safety of moxibustion on changing the presentation of an unborn baby in the breech position, the need for external cephalic version (ECV), mode of birth, and perinatal morbidity and mortality for breech presentation.	RCTs: 3	Cochrane	Yes	need for ECV, use of oxytocin before or during
Buchanan 2010 [89]	To assess the effect of planned early birth compared with expectant management for pregnancies complicated with PPROM prior to 37 weeks' gestation.	RCTs: 7	Cochrane	Yes	neonatal sepsis, respiratory distress, incidence of caesarean section

Kenyon 2010 [90]	To evaluate the immediate and long-term effects of administering antibiotics to women with pROM before 37 weeks, on maternal infectious morbidity, fetal and neonatal morbidity and mortality, and longer term childhood development.	RCTs: 22	Cochrane	Yes	Chorioamnionitis, neonatal morbidity, neonatal infection, use of surfactant
Cousens 2010 [60]	To review the evidence for and estimate the effect on neonatal mortality due to pre-term birth complications or infection, of administration of antibiotics to women with pPROM, in low and middle-income countries.	RCTs: 18	Non-Cochrane	Yes	respiratory distress syndrome , early onset postnatal infection, neonatal mortality
Roberts 2006 [63]	To assess the effects on fetal and neonatal morbidity and mortality, on maternal mortality and morbidity, and on the child in later life of administering corticosteroids to the mother before anticipated preterm birth.	RCTs: 22	Cochrane	Yes	Chorioamnionitis or puerperal sepsis, neonatal death, RDS, cerebro-ventricular haemorrhage, necrotising enterocolitis
Mwansa-Kambafwile 2010 [62]	To review the evidence for and estimate the effect on cause-specific neonatal mortality of administration of antenatal steroids to women with anticipated preterm labour, with additional analysis for the effect in low- and middle-income countries.	Studies: 44 RCTs: 18	Non-Cochrane	Yes	neonatal mortality among preterm infant
Brownfoot 2013 [61]	To assess the effects of different corticosteroid regimens for women at risk of preterm birth.	RCTs: 12	Cochrane	Yes	intra-ventricular haemorrhage, respiratory distress syndrome, broncho pulmonary dysplasia, perinatal death, or mean birth weight.
WHO 2003 [326]	Evidence profiles related to the prioritized questions were prepared, based upon recent systematic reviews, most of which are included in the Cochrane Database of Systematic Reviews	-	-	-	-
Kidney 2009 [128]	The objective was to provide a systematic review of the effectiveness of community-level interventions to reduce maternal mortality.	RCTs: 5 Cohort: 8	Non-Cochrane	Yes	Maternal mortality
Lassi 2010 [112]	To assess the effectiveness of community-based intervention packages in reducing maternal and neonatal morbidity and mortality; and improving neonatal outcomes.	RCTs and qRCTs: 18	Cochrane	Yes	Maternal mortality, neonatal mortality, perinatal morality, stillbirths, newborn care practices
Gogia 2010 [113]	To determine whether home visits for neonatal care by community health workers can reduce infant and neonatal deaths and stillbirths in resource-limited settings.	RCTs: 5	Non-Cochrane	Yes	Neonatal death and stillbirth, 2 doses of maternal tetanus toxoid, clean umbilical cord care, early breastfeeding and delayed bathing).
Bhutta 2009 [129]	examines the evidence for community and health systems approaches to improve uptake and quality of antenatal and intrapartum care,	RCTs: 9	Non-Cochrane	Yes	Stillbirths
Hotnett 2013 [327]	To assess the effects of continuous, one-to-one intrapartum support compared with usual care.	RCTs: 21	Cochrane	Yes	spontaneous vaginal birth, intrapartum analgesia, dissatisfaction, caesarean, instrumental vaginal birth, regional analgesia
Smail 2014 [328]	To assess the effects of prophylactic antibiotics compared with no prophylactic antibiotics on infectious complications in women undergoing caesarean section.	RCTs and qRCTs: 95	Cochrane	Yes	febrile morbidity, wound infection, endometritis and serious maternal infectious complications
Westhoff 2014 [329]	To examine the effect of oxytocin given prophylactically in the third stage of labour on maternal and neonatal outcomes.	RCTs: 20	Cochrane	Yes	Blood loss, removal of placenta, blood pressure
Soltani 2010 [330]	To assess the effect of the timing of administration of prophylactic uterotonics (before compared to after placental delivery) on the outcomes related to the third stage of labour.	RCTs: 3	Cochrane	Yes	postpartum haemorrhage, retained placenta, length of labour, postpartum blood loss, haemoglobin, blood transfusion; use of additional uterotonics, incidence of maternal hypotension
McDonald 2004 [331]	To compare the effects of ergometrine-oxytocin with oxytocin in reducing the risk of PPH (blood loss of at least 500 ml) and other maternal and neonatal outcomes.	RCTs: 6	Cochrane	Yes	Blood loss of at least 500 m
Begley 2011 [332]	To compare the effectiveness of active versus expectant management of the third stage of labour.	RCTs and qRCTs: 5	Cochrane	Yes	maternal primary haemorrhage, maternal haemoglobin
McDonald 2013 [91]	To determine the effects of early cord clamping compared with late cord clamping after birth on maternal and neonatal outcomes	RCTs:15	Cochrane	Yes	Postpartum haemorrhage

Pena-Marti 2007 [333]	To determine the efficacy of fundal pressure versus controlled cord traction as part of the active management of the third stage of labour.	RCTs: 0	Cochrane	No	None
Gulmezoglu 2012 [64]	To evaluate the benefits and harms of a policy of labour induction at term or post-term compared to awaiting spontaneous labour or later induction of labour.	RCTs: 19	Cochrane	Yes	Perinatal deaths, caesarean sections
Hussain 2011 [92]	The purpose of this review was to study the possible impact of induction of labour (IOL) for post-term pregnancies compared to expectant management on stillbirths.	Studies: 25 RCTs: 14	Non-Cochrane	Yes	Stillbirths
Hofmeyr 2013 [334]	To determine the effectiveness of uterine massage after birth and before or after delivery of the placenta, or both, to reduce postpartum blood loss and associated morbidity and mortality.	RCTs: 2	Cochrane	No	Blood loss
Tuncalp 2012 [335]	To assess the effects of prophylactic prostaglandin use in the third stage of labour.	RCTs: 72	Cochrane	Yes	severe PPH, blood transfusion
Mousa 2014 [336]	To assess the effectiveness and safety of pharmacological, surgical and radiological interventions used for the treatment of primary PPH	RCTs: 10	Cochrane	Yes	Maternal mortality, hysterectomy, use of uterotonics, blood transfusion, or evacuation of retained products, maternal pyrexia
Lopez 2010 [337]	Assess the effects of educational interventions for postpartum mothers about contraceptive use	RCTs: 8	Cochrane	Yes	Effect on contraceptive use
Dodd 2004 [338]	To assess the clinical effects of treatments for postpartum anaemia, including oral, intravenous or subcutaneous iron/folate supplementation and erythropoietin administration, and blood transfusion.	RCTs: 6	Cochrane	Yes	lactation at discharge from hospital
French 2004 [339]	The effect of different antibiotic regimens for the treatment of postpartum endometritis on failure of therapy and complications was systematically reviewed.	RCTs: 47	Cochrane	Yes	treatment failures
Siegfried 2011 [340]	To determine whether, and to what extent, antiretroviral regimens aimed at decreasing the risk of mother-to-child transmission of HIV infection achieves a clinically useful decrease in transmission risk, and what effect these interventions have on maternal and infant mortality and morbidity.	RCT: 25	Cochrane	No	HIV infection status at birth, at 2 weeks, 4 to 8 weeks, 3 to 4 months, and at 6, 12 and 18 months; HIV or death at 2 weeks, 4 to 8 weeks, 3 to 4 months, and at 6, 12 and 18 months.
McCall 2010 [67]	To assess efficacy and safety of interventions designed for prevention of hypothermia in preterm and/or low birth weight infants applied within ten minutes after birth in the delivery suite compared with routine thermal care.	RCTs: 6	Cochrane	Yes	Heat losses in infants < 28 weeks' gestation, risk of death within hospital stay
Dyson 2005 [114]	To evaluate the effectiveness of interventions which aim to encourage women to breastfeed in terms of changes in the number of women who start to breastfeed.	RCTs: 7	Cochrane	Yes	Increasing breastfeeding initiation rates
Lewin 2010 [115]	To assess the effects of LHW interventions in primary and community health care on maternal and child health and the management of infectious diseases.	RCTs: 82	Cochrane	Yes	Increasing breastfeeding initiation rates
Lassi 2010 [112]	To assess the effectiveness of community-based intervention packages in reducing maternal and neonatal morbidity and mortality; and improving neonatal outcomes.	RCTs and qRCTs: 18	Cochrane	Yes	Maternal mortality, neonatal mortality, perinatal morality, stillbirths, newborn care practices
Imdad 2011 [116]	To assess the effectiveness of breastfeeding promotion interventions on breastfeeding rates in early infancy.	RCTs and qRCTs: 53	Non-Cochrane	Yes	EBF at 4-6 weeks postpartum
Debes 2013 [93]	To review the evidence for early breastfeeding initiation practices and to estimate the association between timing and neonatal outcomes.	prospective studies, including RCTs, and cohort studies = 18	Non-Cochrane	Yes	All-cause neonatal mortality, infection-related neonatal mortality
Lumbiganon 2012 [117]	To evaluate the effectiveness of antenatal BF education for increasing BF initiation and duration.	RCTs: 19	Cochrane	No	BF educational interventions were not significantly better than a single intervention
Imdad 2013 [94]	To evaluate the effects of application of chlorhexidine to the umbilical cord to children born in low income countries on cord infection (omphalitis) and neonatal mortality.	3 RCTs	Non-Cochrane	Yes	All cause neonatal mortality, omphalitis

Imdad 2013 [95]	To determine the effect of application of antimicrobials on newborn's umbilical cord versus routine care for prevention of morbidity and mortality in hospital and community settings.	RCTs: 34	Cochrane	Yes	All cause neonatal mortality, omphalitis
Zupan 2004 [118]	To assess the effects of topical cord care in preventing cord infection, illness and death.	RCTs and qRCTs: 21	Cochrane	Yes	Colonization with antibiotics
Grein 2005 [341]	Among newborns requiring positive pressure ventilation for resuscitation, is effective ventilation and successful resuscitation achieved faster with the LMA compared with either BMV or ETT?	RCT: 1	Cochrane	No	Time to complete insertion of device
Ziino 2002 [342]	To determine if the administration of epinephrine to apparently stillborn and extremely bradycardic newborns reduces mortality and morbidity	RCTs: 0	Cochrane	No	-
Lee 2011 [96]	To estimate the mortality effect of immediate newborn assessment and stimulation, and basic resuscitation on neonatal deaths due to term intrapartum-related events or preterm birth, for facility and home births.	RTs: 2 qRCT: 2 Obs studies: 20	Non-Cochrane	Yes	Preterm birth
Ungerer 2004 [97]	To assess the effect of prophylactic versus selective antibiotic treatment for asymptomatic term neonates born to mothers with risk factors for neonatal infection.	RCTs: 2	Cochrane	No	Neonatal mortality, neonatal sepsis, use of antibiotics
Mtitimila 2004 [343]	To compare effectiveness and adverse effects of antibiotic regimens for treatment of presumed early neonatal sepsis.	RCTs: 2	Cochrane	Yes	Mortality, treatment failure or bacteriological resistance.
Gordon 2005 [123]	To compare the effectiveness and adverse effects of different antibiotic regimens for treatment of suspected late onset sepsis in newborn infants.	RCTs:13	Cochrane	No	Mortality, treatment failure
Sazawal 2003 [124]	This meta-analysis provides estimates of mortality impact of the case-management approach proposed by WHO.	RCTs: 7	Non-Cochrane	Yes	All-cause mortality, pneumonia specific mortality
Zaidi 2011 [68]	We conducted systematic searches of multiple databases to identify relevant studies with mortality data.	RCTs: 7	Non-Cochrane	Yes	All-cause mortality, pneumonia specific mortality
Bhutta 2009 [98]	We reviewed available evidence for community-based antibiotic management strategies for serious neonatal infections.	RCTs:9	Non-Cochrane	Yes	All-cause mortality, pneumonia specific mortality
Lawn 2010 [100]	To review the evidence, and estimate the effect of KMC on neonatal mortality due to complications of preterm birth.	RCTs:9 Obs studies: 5	Non-Cochrane	Yes	Neonatal mortality
Conde-Agudelo 2014 [99]	To determine whether there is evidence to support the use of KMC in LBW infants as an alternative to conventional care after the initial period of stabilization with conventional care.	RCTs:18	Cochrane	Yes	Nosocomial infection, severe illness, lower respiratory tract, not exclusively breastfeeding at discharge, and maternal dissatisfaction
Edmond 2006 [344]	This review summarizes the evidence on feeding LBW infants and serves as the basis for the development of guidelines on feeding LBW infants in developing countries.	Sys reviews, RCTs, observational studies and descriptive studies	Non-Cochrane	No	What to feed and optimal duration of breastfeeding
Soll 2009 [69]	To determine the effect of multiple doses of exogenous surfactant compared to single doses of exogenous surfactant on mortality and complications of prematurity in premature infants at risk for or having respiratory distress syndrome.	RCTs:3	Cochrane	Yes	Pneumothorax and risk of mortality
Soll 1998 [101]	o assess the effect of intratracheal administration of synthetic surfactant in premature newborns with established respiratory distress syndrome (RDS).	RCTs:6	Cochrane	Yes	Pneumothorax, pulmonary interstitial emphysema, patent ductus arteriosus, intra-ventricular haemorrhage, dysplasia, neonatal mortality
Bahadue 2012 [102]	To compare the effects of early vs. delayed selective surfactant therapy for newborns intubated for respiratory distress within the first two hours of life. Planned subgroup analyses include separate comparisons for studies utilizing natural surfactant extract and synthetic surfactant.	RCTs:4	Cochrane	Yes	Pneumothorax and pulmonary interstitial emphysema

Greenough 2008 [103]	To compare the efficacy of: (i) synchronized mechanical ventilation, delivered as high frequency positive pressure ventilation (HFPPV) or patient triggered ventilation - assist control ventilation (ACV) or synchronous intermittent mandatory ventilation (SIMV)) with conventional ventilation (CMV) (ii) different types of triggered ventilation (ACV, SIMV, pressure regulated volume control ventilation (PRVCV) and SIMV plus pressure support (PS)	RCTs:14	Cochrane	Yes	Air leak, duration of ventilation, duration of weaning
Lemyre 2002 [125]	In preterm infants with recurrent apnoea, does treatment with NIPPV lead to a greater reduction in apnoea and need for intubation and mechanical ventilation, as compared with treatment with NCPAP? Does NIPPV increase the incidence of gastrointestinal complications, i.e. gastric distension leading to cessation of feeds, or perforation?	RCTs:2	Cochrane	Yes	Rates of apnea
Subramaniam 2005 [104]	To determine if prophylactic nasal CPAP commenced soon after birth regardless of respiratory status in the very preterm or very low birth weight infant reduces the use of IPPV and the incidence of chronic lung disease (CLD) without adverse effects.	RCTs:2	Cochrane	Yes	Pnuemothorax, use of IPPV, rates of apnea
Ho 2002 [70]	In spontaneously breathing preterm infants with RDS, to determine if continuous distending pressure (CDP) reduces the need for IPPV and associated morbidity without adverse effects	RCTs:6	Cochrane	No	Blood used for exchange transfusion
Thayyil 2006 [345]	To compare the effectiveness of single volume exchange transfusion (SVET) with that of double volume exchange transfusion (DVET) in producing survival without disability and reducing bilirubin levels in newborn infants with severe jaundice.	RCTs:1	Cochrane	Yes	Blood used for exchange transfusion
Mills 2001 [346]	To evaluate the efficacy of fibreoptic phototherapy.	RCTs:31	Cochrane	Yes	Serum bilirubin
Haroon 2013 [347]	A systematic literature search was conducted for RCTs and quasi-experimental studies comparing breastfeeding education or support to routine care. The	RCTs: 21	Non-Cochrane	Yes	Exclusive breastfeeding rates
Kramer 2012 [348]	To assess the effects on child health, growth, and development, and on maternal health, of exclusive breastfeeding for six months versus exclusive breastfeeding for three to four months with mixed breastfeeding (introduction of complementary liquid or solid foods with continued breastfeeding) thereafter through six months.	RCTs: 2 Observational studies: 18	Cochrane	Yes	Exclusive breastfeeding rates
Lassi 2013 [349]	The effect of complementary feeding (CF) (fortified or unfortified, but not micronutrients alone) and education on CF on children less than 2 years of age in low and middle income countries (LMIC).	RCTs and qRCTs: 16	Non-Cochrane	Yes	HAZ, WAZ, stunting
Dewey 2008 [350]	To assess the efficacy and safety of complementary feeding in children less than 24 months.	RCTs and qRCTs: 15	Non-Cochrane	No	HAZ, WAZ, HHZ, Stunting, wasting, malnourishment, morbidity due to infections
Imdad 2011 [351]	To evaluate the two most important and commonly used complementary feeding interventions i.e. nutrition counselling alone and provision of complementary foods (with and without counselling) from 6 – 24 months of age in children in developing countries with the aim to obtain a point estimate of the effectiveness of these strategies for input to the Lives Saved Tool (LiST) model	RCTs and qRCTs: 17	Non-Cochrane	Yes	HAZ, WAZ, HHZ, Stunting
Bhutta 2008 [352]	The effect of complementary feeding (CF) in food secure and food insecure population	RCTs: 7	Cochrane	Yes	HAZ, WAZ, stunting
Lengler 2004 [105]	To assess the impact of insecticide-treated bed nets or curtains on mortality, malarial illness (life-threatening and mild), malaria parasitaemia, anaemia, and spleen rates.	RCTs: 14	Cochrane	Yes	Mortality, malarial illness (life-threatening and mild), malaria parasitaemia, anaemia, and spleen rates.
Meremikwu 2012 [106]	To evaluate the effects of IPTc to prevent malaria in preschool children living in endemic areas with seasonal malaria transmission.	RCTs: 7	Cochrane	Yes	Clinical malaria episode, all-cause mortality
Lengeler 2004 [105]	To assess the impact of insecticide-treated bed nets or curtains on mortality, malarial illness (life-threatening and mild), malaria parasitaemia, anaemia, and spleen rates.	RCTs: 22	Cochrane	Yes	Protective efficacy, severe malaria, parasite prevalence, high parasitaemia, splenomegaly (30% PE), haemoglobin

Thwing 2011 [71]	We performed systematic literature reviews of published studies in P. falciparum endemic settings to determine the protective efficacy (PE) of ACT treatment against malaria deaths among children with uncomplicated malaria, as well as the PE of effective case management including parenteral quinine against malaria deaths among all hospitalized children.	RCTs: 49	Non-Cochrane	Yes	Malaria mortality
Grimwade 2006 [107]	To assess the effects of routinely administered cotrimoxazole on death and illness episodes in children with HIV infection, and in infants of HIV infected mothers.	RCTs: -	Cochrane	No	-
Adeitfa 2009 [353]	To assess the effects of routinely administered cotrimoxazole on death and illness episodes in children with HIV infection, and in infants of HIV infected mothers.	RCTs and qRCT: 0	Cochrane	No	-
Chetty 2010 [354]	The objective of the systematic review was to pool and evaluate the data on the effectiveness of different infant feeding practices from birth to 18months in achieving HIV-free survival of HIV-exposed infants.	RCTS:17 Obs studies: 17 Secondary articles: 18	Non-Cochrane	Yes	Mixed breastfeeding/replacement, feeding up to 6 months of life
Soares-Weiser 2012 [355]	To evaluate rotavirus vaccines approved for use (Rotarix, RotaTeq, and Lanzhou Lamb Rotavirus (LLR)) for preventing rotavirus diarrhoea.	RCTs: 34	Cochrane	Yes	Rotavirus diarrhoea, all-cause diarrhoea, and hospitalizations and need for medical attention
Soares-Weiser 2004 [356]	To assess rotavirus vaccines in relation to preventing rotavirus diarrhoea, death, and adverse events.	RCTs: 64	Cochrane	Yes	Rotavirus diarrhoea, all-cause diarrhoea, and hospitalizations and need for medical attention
Munos 2010 [357]	To assess efficacy and effectiveness trials of rotavirus vaccines	RCTs: 25	Non-Cochrane	Yes	Hospitalizations
Das 2013 [358]	To assess efficacy and effectiveness trials of vaccines	RCTs and qRCTs: 24	Non-Cochrane	Yes	Mortality, rota-virus specific mortality
Imdad 2011 [119]	The purpose of this paper was to get a point estimate of efficacy of vitamin A supplementation in reducing cause specific mortality by using Child Health Epidemiology Reference Group (CHERG) guidelines.	RCTs: 21	Non-Cochrane	Yes	All-cause mortality, diarrhoea specific mortality, meningitis, and pneumonia specific mortality
Imdad 2010 [108]	To evaluate the effect of vitamin A supplementation (VAS) for preventing morbidity and mortality in children aged 6 months to 5 years.	RCTs: 43	Cochrane	Yes	All-cause mortality, diarrhoea specific mortality, meningitis, and pneumonia specific mortality
Mayo-Wilson 2011 [120]	To determine if vitamin A supplementation is associated with reductions in mortality and morbidity in children aged 6 months to 5 years.	RCTs: 43	Cochrane	Yes	All-cause mortality, diarrhoea specific mortality, meningitis, and pneumonia specific mortality
Ahmed 2010 [359]	To evaluate the management of severe acute malnutrition according to WHO guidelines	RCTs: 25	Non-Cochrane	Yes	Mortality, weight gain
Lenters 2013 [360]	To evaluate the effectiveness of interventions for SAM including the World Health Organization (WHO) protocol for inpatient management and community-based management with ready-to-use-therapeutic food (RUTF), as well as interventions for MAM in children under five years in low- and middle-income countries.	RCTs: 14	Non-Cochrane	Yes	Case fatality
Theodaratou 2010 [109]	To assess the effect of pneumonia case management on mortality from childhood pneumonia.	RCTs: 25	Non-Cochrane	Yes	All-cause mortality, pneumonia specific mortality
Lamberti 2013 [126]	To quantify the protective effects of breastfeeding exposure against pneumonia incidence, prevalence, hospitalizations and mortality.	Prospective cohorts: 7 Case control: 3	Non-Cochrane	Yes	Incidence and prevalence of pneumonia, pneumonia mortality, all-cause mortality, hospitalization
Das 2013 [110]	To estimate the effect of community based interventions including community case management on the coverage of various commodities and on mortality due to diarrhoea and pneumonia.	RCTs and qRCTs: 24	Non-Cochrane	Yes	care seeking for pneumonia and diarrhoea, treatment failure, case management
Fawzi 1993 [65]	A two-part meta-analysis of studies examining the relationship of vitamin A supplementation and child mortality.	RCTs: 12	Non-Cochrane	Yes	All-cause mortality,
Sudfeld 2010 [127]	To determine effect estimates of measles vaccine and vitamin A treatment for the Lives	RCTs and qRCT:	Non-Cochrane	Yes	Preventing measles disease

	Saved Tool (LiST).	525			
Brown 2004 [361]	To determine the efficacy of intervention with high-dose vitamin A as an adjunct to standard treatment on outcome in acute lower respiratory tract infection in children in developing countries.	RCTs: 5	Non-Cochrane	Yes	Faster recovery; oxygen requirement; raised respiratory rate; hospital stay, mortality
Wu 2005 [111]	To determine whether adjunctive vitamin A is effective in children diagnosed with non-measles pneumonia.	RCTs: 6	Cochrane	Yes	Mortality, hospital stay
Grotto 2003 [362]	To perform an updated meta-analysis of the effect of vitamin A supplementation on childhood morbidity from respiratory tract infections and diarrhoea.	RCTs: 9	Non-Cochrane	Yes	Incidence of diarrhoea, incidence of respiratory tract infections
Chen 2008 [363]	To assess the effectiveness and safety of vitamin A for preventing acute LRTIs in children up to seven years of age.	RCTs: 10	Cochrane	Yes	Incidence of acute LRTI in one study; an increase in cough and fever; and increased symptoms of cough and rapid breathing
Yakoob 2011 [66]	To determine all-cause mortality and cause-specific mortality and morbidity in children under five in developing countries for preventive zinc supplementation.	RCTs: 8	Cochrane	Yes	Diarrheal-specific mortality and pneumonia-specific mortality
Lazzirini 2013 [364]	To evaluate oral zinc supplementation for treating children with acute or persistent diarrhoea	RCTs: 18	Cochrane	Yes	Diarrheal duration
Gregorio 2009 [365]	To compare polymer-based ORS with glucose-based ORS for treating acute watery diarrhoea.	RCTs: 34	Cochrane	Yes	Unscheduled intravenous infusions, duration of diarrhoea
Hartling 2006 [366]	To compare oral with intravenous therapy for treating dehydration due to acute gastroenteritis in children.	RCTs: 17	Cochrane	Yes	Intravenous infusions, duration of diarrhoea, hospital stay, oral intake
Hahn 2002 [367]	To compare reduced osmolarity oral rehydration solution with the World Health Organization recommended strength for treating diarrhoea in children.	RCTs: 41	Cochrane	Yes	Unscheduled intravenous infusions
Lenters 2013 [368]	to understand which interventions are effective in promoting the use of ORS, and where there are gaps in the literature	RCTs: 19	Non-Cochrane	Yes	Diarrhoea episodes
Das 2013 [369]	To estimate the effect of antiemetic in gastroenteritis in children	RCTs: 7	Non-Cochrane	Yes	Incidence of vomiting and hospitalization
Christopher 2010 [370]	To evaluate the efficacy and safety of antibiotics for treating Shigella dysentery.	RCTs: 16	Cochrane	Yes	Incidence of diarrhoea
Traa 2010 [371]	To review the effect of ciprofloxacin, ceftriaxone and pivmecillinam for the treatment of dysentery in children in the developing countries.	RCTs: 19	Non-Cochrane	Yes	Treatment failure, bacteriological failure and bacteriological relapse
Das 2013 [372]	To review the literature reporting the effect of antibiotics for the treatment of diarrhoea due to cholera, Shigella and Cryptosporidium in children under five years	RCTs: 6	Non-Cochrane	Yes	Mortality and cause specific mortality
Musekiwa 2011 [373]	To compare the safety and efficacy of ORS ≤270 with ORS ≥ 310 for treating dehydration due to cholera.	RCTs: 7	Cochrane	Yes	Biochemical hyponatraemia

Appendix 3: Quality assessment of included reviews (AMSTAR criteria) – Chapter 2

Quality assessment of included reviews (AMSTAR criteria)												
Intervention	Review	AMSTAR Rating Criteria										
		1	2	3	4	5	6	7	8	9	10	11
Pre-pregnancy Interventions												
Family Planning	Conde-Agudelo 2006 [306]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
	Kosuki 2013 [45]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	Y	Y
	Conde-Agudelo 2007 [307]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	Y	Y
Prevention and management of STI, including HIV for PMTCT of HIV and syphilis	Ng 2011 [309]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Anglemyer 2013 [308]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Folic acid fortification and/or supplementation to prevent Neural Tube Defects	Imdad 2011 [310]	Y	Y	Y	CA	Y §	Y	Y	Y	Y	CA	Y
	Blencowe 2010 [46]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
	De-Regil 2010 [47]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Pregnancy interventions												
Antenatal Care	Carroli 2001 [121]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	Y	Y
	Homer 2012 [122]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Dowswell 2010 [48]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Iron and folic acid supplementation during pregnancy	Pena-Rosas 2012 [80]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Pena-Rosas 2012 [311]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Yakoob 2011 [312]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
	Lassi 2013 [49]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Tetanus immunization in pregnancy for preventing neonatal tetanus	Demicheli 2013 [50]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Blencowe 2010 [51]	Y	Y	Y	CA	Y §	Y	Y	Y	Y	CA	Y
Prophylactic antimalarial and ITNs for preventing malaria in pregnancy	Radeva-Petrova 2014 [81]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Gamble 2007 [82]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Gamble 2006 [53]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Eisele 2010 [52]	Y	Y	Y ǂ	Y	Y §	Y	Y	Y	Y	CA	Y
Interventions for smoking cessation during pregnancy for improving birth outcomes	Chamberlain 2013 [83]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Coleman 2012 [54]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Screening and treatment of syphilis	Blencowe 2011 [313]	Y	Y	Y	CA	Y §	Y	Y	Y	Y	CA	Y
	Walker 2001 [314]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
Prevention and management of HIV and Prevention of Mother to Child Transmission in Pregnancy	Wiysonge 2011 [315]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Shey 2002 [317]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Kesho Bora 2009 [318]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Read 2005 [316]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Calcium supplementation in pregnancy	Imdad 2011 [55]	Y	Y	Y ǂ	CA	Y §	Y	Y	Y	Y	CA	Y
	Hofmeyr 2014 [56]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Jabeen 2011 [319]	Y	Y	Y ǂ	Y	Y §	Y	Y	Y	Y	CA	Y
Low-dose aspirin for the prevention of pre-eclampsia in high risk women	Jabeen 2011 [319]	Y	Y	Y ǂ	Y	Y §	Y	Y	Y	Y	CA	Y
	Duley 2007 [320]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Askie 2007 [321]	Y	Y	Y	CA	Y	Y	Y	Y	Y	Y	Y
Use of antihypertensive drugs for treating severe hypertension in pregnancy	Duley 2013 [322]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Quality assessment of included reviews (AMSTAR criteria)												
Intervention	Review	AMSTAR Rating Criteria										
		1	2	3	4	5	6	7	8	9	10	11
	Magee 2003 [323]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Prevention and treatment of eclampsia	Jabeen 2011[319]	Y	Y	Y ¶	Y	Y §	Y	Y	Y	Y	CA	Y
	Duley 2010 phynetoin [57]	Y	Y	Y	N	Y	Y	Y	Y	Y	CA	Y
	Duley 2010 anticonvulsants [84]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Duley 2010 lytic cocktail [85]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Duley 2010 diazepam [58]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Reduce mal presentation at term using external cephalic version (> 36 weeks)	Cluver 2012 [86]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Hutton 2006 [59]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Hofmeyr 2012 planned c sec [87]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Hofmeyr 2003 postural [324]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Hofmeyr 2012 breech [88]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Coyle 2012 [325]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Induction of labour for management of PRoM at term.	Buchanan 2010 [89]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Antibiotics for management of preterm rupture of membranes	Kenyon 2013 [90]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Cousens 2010 [60]	Y	Y	Y ¶	CA	Y §	Y	Y	Y	Y	CA	Y
Childbirth Interventions												
Corticosteroids for prevention of neonatal respiratory distress syndrome	Mwansa-Kambafwile 2010 [62]	Y	Y	Y ¶	Y	Y §	Y	Y	Y	Y	CA	Y
	Roberts 2006 [63]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Brownfoot 2013 [61]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Management of unintended pregnancy	WHO 2003 [326]	Y	Y	Y	CA	Y §	Y	Y	Y	Y	CA	Y
Social support during childbirth	Hodnett 2013 [327]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Prophylactic antibiotic for caesarean-section	Smaill 2014 [328]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
Prevention of postpartum haemorrhage	Westhoff 2013 [329]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Soltani 2010 [330]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Active management of third stage of labour to prevent postpartum haemorrhage	Begley 2011 [332]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	McDonald 2004 [331]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	McDonald 2013 [91]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Pena-Marti 2007 [333]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Induction of labour for prolonged pregnancy	Gulmezoglu 2012 [64]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Hussain 2011 [92]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
C-section for absolute maternal indication (e.g. obstructed labour and central placenta previa)												
Management of post-partum haemorrhage e.g.: uterine massage	Hofmeyr 2013 [334]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Uterotonics	Tuncalp 2002 [335]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Mousa 2014 [336]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Postpartum interventions												
Advice and provision of family planning	Lopez 2010 [337]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Prevent, measure and treat maternal anaemia	Dodd 2004 [338]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Detection and management of postpartum sepsis	French 2004 [339]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
Screening and initiation or continuation of ARV therapy for HIV	Siegfried 2011 [340]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
Neonatal Interventions												

Quality assessment of included reviews (AMSTAR criteria)												
Intervention	Review	AMSTAR Rating Criteria										
		1	2	3	4	5	6	7	8	9	10	11
Promotion and provision of thermal care for all newborns to prevent hypothermia	McCall 2010 [67]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Promotion and support for early initiation and exclusive breastfeeding (within the first hour)	Lassi 2010 [112]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Dyson 2005 [114]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Lewin 2010 [115]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Imdad 2011 [116]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
	Lumbiganon 2012 [117]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Debes 2013 [93]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
Promotion and provision of hygienic cord and skin care	Zupan 2004 [118]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Imdad 2013 [94]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
	Imdad 2013 [95]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
Neonatal resuscitation with bag and mask for babies who do not breath at birth	Grein 2005 [341]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Ziino 2002 [342]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Lee 2011 [96]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
Newborn Immunization												
Presumptive antibiotic therapy for the newborns at risk of bacterial infection	Ungerer 2004 [97]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Mtitimila 2004 [343]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
Case management of neonatal sepsis, meningitis and pneumonia	Gordon 2005 [123]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Sazawal 2003 [124]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	Y	Y
	Zaidi 2011 [68]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Bhutta 2009 [98]	Y	Y	Y ≀	CA	Y §	Y	Y	Y	Y	CA	Y
Kangaroo mother care for preterm and for < 2000g babies	Lawn 2010 [100]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Conde-Agudelo 2014 [99]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Extra support for feeding the small and preterm baby	Edmond 2006 [344]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Prophylactic and therapeutic use of surfactant to prevent respiratory distress syndrome in pre-term babies	Soll 2009 [69]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Soll 1998 [101]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Bahadue 2012 [102]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Continuous positive airway pressure (CPAP) to manage pre-term babies with respiratory distress syndrome	Greenough 2008 [103]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Lemyre 2002 [125]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Ho 2002 [70]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Management of newborns with jaundice	Thayyil 2006 [345]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Mills 2001 [346]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Infant and child health interventions												
Promotion and support for exclusive breastfeeding for 6 months	Imdad 2011 [116]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
	Dyson 2005 [114]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Haroon 2013 [347]	Y	Y	Y	CA	Y §	Y	Y	Y	Y	CA	Y
Continued breastfeeding up to 2 years and beyond	Kramer 2012 [348]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Appropriate complementary feeding starting at 6 months	Bhutta 2008 [352]	Y	Y	Y ≀	Y	Y §	Y	Y	Y	Y	CA	N
	Dewey 2008 [350]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Imdad 2011 [351]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
	Lassi 2013 [349]	Y	Y	Y	Y	Y §	Y		Y	Y	Y	Y
Provision and promotion of use of insecticide treated bed nets for children	Lengeler 2004 [105]	Y	Y	Y	Y	Y	Y	Y		Y	CA	Y

Quality assessment of included reviews (AMSTAR criteria)

Intervention	Review	AMSTAR Rating Criteria										
		1	2	3	4	5	6	7	8	9	10	11
Case management of childhood malaria	Eisele 2010 [52]	Y	Y	Y ≀	Y	Y §	Y	Y	Y	Y	CA	Y
	Meremikwu 2012 [106]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Thwing 2011 [71]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Comprehensive care of children infected or exposed to HIV infection	Grimwade 2006 [107]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Siegfried 2011 [340]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Adetifa 2009 [353]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Chetty 2010 [354]	Y	Y	Y ≀	Y	Y	Y	Y	Y	Y	CA	Y
Promote and provide routine immunization plus *H. Influenza*, meningococcal, pneumococcal, and rotavirus vaccines	Soares-Weiser 2012 [355]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Soares-Weiser 2004 [356]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Munos 2010 [357]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
	Das 2013 [358]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
Vitamin A supplementation from 6 months of age in Vitamin A deficient populations	Imdad 2011 [119]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	Y	Y
	Imdad 2010 [108]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Mayo-Wilson 2011 [120]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	Y	Y
Management of severe acute malnutrition	Ahmed 2010 [359]											
	Lenters 2013 [360]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
Case management of childhood pneumonia	Theodoratou 2010 [109]	Y	Y	Y ≀	Y		Y	Y	Y	Y	CA	Y
	Sazawal 2003 [124]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	Y	Y
	Lamberti 2013 [126]	Y	Y	Y ≀	Y	Y §	Y	Y	Y	Y	CA	Y
	Das 2013 [110]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
Vitamin A as part of treatment for measles-associated pneumonia for children above 6 months	Fawzi 1993 [65]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
	Sudfeld 2010 [127]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
Vitamin A as part of treatment for non-measles-associated pneumonia for children above 6 months	Wu 2005 [111]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Brown 2004 [361]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Grotto 2003 [362]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Chen 2008 [363]	Y	Y	Y	Y	Y	Y	Y	Y	Y	CA	Y
Case management of diarrhoea: Acute watery diarrhoea	Yakoob 2011 [66]	Y	Y	Y	CA	Y §	Y	Y	Y	Y	CA	Y
	Lazzerini 2013 [364]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Gregorio 2009 [365]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Hartling 2006 [366]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Hahn 2002 [367]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Das 2013 [369]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	Ca	Y
	Lenters 2013 [368]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
Dysentery	Christopher 2010 [370]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Traa 2010 [371]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Musekiwa 2011 [373]	Y	Y	Y	CA	Y	Y	Y	Y	Y	CA	Y
	Das 2013 [372]	Y	Y	Y	Y	Y §	Y	Y	Y	Y	CA	Y
Home visits across the continuum of care women's groups	Kidney 2009 [128]	Y	Y	Y	CA	Y §	Y	Y	Y	Y	CA	Y
	Bhutta 2009 [129]	Y	Y	Y	Y	Y §	N	N	N	Y	CA	Y
	Gogia 2010 [113]	Y	Y	Y	CA	Y §	Y	Y	Y	Y	Y	Y
	Lassi 2010 [112]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Quality assessment of included reviews (AMSTAR criteria)

Intervention	Review	AMSTAR Rating Criteria										
		1	2	3	4	5	6	7	8	9	10	11

ɻ Couldn't assess if two people undertook the exercise.
§ Yes for included studies only.

AMSTAR criteria points:

1. Was an 'a priori' design provided?
2. Was there duplicate study selection and data extraction?
3. Was a comprehensive literature search performed?
4. Was the status of publication (i.e. grey literature) used as an inclusion criterion?
5. Was a list of studies (included and excluded) provided?
6. Were the characteristics of the included studies provided?
7. Was the scientific quality of the included studies assessed and documented?
8. Was the scientific quality of the included studies used appropriately in formulating conclusions?
9. Were the methods used to combine the findings of studies appropriate?
10. Was the likelihood of publication bias assessed?
11. Was the conflict of interest included?

Appendix 4: Characteristics of included studies: RCTs – Chapter 3

Author/year	Country	Target population	Intervention	Comparison	Duration of intervention	Outcomes reported	Quality assessment
Acharya 2015 [374]	India	Expectant mothers (n=11885)	**Community mobilization** To raise awareness of essential maternal and newborn health care through communication and advocacy activities to promote safe pregnancy and neonatal care, directly at the village level and through mass campaigns at a district level. (L1) and L2 areas where they received more intense mobilization that included L1 and strengthening village health and sanitation committees (established at the panchayat level to improve accountability related to supply of funds, facilities, commodities, and services needed to support core maternal and newborn health activities).	No comparison	2 years	Neonatal deaths and other care related outcomes	Selection=LR Performance and detection = LR Attrition=UC Reporting = LR
Fotrell 2013 [375] **ISRCTN01805825**	Bangladesh	Women of reproductive age (19301 live births)	**Community mobilization** Participatory learning and action cycle (n=9106)	Standard care (n=10204)	2.5 years	Stillbirths Neonatal deaths Perinatal deaths Maternal deaths and other care related outcomes	Selection=LR Performance and detection = LR Attrition=LR Reporting = LR
Persson 2013 [376] **ISRCTN44599712**	Vietnam	Women of reproductive age (22561 births)	**Community mobilization** Laywomen facilitated monthly meetings during the 3 years in groups composed of health care staff and key persons in the communes. A problem-solving approach was employed including identifying and prioritizing local perinatal health problems and accomplishing improvement cycles that included concrete actions on prioritization problems (n=11906).	Standard care (n=10655)	3 years	Stillbirths Neonatal mortality Maternal mortality Perinatal mortality Other care related outcomes	Selection = LR Performance and detection = LR Attrition = UC Reporting = LR
Lewycka 2013 [377, 378] **ISRCTN06477126**	Malawi	Women of reproductive age (26262 births)	**Community mobilization** Community action cycle and home visits at five time points during pregnancy and after birth (n=13683) **Home visitation** Peer counsellors made five home visits during and after pregnancy and provided education on exclusive breastfeeding, infant care, immunization, MTCT, and family planning (n=14022)	Standard care (n=14548)	4 years	Stillbirths Neonatal deaths Perinatal deaths Infant deaths Maternal deaths and other care related outcomes	Selection=LR Performance and detection = LR Attrition=LR Reporting = LR

Author/year	Country	Target population	Intervention	Comparison	Duration of intervention	Outcomes reported	Quality assessment
			Community mobilization and home visitation (n=13678)				
Kirkwood 2013 [379] **NCT00623337**	Ghana	Pregnant women (16329 deliveries)	**Home visitation** Home visits during pregnancy to promote essential newborn-care practices, assess babies for danger signs, and refer as necessary (n=9885).	Standard care (n=10096)	1 year	Neonatal health care seeking outcome Stillbirths Neonatal deaths Perinatal deaths Infant deaths Maternal deaths and other care related outcomes	Selection=LR Performance and detection = LR Attrition=LR Reporting = LR
Nsibande 2013 [380-382] **ISRCTN41046462**	South Africa	Pregnant women (n=2423)	**Home visitation** Home visits made to mothers on uptake of PMTCT interventions and appropriate newborn care practices. Babies with illness or identified danger signs were referred and also assessed the effectiveness of this referral system (n=2423)	Standard care	3 years	Care related outcomes	Selection=UC Performance and detection = LR Attrition=UR Reporting = LR
Magoma 2013 [383] **ACTRN 12609000268246**	Tanzania	Pregnant women (905)	**Enhanced Perinatal care/education** Introduction and promotion of birth plans by care providers (n=404)	Standard care (501)	8 months	Perception of quality care, EMONC and postnatal care related outcomes	Selection=LR Performance and detection = HR Attrition=LR Reporting = LR
More 2012 [384, 385] **ISRCTN96256793**	India	Women of reproductive age (18197 births)	**Community mobilization** Action learning cycle in which they discussed perinatal experiences, improved their knowledge, and took local action (n=9155 births)	Standard care (n=9042 births)	3 years	Stillbirths Neonatal deaths Extended perinatal deaths And other care related outcomes	Selection=LR Performance and detection = LR Attrition=LR Reporting = LR
Colbourn 2012 [386] **ISRCTN18073903**	Malawi	Women of reproductive age (160576 births)	**Community mobilization** Participatory women's group community intervention (5080 births)	Standard care (4919 births)	2 years	Stillbirths Neonatal deaths Perinatal deaths Maternal deaths And other care related outcomes	Selection=LR Performance and detection = LR Attrition=LR Reporting = LR
Bhandari 2012 [387] **NCT00474981**	India	29,667 births in intervention clusters and 30,813 in control clusters.	**Community mobilization and home visitation** Community health workers were trained to conduct postnatal home visits and women's group meetings; physicians, nurses, and community health workers were trained to treat or refer sick newborns and children; supply of drugs and supervision were strengthened.	Standard care	1.5 years	neonatal mortality, stillbirths, perinatal mortality, infant mortality post neonatal mortality Other care related outcomes	Selection=LR Performance and detection = LR Attrition=UR Reporting = LR

Author/year	Country	Target population	Intervention	Comparison	Duration of intervention	Outcomes reported	Quality assessment
Bhutta 2011 [43, 388] **ISRCTN16247511**	Pakistan	Women of reproductive age (26987 pregnancies)	**Community mobilization and home visitation** Creation of volunteer-based village health committees, basic training and linkage of traditional birth attendants with LHWs, promotion of antenatal care, immediate newborn care, training in group counselling and communication strategies, recognition of sick newborn babies and danger signs for referral (n=14152)	Standard care (n=12835)	2 years	Stillbirths Neonatal deaths Perinatal deaths Maternal deaths And other care related outcomes	Selection=LR Performance and detection = LR Attrition=LR Reporting = LR
Wu 2011 [389] **NCT 01054235**	China		**Enhanced Perinatal care/education** Training township hospital midwives and instructing them in how to provide systematic maternal care, 2) informing women in the community of the importance of prenatal care, 3) if needed, providing basic medical instruments to the hospitals (n=673)	Standard care (n=591)	2.5 years	Stillbirths Neonatal deaths Perinatal deaths And other care related outcomes	Selection=LR Performance and detection = LR Attrition=UR Reporting = LR
Gill 2011[390] **NCT00518856**	Zambia	3559 infants	**Enhanced Perinatal care/education** Training in a modified version of the neonatal resuscitation protocol, and single dose amoxicillin coupled with facilitated referral of infants to a health centre (n=2007)	Control birth attendants continued their existing standard of care (basic obstetric skills and use of clean delivery kits). (n=1552)	2.5 years	neonatal mortality, stillbirths, perinatal mortality, Other care related outcomes	Selection=LR Performance and detection = LR Attrition=LR Reporting = LR
Okeibunor 2011 [391]	Nigeria	Women (n=1372)	**Enhanced Perinatal care/education** Under the CDI programme, volunteer community-directed distributors (CDDs) trained to deliver ITNs and IPTp drugs as well as basic counselling services to pregnant women. (n=751)	Standard care (n=621)	-	Care related outcomes	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR
Tripathy 2010 [295] **ISRCTN21817853**	India	18207 live births	**Community mobilization** Implemented a participatory learning cycle, through developing women's groups where they identify and prioritize maternal and newborn health problems in their community, collectively selected relevant strategies to address those problems, implemented the strategies, and evaluated the results (n=9770)	Health committees in control clusters were formed to give Community a voice in the design and management of local health services (n=9620)	2 years	Maternal and neonatal health care seeking Neonatal mortality, stillbirths, perinatal mortality, maternal mortality Other care related outcomes	Selection=UR Performance and detection = HR Attrition=LR Reporting = LR
Azad 2010 [392] **ISRCTN5479206**	Bangladesh	29889 live births	**Community mobilization** Implemented a participatory learning and action cycle in which they identify and	Control group was not provided with participatory learning	2 years	Neonatal health care seeking outcome Neonatal mortality,	Selection=LR Performance and detection = HR Attrition=LR

Author/year	Country	Target population	Intervention	Comparison	Duration of intervention	Outcomes reported	Quality assessment
6			prioritize problems, then formulate strategies and lastly implemented and monitored and finally evaluated the process +intervention group was again divided into two according to the trained TBAs for asphyxia or not (n=20943)	groups (n=22774)		stillbirths, perinatal mortality, maternal mortality Other care related outcomes	Reporting = LR
Darmstadt 2010 [393, 394] **NCT00198627**	Bangladesh	A total of 4616 and 5241 live births were recorded from 9987 and 11153 participants	**Home visitation** Community health workers identified pregnant women; made two antenatal home visits to promote birth and newborn care preparedness; made four postnatal home visits to negotiate preventive care practices and to assess newborns for illness; and referred sick neonates to a hospital and facilitated compliance. (n=4616 live births)	Standard care (n=5241 live births)	3 years	Neonatal mortality, stillbirths, perinatal mortality, Other care related outcomes Health care seeking outcomes	Selection=LR Performance and detection = LR Attrition=LR Reporting = LR
Midhet 2010 [44]	Pakistan	1661 pregnant women	**Community mobilization** The IEEC for women was designed to increase awareness of safe motherhood and neonatal health. To women only (n=836) **Community mobilization** To couples (n=703)	Standard care (n=1022)	4 years	Maternal health care seeking, neonatal mortality, stillbirths, perinatal mortality, maternal mortality Other care related outcomes	Selection=LR Performance and detection = UR Attrition=UR Reporting = LR
Kumar 2008 [214, 303, 304, 395] **NCT00198653**	India	Population 104,123	**Community mobilization and home visitation** Home visitation and community empowerment to promote essential newborn (n=1625) **Community mobilization and home visitation** Home visitation and community empowerment to promote essential newborn + thermospot (n=1175)	A control group received the usual services (n=1173)	16 months	Maternal and neonatal health care seeking, maternal mortality, neonatal mortality, stillbirths, perinatal mortality, Other care related outcomes	Selection=LR Performance and detection = LR Attrition=LR Reporting = LR
Bhutta 2008 [42, 396] **ISRCTN16247511**	Pakistan	Women of reproductive age	**Community mobilization and home visitation** Home-based newborn care and Community organization and mobilization and group education sessions to establish an emergency transport fund for mothers and newborns (n=1478)	LHW training in home based newborn care (n=1401)	24 months	Neonatal mortality, stillbirths, perinatal mortality Care related outcomes	Selection=UR Performance and detection = LR Attrition=UR Reporting = LR
Sloan 2008 [397]	Bangladesh	Women of reproductive age (4165 live births)	**Enhanced Perinatal care/education** Trained community workers to teach CKMC to expectant mothers (n=2080)	No CKMC care education (n=2003)	6 months	Neonatal health care seeking outcome Neonatal mortality Infant mortality Care related	Selection=LR Performance and detection = HR Attrition=LR Reporting = LR

Author/year	Country	Target population	Intervention	Comparison	Duration of intervention	Outcomes reported	Quality assessment
						outcomes	
Bashour 2008 [398]	Syria	876 women	**Home visitation** Registered midwives with special training made a one or a series of home visits providing information, educating, and supporting women 4 postnatal home visits (n=285) **Home visitation** one visit home visits (n=294)	no visit (n=301)	4 months	Care related outcomes Maternal health care seeking	Selection=HR Performance and detection = HR Attrition=UR Reporting = LR
Mboyne 2008 [399]	Uganda	Pregnant women	**Enhanced Perinatal care/education** Fifty-one community workers were trained for dangers of malaria in pregnancy; malaria-prevention interventions; the benefits and side-effects of SP; taking blood samples for parasite count; haemoglobin analysis; taking the baby's weight; and estimating the gestational age (n=2081)	Routine delivery of IPTp (n=704)	-	Care related outcomes	Selection=LR Performance and detection = UR Attrition=UR Reporting = LR
Baqui 2008 [400] **NCT00198705**	Bangladesh	19557 pregnant women 19525 deliveries	**Home visitation** Trained all TBAs for improved services for enhanced referrals, antenatal care and postpartum visits, and provided them with delivery kits. TBAs were also linked with Lady Health Workers (LHWs) in the community (n=14880) **Community mobilization** Community mobilization (n=16499)	TBAs were not trained and did not receive delivery kits. Routine care was delivered by LHWs (n=15779)	2 years	Neonatal mortality, stillbirths, perinatal mortality, Other care related outcomes	Selection=LR Performance and detection = HR Attrition=LR Reporting = LR
Mullany 2007 [401]	Nepal	442 pregnant women	**Enhanced Perinatal care/education** Education with husband antenatal health education (n=133) **Enhanced Perinatal care/education** Couple education – antenatal health education (n=130)	No education at all (n=149)	One session of education	Care related outcomes	Selection=LR Performance and detection = UR Attrition=UR Reporting = LR
Bari 2006 [402]	Bangladesh	3228 deliveries	**Home visitation** Promoting care-seeking for sick newborns through health education of families, identification and referral of sick newborns in the community by community health workers (CHWs), and strengthening of neonatal care (n=520)	Standard care (n=548)	2 years	Neonatal health care seeking Care related outcomes	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR
Jokhio 2005 [403]	Pakistan	19559 women	**Enhanced Perinatal care/education** Trained TBA to provide antepartum, intrapartum, and postpartum care; clean delivery; refer women for emergency obstetrical care; and care of the newborn.	Usual care (n=9443)	6 months	Maternal mortality, neonatal mortality, stillbirths, perinatal mortality, other care related outcomes	Selection=UR Performance and detection = LR Attrition=UR Reporting = LR

Author/year	Country	Target population	Intervention	Comparison	Duration of intervention	Outcomes reported	Quality assessment
			(n=10114)				
Manandhar 2004 [298-301] **ISRCTN31137309**	Nepal	Women of reproductive age	**Community mobilization** Participatory learning skills and generated information on pregnancy and childbirth, covering beliefs and practices in both uncomplicated and complicated pregnancies (n=3036).	improvements in equipment and training provided at all levels of the healthcare System (n=3344).	2 years	Maternal and neonatal health care seeking, maternal mortality, neonatal mortality, stillbirths, perinatal mortality, maternal deaths, other care related outcomes	Selection=LR Performance and detection = HR Attrition=LR Reporting = LR
Srinivasan 1995 [404]	India	1623 pregnancies	**Enhanced Perinatal care/education** In high risk intervention package group trained midwives identified high-risk pregnancies and intervened accordingly TNG intervention package group does not include identification of high risk pregnancies (n=573)	Received general health services and no special inputs were provided by project staff (n=594)	3 years	Care related outcomes	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR

Appendix 5: Characteristics of included studies: non-RCTs – Chapter 3

Author/year	Country	Target population	Intervention	Comparison	Duration of intervention	Outcomes reported	Quality assessment
Foord 1995[405]	Gambia	1449 pregnancies	Antenatal care, provided malaria prophylaxis, identification of infections and early referral to facilities (n=780)	Standard care (n=669)	3 years	Stillbirth Perinatal deaths Care related outcomes	Selection=HR Performance and detection = UR Attrition=UR Reporting = LR
Mann 2010[406]	India	Women were eligible if they were between 15 and 59 years of age	Community-centred primary health care. Activities in the project villages are carried out at three levels: village health workers, mobile health teams and the secondary-care hospital in Jamkhed (n=3002)	Standard care (n=3003)	15 years	Neonatal deaths Infant deaths Under 5 deaths Care related outcomes	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR
Turan 2011[407]	Eritrea	postpartum women	participatory educational sessions on safe motherhood topics with women and men in the community	Standard care	2 years	Care related outcomes	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR
Xu 1995[408]	China	Pregnant women	Improved access to maternal care services, mass health education and strengthened obstetric emergency services	Standard care	3 years	Maternal deaths Care related outcomes	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR
Zhang 2004[409]	China	Pregnant women (n=348)	Reproductive health and family planning project	-	4 years	Care related outcomes	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR
Alisjahbana 1995 [410]	Indonesia	3275 pregnancies	Trained TBAs for enhanced complication referrals, teaching mothers for danger signs. Improved accessibility to health care services and trained hospital doctors and nurses for appropriate care management, distributed home based maternal and neonatal action records (n=2275)	Routine services provided by government health care facilities and hospitals (n=1000)	1 year	Perinatal deaths Care related outcomes	Selection=HR Performance and detection = HR Attrition=UR Reporting = LR
Bang 1999 [40, 411-413]	India	5921 live births	Train paramedics, village HCW, and TBA in administration of antibiotics and counselling in mother and newborn care (n=979)	In control areas these tasks were done by the government health services and the Integrated Child Development Service (ICDS) workers (n=1108)	3 years	Stillbirths Perinatal deaths Neonatal deaths Care related outcomes	Selection=HR Performance and detection = UR Attrition=UR Reporting = LR
Baqui 2008 Care India [414, 415]	India	13826 live births	Antenatal intervention, birth preparedness, disposable delivery kit, newborn care, postnatal intervention vs. routine care (n=7918)	Received standard government health and Integrated Child Development Services (n=6014)	2.5 years	Neonatal deaths Care related outcomes	Selection=HR Performance and detection = LR Attrition=UR Reporting = UR
Ronsmans 1997[416]	Bangladesh	24059 live births	MCH-FP areas (referrals for sick cases, safe delivery kit, iron and folate for mothers, family planning, management of obstetric complication etc..) (n=2615)	Comparison area did not have MCH-FP services and was provided with routine services* (n=2992)	6 years	Maternal deaths	Selection=HR Performance and detection = UR Attrition=UR Reporting = UR

Bang 2005 [417]	India	5651 deliveries 5510 live births	Assessed the impact of TBA training on neonatal resuscitation and home based care education on neonatal mortality (n=2512)	TBAs in control areas were not additionally trained as TBAs in intervention arm, but they did receive usual training from government sources (n=2958)	10 years	Care related outcomes	Selection=HR Performance and detection = UR Attrition=UR Reporting = LR
Greenwood 1990[418]	Gambia	1963 pregnancies 1843 live births	Government of Gambia implemented OHC service and trained TBAs regarding clean deliveries at home, referrals for delivery and promotion of antenatal and post care among mothers (n=1208)	Non- PHC areas have routine delivery service outlets like health facilities and hospitals (n=705)	5 years	Perinatal deaths Neonatal deaths Care related outcomes	Selection=HR Performance and detection = UR Attrition=UR Reporting = UR
Syed 2006 [419]	Bangladesh	3110 women	Essential newborn care was integrated into the ongoing interventions of the NGOs. The major components of the interventions included: increasing the coverage of health workers and community-based caregivers trained and competent in providing essential newborn care and promoting positive maternal and newborn-care practices (n=2787)	Standard care (n=323)	2 years	Care related outcome	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR
Hounton 2008 [394, 420-423]	Burkia Faso	40446 women	Effects of the Skilled Care Initiative (SCI) community mobilisation on pregnancy (N=18658)	Standard care N=21788	2 years	Maternal deaths	Selection=HR Performance and detection = UR Attrition=UR Reporting = LR
Liu 2010 [424]	China	Pregnant women (n=9620)	Establishing the emergency obstetric centres, Strengthening the maternal health-service quality in hospitals, Changing the functions of village doctors, so that they can replace the midwife (n=2991)	Standard care (n=6629)	4 years	Care related outcomes	Selection=HR Performance and detection = UR Attrition=UR Reporting = LR
Fauveau 1991 [425]	Bangladesh	Women of reproductive age (n=21824)	midwives were equipped to treat immediately obstetric complications at their onset, and were backed up by an effective chain of referral. (n=1534 live births)	Standard care (n=1784)	3 years	Maternal deaths	Selection=HR Performance and detection = UR Attrition=UR Reporting = LR

Appendix 6: Characteristics of included studies: (before/after, interrupted time series) studies – Chapter 3

Study ID	Country	Study design	Participants (n)	Intervention	Outcomes reported	Risk of Bias assessment
Awasthi 2009 [218, 426-430]	India	Before/After study	Newborns born in last 48 hours (n=490)	Intervention comprised of Neonatal Well-Being Card The card contained pictorial representation of neonatal danger signs, and messages regarding the importance of qualified medical care-seeking	Qualified medical care-seeking for all Illnesses	Selection=HR Performance and detection = LR Attrition=LR Reporting = LR Baseline outcome and characteristics = LR
Daga 1993 [431]	India	Before/after study	Children under 6 years of age	Training of dais in newborn care which included warmth, resuscitation and identification and referral of a baby. Training of Anganwadi workers to make a home visit, referring a baby with foot length less than 6.5 cm to PHC if dai fails to make correct assessment, monitor the progress of a borderline preterm/low birth weight baby	ANC registration Newborns referrals Neonatal mortality	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR Baseline outcome and characteristics = UR
Emond 2002 [432]	Brazil	Before/after study	Births Pre-intervention 1195 Births- post interventions 1225	Women attending the community antenatal clinics were assessed as high or low risk. High-risk pregnancies were booked for delivery at hospital, Low-risk mothers were offered delivery at the polyclinic. In addition, social workers from the health centres, who also made a limited number of home visits.	Stillbirths/miscarriages Early neonatal deaths Prematurity, Low birth weight caesarean section, delivery at community clinic	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR Baseline outcome and characteristics = UR
Fujino 2009[433]	Zambia (low income areas)	ITS	1546 mothers	There was a perception among the Dominican nurses that women delayed accessing care because they held beliefs and attitudes regarding obstetric care that caused them to delay seeking help.	Response to danger signs	Selection=UR Performance and detection = UR Attrition=LR Reporting = LR Baseline outcome and characteristics = UR
Garces 2012[434]	Guatemala (rural clusters)	Before/after studies	522 TBAs, 10 Physicians and 12 nurse/nurse midwives participated in the study	Training of practicing birth attendants within each community to evaluate clinical condition of newborns, and Apgar scores. Birth attendants included TBAs, nurses, nurse-midwives, and physicians.	Perinatal mortality, stillbirth, early neonatal mortality	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR Baseline outcome and characteristics = UR
Saaka 2011[435]	Ghana	Before/after intervention	Only women aged 15–45 years, whose children were aged 0–36 months	Promoting infant feeding practices, health-seeking behaviours at the community level and enhancing the quality of care, effective case management of common childhood illnesses, Expanded Programme on Immunization, and growth monitoring centres, support of community-level health promotion activities including support of mothers' support groups and holding of health campaigns, etc.	Underweight, malnutrition, breastfeeding, fully immunized children, health-seeking behaviour for ARI, complementary feeding, incidence of diarrhoea	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR Baseline outcome and characteristics = UR
Thassari 2000[436]	Thailand	Before/after study	pregnant women who attended an ANC clinic	Preparation for pregnancy, nutrition during pregnancy and breast feeding periods, breast feeding, preparation for delivery and preparation for postpartum.	Change in behaviour, satisfaction	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR Baseline outcome and characteristics = UR
O'rourke 1998[437]	Bolivia	Before/after study	Not mentioned	Impact of women group diagnosing, designing, implementing, and evaluating community-based solution to maternal and perinatal health	Perinatal mortality, breastfeeding rates	Selection=UR Performance and detection = UR

Study ID	Country	Study design	Participants (n)	Intervention	Outcomes reported	Risk of Bias assessment
				problems		Attrition=UR Reporting = LR Baseline outcome and characteristics = UR
Moran 2006 [238]	Burkina Faso	Before/after study	180 pregnant women and 180 women delivered in 12 months	MNH program of JPIEGO focused on birth preparedness, recognition of danger sings	Planning for delivery with skilled birth attendance	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR Baseline outcome and characteristics = UR
Dongre 2009 [438-443]	India	Before/after study	Not mentioned	Educate women about newborn danger sings birth preparedness, health care seeking, and conduction of monthly village based meeting	Planning for delivery with skilled birth attendance	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR Baseline outcome and characteristics = UR
Carlo 2010 [444-446]	Argentina, Congo DR, Guatemala, India, Pakistan, and Zambia	Before/after study	57,643 infants	Essential Newborn Care included routine neonatal care, initiation of breathing and resuscitation (including bag and mask ventilation), thermoregulation, early and exclusive breast-feeding, kangaroo (skin-to-skin) care, care of small babies, recognition of danger signs, and recognition and initial management of complications.	Neonatal mortality, stillbirths and perinatal mortality	Selection=LR Performance and detection = LR Attrition=LR Reporting = LR Baseline outcome and characteristics = UR
Coskun 2009[447]	Turkey	Evaluation study		Antenatal period education module: Adaptation to pregnancy and health in pregnancy, Preparation for childbirth, Labour and delivery pain management, Maternity ward/Immediately after delivery, Puerperal women's health	Iron/folate, breastfeeding	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR Baseline outcome and characteristics = UR
Hodgins 2010 [448]	Nepal	Before/after study	1470 each before &after intervention recently delivered women	community-based antenatal counselling and dispensing and an early postnatal home visit; most activities were carried out by community-based health volunteers	Advice on arrange skilled birth attendant, newborn danger signs, delivery related danger signs, delayed bathing, delay in care seeking	Selection=LR Performance and detection = LR Attrition=UR Reporting = LR Baseline outcome and characteristics = UR
Mushi 2010 [449]	Tanzania	Before/after study	512 deliveries	The intervention package comprised of two main components (a) training of Safe Motherhood Promoters (these were trained specifically for this intervention study) and (b) education and awareness on maternal health aspects.	Deliveries with skilled attendant, Early ANC booking	Selection=UR Performance and detection = UR Attrition=UR Reporting = LR Baseline outcome and characteristics = UR

Appendix 7: Characteristics of included studies: cross sectional studies – Chapter 3

Study ID	Country/ setting	Participants	Results
Adair 2012 [208]	Indonesia /poorest provinces	Ever-married women aged 15–49 years (n=3,517)	After controlling place of delivery Infant mortality rate was associated with • ANC provider =TBA/none vs. doctor/midwife/nurse: adj. OR 2.89; 95% CI: 1.76-4.79 • Skilled attendant = TBA/none vs. doctor/midwife/nurse: adj. OR 1.62; 95% CI: 1.13-2.31 After controlling birth attendant Infant mortality rate was associated with • ANC provider =TBA/none vs. doctor/midwife/nurse: adj. OR 2.99; 95% CI: 1.80-4.97 • Place of delivery = home vs. facility: adj. OR 1.41; 95% CI: 0.96-2.08
Adhikari 2011 [146]	Nepal (National survey)	Women of reproductive age (n=10,793)	Infant mortality was associated with • Literate vs. illiterate: adj. OR: 0.61; 95% CI: 0.47-0.80 • Involvement of respondent vs. without involvement of respondent: adj. OR: 0.74; 95% CI: 0.57-0.95
Alexandre 2005 [145]	Haiti (National survey)	women aged 15 to 49 who had given birth during the three years (n=9,595 households)	Among users of prenatal care services, mothers in rural areas made an expected number of 3.78 prenatal care visits, compared to 5.06 visits for the women in urban areas. Partner education • Rural Areas: Prenatal care utilization among women whose partners had at least secondary education was OR 2.62 (P<0.01) • Urban Areas: Prenatal care utilization among women whose partners had at least secondary education was OR 1.9 (P<0.05)
Anson 2004 [144]	China	Women (n=4,273)	Maternal care utilization was inversely related to age and parity and positively to education. Occupation was related to use of pre and post-natal services, but not to home birth. Per-capita income and living arrangement are not related to utilization. Controlling for individual characteristics, the availability of MCH workers in the village increased the propensity of using of pre- (OR 1.17, P <0.05) and post-natal care (OR 1.23, p<0.01), but decreased the odds of giving birth in a health care facility (0.74, p<0.001). Having a village doctor responsible for MCH was associated with higher utilization of pre-natal care (OR 1.26, p<0.05) and the use of health care facility for giving birth (OR 1.36, p<0.001), but did not affect the probability of post-natal visit. Longer distance from township health centres was related to somewhat decreased odds of using the pre-natal service they offer (OR 0.96, p<0.05), but was not related to the likelihood of home delivery or post-natal care.
Anwar 2008 [147]	Bangladesh	2164 deliveries	After controlling for age and parity of mothers Factors associated with Skilled birth attendance at delivery • Women's education compared to no education = ≥10 years (adj. OR 2.69; 95% CI: 1.66-4.38) • Assets quintile compared to lowest = second (adj OR 1.47; 95% CI: 1.01-2.13), middle (adj. OR 1.51; 95% CI: 1.03-2.19), fourth (adj. OR 2.32; 95% CI: 1.60-3.39), highest (adj. OR 2.89; 95% CI: 1.91-4.38) • Husband's education compared to none = ≥10 years (adj. OR 2.25; 95% CI: 1.54-3.28) • Distance to hospital compared to 0-5km= >5km (adj. OR 0.66; 95% CI: 0.53-0.82) Factors associated with receiving postnatal care • Assets quintile compared to lowest = highest (adj. OR 1.54; 95% CI: 1.05-2.25) • Husband's education compared to none = not significant at any level • Distance to hospital compared to 0-5km= not significant After adjusting for other determinants, the differences in the use of maternal health-care services for poor and rich people remained substantial [adjusted odds ratio (OR) 2.51 (95% confidence interval, CI: 1.68–3.76) for skilled attendance; OR 2.58 (95% CI: 1.28–5.19) for use of caesarean sections and OR 1.53 (95% CI: 1.05–2.25) for use of postnatal care services]
Fosu 1994 [148]	Uganda, Kenya, Ghana, Togo, Zimbabwe, Botswana	Children under 5 (Uganda =4373, Kenya=6589, Ghana=3690, Togo=2803, Zimbabwe=3164, Botswana=3069	Factors which account for differentials in health service use for sick child include the age of the mother, the mother's education, family resources, rural-urban residence and the number of reported diseases.
Goldman 2000 [202]	Guatemala	women aged 18-35 interviewed (n=3193	Families are much more likely to seek a provider when a child experiences fever and gastrointestinal symptoms, as compared with respiratory and other symptoms, and when a mother perceives the illness to be serious. The estimates also indicate that infants, low

		children)	parity children, and children assessed as having generally been in good health are more likely to visit providers than other children.
Kambarami 1999 [257] (Abstract)	Zimbabwe Rural districts	644 women aged 15 to 50 years	Factors significantly associated with poor perinatal outcome were distance from health care centre ($p < 0.001$), when ANC started ($p = 0.03$), problems at health facility ($p = 0.019$), problems with pregnancy ($p < 0.001$), hypertension ($p = 0.005$), vaginal bleeding ($p < 0.001$), urinary tract infection ($p = 0.03$). ANC attendance, ability to pay, frequency of attendance and use of herbs were not significantly associated with perinatal death with p-values of 0.153, 0.029, 0.7 and 0.92 respectively.
Liang 2011 [149]	China	3954 infants	After adjusting for urban-rural areas it was found that most neonatal deaths of preterm babies in remote areas were born at home and were not treated before death.
Malqvist 2008 [150]	Vietnam	17,519 births and 284 neonatal deaths	Neonatal death within 24 hours of birth was more likely when the mother did not seek care at the time of delivery, or did so at the lowest level of the system ($x^2$535.5, p, 0.001). Mothers of ethnic minorities were more likely to exhibit this care-seeking behaviour at delivery.
More 2011 [151]	India Slums	10,754 births	Mother choices of health care provider for illness during pregnancy • Socio economic assets score: *Private hospital* adj. OR 1.40; 95% CI: 1.30-1.51. *Public hospital* adj. OR 0.76; 95% CI: 0.69-0.84 • With every 1 year increase in age: Private hospital adj. OR 1.03; 95% CI: 1.01-1.05. *Public hospital* adj. OR 0.96; 95% CI: 0.94-0.98
Moronkola 2007 [258]	Nigeria (low income and low literacy population)	Women of reproductive age (15–49 years) (n=1765)	Utilization of maternal health care services were affected by • centralization of health-care facilities ($p < 0.001$), • quality of health care ($p < 0.001$), • cost of health care ($p < 0.001$), • access to health care ($p < 0.001$), • health education ($p < 0.001$), • attitude of health-care workers ($p < 0.001$)
Obermeyer 1991 [152]	Jordon	2,949 women	<u>The following factors were significantly associated with Hospital/home birth</u> • maternal education OR 1.59 ($p < 0.001$) • maternal age (15-24 yrs) OR 0.67 ($p < 0.001$) <u>The following factors were significantly associated with birth attendant daya/midwife/ physician</u> • maternal education OR 1.35 ($p < 0.001$) The effect of socio-demographic factors, including residence, education, parity, and standard of living were associated with utilization of prenatal care and health care at delivery
Rahman 2008 [153]	Bangladesh	1019 women	Significant socioeconomic disparities in both antenatal and delivery care seeking were reported. Service accessibility, however, significantly reduces the socioeconomic differentials in delivery care seeking. <u>seeking delivery care from trained provider</u> *Enabling variables* • Household resources (ref: Lower resources) 6.31 ($p<0.01$) • Women's gainful employment (ref: No) 4.69 ($P < 0.05$) *Need variables (current risk variables)* • High-risk morbidities in pregnancy 0.94 • Morbidity during delivery 2.32 ($p<0.01$) *Service variables* • Accessibility of health centre 7.72 ($p<0.01$)
Rai 2012 [154]	Nigeria	Married adolescent (aged 15–19 years) women (n=2,434)	Women's education (adj. OR 2.054; 95% CI: 1.477–2.856 for at least 4 ANC , adj. OR 1.534; 95% CI: 1.067–2.206 for postnatal care) , husband's education at least secondary (adj. OR 2.45; 95% CI: 1.75- 3.44 for at least 4 ANC, adj. OR 1.69; 95% CI: 1.12-2.54 for safe delivery, adj. OR 1.64; 95% CI: 1.14-2.36 for postnatal care), wealth quintile richest (adj OR 5.563; 95% CI: 2.445–9.657 for at least 4 ANC), and region of residence were documented as the most important factors associated with maternal healthcare service utilization.

Ramos 2007 [155]	Argentina	121 maternal deaths	After adjusting for clusters (regions of country): The probability of dying was 10 times greater in the absence of essential obstetric care (OR 8; 95% CI: 1.00-63.96), active emergency care and qualified staff (OR 5.50; 95% CI: 1.22-24.81), and doubled with every 10-year increase in age. Other contributing factors included delays in recognizing "alarm signals"; reluctance in seeking care owing to desire to hide an induced abortion; delays in receiving timely treatment; and delays in referral/transportation in rural areas.
Ronsmans 2010 [156]	Bangladesh	Pregnant women (n= 59,165 pregnancies)	After adjusting for year of birth, distance to basic obstetric facility, asset quintile, maternal education, maternal age and birth order: Maternal mortality in presence of basic EMoC compare to none was adj. OR 3.92; 95% CI: 2.63-6.01 and in presence of comprehensive EmOC was OR 31.66; 95% CI: 22.03-45.48. Stillbirths in presence of basic EmOC compare to none was ajd OR 1.25; 95% CI: 1.09-1.42 and in presence of comprehensive EmOC OR 6.61; 95% CI: 5.62-7.79 Early neonatal mortality in presence of basic EmOC compare to none was ajd OR 1.47; 95% CI: 1.27-1.69 and in presence of comprehensive EmOC OR 2.69; 95% CI: 2.16-3.37
Roost 2010 [157]	Bolivia	Women (n=297)	Lack of ANC, lower education levels, and rural residence were interactively associated with near-miss upon arrival. Such risk was considerably increased for women who lived in rural areas (OR 12.6; 95% CI 2.8–56.6). In addition, high maternal age and first time pregnancy were associated with near-miss upon arrival.
Saini 2012 [158]	India	360 neonates	Odds of home delivery were significantly lower when the number of family members was higher (OR 0.38, 95% CI: 0.22–069) and the number of ANC visits were more (OR 0.42, 95% CI: 0.34–0.52) while it increased significantly with an increase in the number of live births (OR 2.29, 95% CI: 1.39–3.77).
Sein 2012 [159]	Myanmar	196 ever married females	Institutional delivery • Place of residence (urban adj. OR 17.583; 95% CI: 5.84–52.94), • women's education (middle adj. OR 3.166; 95% CI: 1.16–8.64) • ANC frequency (>4 visits adj. OR 2.884; 95% CI: 1.07–7.768) Postnatal care • Place of residence (urban adj. OR 6.97; 95% CI: 2.95–16.46), • ANC frequency (>4 visits adj. OR 3.173; 95% CI: 1.276–7.891)
Sharma 2009 [160]	Thailand	930 women	Village level residual variance of seeking care for morbidity during pregnancy was 0.27. Individual socio-demographic variables on the odds of reporting care seeking behaviour. • Women who had two or more children were significantly less likely to seek care for morbidity during pregnancy compared to women with less than two children (OR = 0.57) • Women over age 20 were more likely to receive the care (OR = 1.74 and 2.84 respectively for age 20–35 and over 35) than women under age 20. Variables representing community well-being and social and health infrastructure. • Women living in a village with a school, health facility and bus route were more likely to seek care for morbidity but the association was not significant. Community well-being indicators. • People with education less than Grade 10 and the percentage of people with health insurance in the village were found to have significant positive associations with care seeking behaviour. • 1% increase in the percentage of people with less than high school education in a village increased the odds of receiving care for obstetric morbidity during pregnancy by 6 per cent (OR = 1.05). • Similarly every unit increase in the percentage of people with health insurance in the village was associated with a 4 per cent increase in the odds of receiving care (OR = 1.04).
Singh 2012 [161]	India	124,385 ever-married women (age group 15–49)	Women's education, wealth quintile and region are the most important determinants for the utilization of maternal and child health care services.
De Souza 2000 [273]	Brazil	127 infants	Three major groups of factors that alone or in combination appeared to contribute to most deaths were delays in seeking medical care on behalf of the parents, medical interventions reported as ineffective by mothers and delays in providing medical care to children who arrived at the hospital too late in the day to be scheduled for consultation.

Stuyft 1996 [162]	Guatemala	324 mothers	Health care seeking for child illness improved with mothers being employed (adj OR 1.5; 95% CI: 1.0-2.2)
Sutrisna 1993 [163]	Indonesia	141 child deaths	Household income, maternal age, and education, and distance between home and government health post were not associated with whether or not western medical care was sought.
Teerawichitchainan 2008 [164]	Vietnam	11, 355 children	After controlling for clusters and stratification: ethnicity and maternal education on health decisions are pronounced even when poverty effects are controlled
Ogunlesi 2010 [165]	Nigeria	168 respondents	Logistic regression showed that high maternal education and high family socioeconomic status were strong predictors of early care-seeking and care-seeking outside the home.
Titaley 2010 [166]	Indonesia	26,591 singleton live-born infants of the mothers	Factors strongly associated with underutilization of antenatal care services were infants from rural areas and from outer Java-Bali region, infants from low household wealth index and with low maternal education level, and high birth rank infants with short birth interval of less than two years. Other associated factors identified included mothers reporting distance to health facilities as a major problem, mothers less exposed to mass media, and mothers reporting no obstetric complications during pregnancy
Toan 1996 [167]	Vietnam	1130 children	Attendance at antenatal health services • Mother age: OR 1.70 (95% CI: 1.16-2.49) • Mother education no formal: 0.34 (95% CI: 0.23-0.48) • Mother occupation: no farmer OR 3.06 (95% CI: 2.15-4.35) • Mother religion catholic: OR 0.27 (95% CI: 0.20-0.36)
Trinh 2007 [168]	Vietnam	1,335 eligible women	External environment, predisposing characteristics, and need, which existed before contact with ANC providers, were most related to using any ANC and gestational age at entry to ANC
Ye 2010 [169]	Lao PDR	310 married women of reproductive age	We found that significant predictors of ANC utilization (p-value < 0.05) were: level of education (OR = 6.8, 95% CI = 2.7–16.8), income (OR = 2.6, 95% CI = 1.2–5.7), knowledge (OR = 6.5, 95% CI = 2.4–17.6), attitude (OR = 3.0, 95% CI = 1.3–7.1), distance (OR = 2.9, 95% CI = 1.1–7.6), availability of public transportation (OR = 4.5, 95% CI = 2.0–10.4), cost of transportation (OR = 2.5, 95% CI = 1.1–5.7), and cost of service (OR = 4.6, 95% CI = 2.2–9.6).
Erci 2003 [170]	Turkey	446 women had or had not received prenatal care	Low education of pregnant women and unwanted pregnancy were barriers to use of prenatal care services. Additional barriers were negative attitudes toward pregnancy and attitudes toward prenatal care. These barriers decreased frequency of use and delayed early initiation of prenatal care. The most important barrier reported by the women was being too busy at home to seek care.
Okong 2006 [209]	Uganda	685 women with severe maternal morbidity	Half the cases were at home when the events occurred. More than half the cases delayed to seek care, because the patients were unwilling, or relatives were not helpful.
Rabiu 2010 [220]	Nigeria	Women attended the gynaecological and family planning	Most patients (87.9%) sought medical care when they experienced symptoms of reproductive tract infections (RTI). Only 9.9% treated self while 2.2% ignored symptoms. Government health centres were the most visited health facility for treatment of RTI's.
Uzma 1999 [171]	Bangladesh (urban slums)	postpartum women	The frequency of reported illnesses was significantly associated with both increasing age and parity. Despite severe poverty, most of the women reporting illnesses (71%) received some form of health care from a wide range of western and traditional health care providers, with Traditional Birth Attendants (TBAs) and unqualified western care providers being the most frequently utilised
Fotso 2008 [172]	Kenya	1927 women	Household wealth, education, parity, and place of residence were closely associated with frequency and timing of ANC and with place of delivery (P <0.001 for each of these factors).
Walraven 2000 [250]	Gambia	Women aged 15-49 years	Indirect causes of maternal deaths were anaemia, and hepatitis. Low standards for health care for obstetric referrals, failure to recognize the severity of the problem at the community level, delays in starting the decision making process to seek care, lack of transport, substandard primary health care as one of probable and possible contributing factors to the maternal deaths.
Sunil 2006 [173]	India (rural)	Women with last births during the three years	The study results suggest that in addition to individual characteristics, program and system factors influence the utilization of maternal care in rural areas. Program factors, particularly educational activities promoting the benefits of maternal care services carried out through Mahila Mandal and Anganwadi Centres, are important in increasing the use of maternal care services in rural areas. Additionally, the results indicate that the mere presence of a private health care facility need not necessarily improve utilization.
de Silva 2001 [203]	Sri Lanka	2248 children less than five years of age	Care seeking of mother caretakers was driven by symptomology. Young children with higher perceived severity and high-risk symptoms were brought to provider care more frequently, although a large percentage of episodes with low-risk symptoms were also brought for outside care. Care seeking was similar across socio-economic groups.

Schillaci 2010 [174]	Mexico	Birth records	Mothers from low-income areas started their prenatal care significantly later in their pregnancies between 1989 and 1999, and had significantly fewer prenatal visits between 1989 and 1997.
Safdar 2002 [210]	Pakistan (rural areas)	1,178 married women	The most frequent antenatal care providers were female doctors (55%). Majority (67%) of women had delivered at home with the assistance of traditional birth attendants (TBAs).
Mahdi 2010 [251]	Iraq	Women were those who had delivered a baby within 40 days of the interview. (n=353)	• The most frequent reason given for preferring a hospital delivery was that the hospital was safe and secure (from the health point of view) (96.6% of the women). The hygiene of hospitals was the reason given by 66.6% of the women. Emergency transfer from midwife to hospital was reported by 5.4% of the women and lack of availability of a midwife by 2.4%. • The reasons reported by women who delivered at home for preferring home delivery are also shown in. Social support and privacy was the predominant reason given by 98.2% of the women who had home delivery of their present child. Fear of interventions and repeated examinations at hospitals was the concern of 71.9% of the women who preferred home delivery. About 17.5% had an unplanned home delivery as a result of quick labour or the security situation did not allow transfer to hospital.
Mash 2003 [204]	Ethiopia	368 mothers	<u>Amongst the 101 mothers of children under the age of six months</u> • 24% reported exclusive breast-feeding (24/101). • 17% children completed their immunisation schedule <u>Amongst the 111 children who had diarrhoea</u> • Only 17% had received home treatment with ORS (19/111). • 43%, 30% and 28% reported diarrhoea, pneumonia and malaria sought appropriate care
Birungi 2011[450]	Kenya	506 pregnancies among 393 HIV-positive female adolescents aged 15-18	• Use of PMTCT services was less common than use of prenatal care among HIV-positive adolescents (67% of pregnancies vs. 84%). • These adolescents made four or more prenatal care visits in only 45% of pregnancies. • In addition, use of skilled care during or after abortion or miscarriage was low (20%). • HIV-positive adolescents were less likely to use maternal health care for higher-order pregnancies than for lower-order pregnancies (0.4-0.6). They were, however, more likely to receive prenatal care and PMTCT services when their husband rather than someone else was responsible for the pregnancy (3.7 and 4. 9, respectively).
Abraham 1991 [175]	India	2406 mothers	Mothers/any literate family members, neighbour/visiting field staff were instructed to make appropriate entry about mother's current health status by making a tick mark on the card. This card also had a provision of doted boxes for recognizing the risk of the mother. A mark in any dotted area indicated need for consultation with medical officer/specialist. The card thus would enable the mother herself to realize the risk condition at earliest. • Only 89.2 percent retrieval of the cards was possible after a period of 18 months. Screening of the population for "at risk" women monitoring and referral could be undertaken with the help of this card.
Allendorf 2010 [211]	India	2,444 married women, aged 15–39 with at least one child	• Among nuclear families, women with better marital relationships are more likely than others to use antenatal care services and to deliver in a health-care facility. • Among joint families, women who have better relationships with their in-laws are more likely to use antenatal care services.
Ahmed 2001 [176]	Bangladesh	1511 women who had live births	• Neonates with illnesses were taken to homeopaths (38%) and village doctors (37%). 17% to trained providers and 5% to health facilities. • Health care seeking from trained providers depended on the gender of neonate, antenatal care of women from trained providers, father's education, and monthly expenditure of the family.
Carlson 2011 [177]	Chad, Mali and Niger	3111 in chad, 8102 Mali and 5448 in Niger	• 47% of mothers in Chad, 12% in Mali and 36% in Niger did not attend either ANC or EPI. • Region, mother's education and partner's education were predictors of non-attendance in all three countries. Wealth index, ethnicity, and occupation were associated with non-attendance in Mali and Niger. Other predictors included religion, healthcare autonomy, household size and number of children under five.
Chamberlain 2007 [178]	Yemen, Uganda and Canada	100 women in each of this country	• Women's perception of themselves as worthy of care was positively related to utilization. The ability to make one's own health care decisions varied with her country's development level. Implementation strategies must consider women's decision-making capacity.

Ciceklioglu 2005 [179]	Turkey	245pregnant women registered with primary care settings	• As to prenatal care, 64.9% of the participants received an adequate amount and 25.9% an adequate content. Parity (P = 0.00), insurance coverage (P = 0.00), abortion history (P = 0.03), husband's occupation (P = 0.00), maternal age (P = 0.04), and level of educational attainment (P = 0.03) were related to the amount of care. Employment status (P = 0.03), continuous use of private sources (P = 0.00) and public hospitals (P =0.01) were associated with the content.
El-Kak 2009 [180]	Lebanon	1869 completed questionnaires from 2051 eligible women	Younger age, health insurance, and severity and duration of problems were associated with use. Women with higher parity and those with financial problems were significantly more likely to use public and subsidized services.
Elo 1992 [181]	Peru	1925 women	positive effect of maternal schooling on the use of prenatal care and delivery assistance
Okafor 1991 [182]	Nigeria	498 women	Variables found to be statistically significant (P < 0.01) for use of services are maternal education, occupation, distance and previous use of a physician. Husband's occupation was significant only for prenatal registration, but not for subsequent use of services.
Haque 2011 [183]	Bangladesh	1,778 currently married women aged 15 to 24 years	In adjusted models (for maternal age at birth, maternal education, parity, household members, residence, religion, wealth index, frequency of mass media exposure, and child gender.), • Young women who had a higher level of overall autonomy were more likely to receive sufficient ANC (AOR, 1.64; 95% CI, and 1.17–2.23) and receiving ANC from medically trained provider (AOR, 1.91; 95% CI, 1.42–2.45). • Women who had medium overall autonomy were 1.40 times more likely (95% CI, 1.03–1.98) to have deliveries assisted by a medically trained provider than women who had low autonomy.
Habibov 2008 [184]	Tajikistan	4156 households	Adjusted for design effect: • higher educational attainment increases the utilization of prenatal care. • Conversely, poverty, limited knowledge about matters related to sex, low quality of health care service, lack of public infrastructure, as well as absence of or long distance of travel to the nearest health facility, all reduce the utilization of prenatal health care.
Granich 2011[215]	Mexico	94 households with children <5 years old	• A mean of 2.5 outside-the-home health care options were reported for each diarrheal type; the local grocery store was reported in 245 (67%) of the hypothetical health care seeking behaviour patterns and as a first option in 199 (54%). • Maternal and/ or paternal education had little impact on hypothetical health care seeking behaviour. Households with lower SES were more likely to report using local grocery stores as a first option and were less likely to use options outside the village.
Heuvel 1999 [185]	Zimbabwe	235 women, aged 16 to 54 years	• Use of maternity waiting shelters (OR 5.3; 95% CI: 2.6- 11.1) and complications during the pregnancy (OR 1.8; 95% CI: 1.0 – 3.4) were important factors for hospital delivery • unemployment (OR 0.4; 95% CI: 0.2-0.8)and being without a husband were associated with deliveries outside the hospital (OR 0.6; 95% CI: 0.2-1.6)
Hirose 2011 [186]	Afghanistan	472 women	Uptake of antenatal care (ANC) and the birth plan reduced decision delay at the time of the obstetric emergency. Access to care and social networks reduced departure delay
Iyen 1989 [271]	Nigeria	800 women	The survey emphasizes difficulties currently faced by VHWs including competition from commercial 'quacks' as well as unenthusiasm from persons of other religions and from women who prefer not to be advised by male VHWs.
Gombojav 2009 [187]	Mangolia	1279 mothers and their healthy infants	Delay in medical care seeking (.3 days from acute lower respiratory infection (ALRI) symptom onset) was associated with younger maternal age (OR (95% CI) 3.8 (1.2 to 11.6)), single child families (3.8 (1.2 to 11.61)), absent father (4.1 (1.2 to 14.4)) and residence more than 1 km from a clinic (3.5 (1.2 to 10.2)).
Hazarika 2011 [188]	India	31,797 women	• Wealth is one of the strongest determinants of skilled birth attendant use (adj OR 2.89 2.20, 3.80), with the poor being at a disadvantage. • There are significant differences in the use of skilled delivery care among the urban and rural (adj OR 0.82 0.70, 0.97) populations in India. Women in urban areas are more likely to use skilled attendants. • Muslim women (adj OR 0.61 0.50, 0.74) and women with lower levels of education are also less likely to avail skilled delivery services. • Women who gave history of antenatal visits were more likely to have skilled attendants at birth (adj OR 2.15 1.84, 2.52).

			• there are several financial, social, regional and cultural barriers to skilled birth attendant use in India
Gupta 2007 [205]	India	1307 under-5 children	• One or more danger signs were known to 80% (152/191) of mothers and an equal number (80%) of mothers had sought treatment. • ARIs are mostly mild or self-limiting but only 16% of caretakers perceived so and doctors also prescribed medicines. • The attack rate of Acute Diarrheal Diseases was 7.73% in the study and ADD's annual adjusted morbidity rate was 1.69 episodes per child per year. • Though nearly three-fourth of mothers (71.3%) had reported to be seeking medical advice (which is not needed in mild episodes of diarrhoea) the ORS use was 38.6%, use of Home available fluids (HAF) was 42% and continued feeding was 50% during the ADD episode and awareness of at least two danger signs was present in 34%.
Ibrahim 1992 [189]	Sudan	6275 deliveries monitored over a period of 3 years,	There was a 25% reduction in the risk of unfavourable outcome of pregnancy (i.e. stillbirth and neonatal death) in the third year relative to the first 2 years.
Delgado 1994 [206]	Guatemala	146 rural women with children less than 5 years of age	Mothers sought care from elder women before the procurement of professional help during the illnesses of their children
Kamiya 2011 [212]	Tajikistan	women aged 15–49	Women's autonomy as measured by women's decision-making on household financial matters increase the likelihood that a woman receives antenatal and delivery care, whilst it has a negative effect on the probability of attending to four or more antenatal consultations. The hypothesis that women's autonomy and reproductive health care utilization are independently determined is rejected for most of the estimation specifications, indicating the importance of taking into account the endogenous nature of women's autonomy when assessing its effect on health care use.
Knobel 1994[216]	Taiwan	all infant deaths in Taiwan from 1981 to 1988	• While infant deaths due to nearly all causes declined, deaths due to injury and accidents rose from 0.62 to 0.71 per 1000 live births, and the sudden infant death rate rose from 0.13 to 0.46. • Notable geographic differences included a high death rate in the small islands off the coast and in the eastern mountainous counties (9.1-11.2/1000 live births); this rate was twice that in Taipei (4.5/1000live births). • In addition, the level of urbanisation was also an important determinant of death rate; urban areas had much lower rates than rural areas. The highest rate (15.4) was persistently observed in the rural areas where the aboriginal tribes reside. This
Killewo 2006 [252]	Bangladesh	638 (29.3%) or respondents were male and 1,539 (70.7%) were female	• 881 (40.5%) reported at least one household member who experienced an illness perceived to be serious enough to warrant care-seeking either from health facilities or from providers. • Of these, 775 (88.0%) actually visited some providers for treatment, of whom 79.1% used transport. • Overall, 69.3% perceived a delay in deciding to seek care, while 12.1% and 24.6% perceived a delay in accessing transport and in reaching the provider respectively. • The median time required to make a decision to seek care was 72 minutes, while the same was 10 minutes to get transport and 80 minutes to reach a facility or a provider. • Time to decide to seek care was shortest for pregnancy-related conditions and longest for illnesses classified as chronic, while time to reach a facility was longest for pregnancy-related illnesses and shortest for illnesses classified as acute. • However, the perceived delay in seeking care did not differ significantly across socioeconomic levels or gender categories but differed significantly between those seeking care from informal providers compared to formal providers. • Reasons for the delay included waiting time for results of informal treatment, inability to judge the graveness of disease, and lack of money. • For pregnancy-related morbidities, 45% reported 'inability to judge the graveness of the situation' as a reason for delay in making decision. • After controlling for possible confounders in multivariate analysis, type of illness and facility visited were the strongest determinants of delay in making decision to seek care.
Koenig 2007 [253]	Bangladesh	103,796 ever-married women aged 13–49.	• Bangladeshi women report low but increasing use of antenatal care, as well as low rates of delivery in a health facility or with the assistance of a skilled provider.

			• Although almost half of women reported having one or more complications during pregnancy that they perceived as life threatening, only one in three sought treatment from a qualified provider. • More than three-fourths of women with the time-sensitive complications of convulsions or excessive bleeding either failed to seek any treatment or sought treatment from an unqualified provider. • The principal reason cited for failing to seek care for life-threatening complications was concern over medical costs, and pronounced socioeconomic disparities were found for maternal care-seeking behaviour in both urban and rural Bangladesh.
Kongnyuy 2008 [274]	Malawi	73 health facilities (13 hospitals and 60 health centres)	• There were 1.6 comprehensive emergency obstetric care (CEmOC) facilities per 500,000 population and 0.8 basic emergency obstetric care (BEmOC) facilities per 125,000 populations. • About 23% of deliveries were conducted in emergency obstetric care (EmOC) facilities and the met need for emergency obstetric complications was 20.7%. • The case fatality rate for emergency obstetric complications treated in health facilities was 2.0%. • Up to 86.7% of pregnant women attended antenatal clinic at least once and only 12.0% of them attend postnatal clinic at least once. • There is a shortage of qualified staff and unequal distribution with more staff in hospitals leaving health centres severely understaffed.
Iyenger 2009 [254]	India	(n=156) of women aged 15-49 years	• Of the 156 deaths, 31 (20%) were pregnancy-related; 77% of these women died during the postpartum period, and 74% of the deaths occurred in the home. • Direct and indirect obstetric causes were responsible for 58% and 29% of the deaths respectively; 12% were injury-related deaths. • Medical care was sought for 65% of the women, and 29% were hospitalized. • Family perception of not being able to afford treatment at distant hospitals was a major barrier to seeking care, and 60% of those who sought care had to borrow money for treatment. • Lack of skilled attendance and immediate postpartum care were major factors contributing to deaths.
MacLeod 1998 [270]	Tanzania	76 maternal deaths	• The leading causes of death were postpartum haemorrhage with retained placenta, anaemia, postpartum haemorrhage without retained placenta, AIDS complex and obstructed labour (in descending order of frequency). • Maternal deaths were seen irrespective of group factors such as access to a main road, presence of antenatal risk factors and contact with health care personnel or a nearby facility before death. • Mortality was also present both in home and hospital deliveries (excluding hospital referrals). • Antenatal care had been received by 97.2% of the mothers who died after the second trimester. • The referral rate even in the presence of a known antenatal risk factor was 34.6%. • Patient compliance to the referral was only 44.4%. Mothers and their families followed strong cultural beliefs even when they were detrimental to the mother's health.
Materia 1993 [259]	Ethiopia	419 women	• Antenatal care was positively associated with living within 10km of the Health Centre
Kumar 2008 [214]	India	360 school going adolescents	• Majority (81%) of the adolescents reported having some health problem during last three months prior to the survey; predominant (60%) problems were psychological and behavioural in nature. • To resolve these problems boys consulted mainly friends/peers (48%) while girls consulted their mothers (63%). Compared to the dispensary-based adolescent health clinic, utilisation was significantly higher in a school- based clinic where proportion of psychological or behavioural problems reported was also significantly higher ($p<0.01$).
Miranda 2009 [451]	Brazil	1200 women	• Majority (72%) accessed FHP services in the preceding 6 months, principally for routine and gynaecological visits. • Factors independently associated with seeking FHP included: ever tested for human immunodeficiency virus, using anal sex as contraceptive method and reporting a current vaginal discharge. • Prior commercial sex work, previous diagnosis with an sexually transmitted infection or using oral sex as a contraceptive method were associated with less use of FHP services.
McPherson 2010 [452]	Nepal	17 FCHVs, 12 mothers, 6 husbands, 6 mother in laws	• The booklet is shared among household members, promotes discussion, and is referred to when questions arise or during emergencies.

			• Booklet cards on danger signs and nutritious foods are particularly well-received. • Cards on family planning and certain aspects of birth preparedness generate less interest. • Husbands and mothers-in-law control decision-making for maternal and newborn care-seeking and related household-level behaviours.
Mercer 2006 [190]	Bangladesh	759 neonates	The main risk factors for neonatal death among 122 singleton babies, based on the two sets of controls, were: • Complications during delivery [AOR, 2.6 (95% CI: 1.5–4.5) and 3.1 (95% CI:1.8–5.3)], • prematurity [AOR, 7.2 (95% CI: 3.6–14.4) and 8.3 (95% CI: 4.2–16.5)], • Care for a sick neonate from an unlicensed 'traditional healer' [AOR, 2.9 (95% CI 0.9–9.5 and 5.9 (95% CI: 1.3–26.3)], • Care not sought at all [AOR, 23.3 (95% CI: 3.9–137.4)].
Nyamtema 2010 [453]	Tanzania	29 health managers	• Maternal and perinatal audit systems existed only in 4 and 3 hospitals respectively, and key decision makers did not take part in audit committees. • Sixty percent of care providers were not aware of even a single action which had ever been implemented in their hospitals because of audit recommendations. • There were neither records of the key decision points, action plan, nor regular analysis of the audit reports in any of the facilities where such audit systems existed.
Ogunlesi 2012 [191]	Nigeria	182 mother baby	• Mothers recognized jaundice in their infants, 34.1% delayed care for C48 h, 40.6% sought medical care in orthodox health facilities while 20.9% did not seek care outside the home. • In all, 61.5% mothers administered various medications to jaundiced babies. • Appropriate health care-seeking behaviours were recorded among 28.6% mothers. Low maternal education had a significant relationship with delayed health care-seeking and the use of home remedies for newborn jaundice. • A significantly higher proportion of babies who had home remedies had delayed care. Delayed care for C48 h was also significantly associated with high Total Serum Bilirubin on admission, higher requirement for exchange transfusion and higher occurrence of kernicterus. Intensive health education of families may help improve their health care-seeking behaviours for neonatal jaundice.
Mash 2003 [204]	Ethiopia	368 mother-child pairs	• Amongst the 101 mothers of children under the age of six months only 24% reported exclusive breast-feeding (24/101). • There were 194 children who should have completed their immunisation schedule; only 17% of them had done so (33/194). Amongst the 111 children who had diarrhoea, only 17% had received home treatment with ORS (19/111). • Thirty per cent of mothers of children with possible pneumonia (25/83) and 28% who reported malaria (14/50) sought appropriate care. • Amongst those caregivers seen at the health facility only 26% had an understanding of treatment recommendations.
Mboyne 2003 [276]	Uganda	300 women with children aged less than 2 years	• The results showed that the 300 women interviewed had 323 children of whom 37.9% had an episode of fever 2 weeks before the survey, 40.3% had diarrhoea, 37.4% had URTI, and 26.8% were fully immunized. • Most of the women, 82.7%, perceived fever as the most serious health problem to their children. URTI, diarrhoea, and measles were perceived as serious by a lower proportion of women. • Although this study showed high perceptions of childhood diseases, the proportion of mothers seeking care for sick children was low, indicating that there are barriers to accessing care. For example, 44.7% of women sought care when their children had fever, 35.0% when children had URTI and 31.3% when children had diarrhoea. • However, most children with fever, diarrhoea, and URTI were treated at home and taken to health units only when they developed life-threatening symptoms. • This late referral to health units was complicated by high costs of care, long distances to health units, poor attitude of health workers, lack of drugs at health units, and limited involvement of fathers in care of the children
Chowdhury 2000 [454]	Bangladesh	1,019 pregnant women	• Among the visits in which the women had any symptoms, the percentages of care-seeking for less frequently reported morbidities such as fits and convulsions, bleeding, fever >3 days, excessive vomiting were about 74, 50, 34 and 33% respectively, whereas those for more commonly reported complications such as urinary problems, symptomatic anaemia and palpitations were less than 20%.

			• Care for these morbidities was mostly sought from untrained providers.
Prata 2012 [455]	Nigeria	1875 women	**The purpose of this study is to demonstrate the importance of community mobilization in the uptake of a health intervention, namely, community-based distribution of misoprostol to prevent postpartum haemorrhage.** • Most women delivered at home (95%) and skilled attendance at delivery was low (7%). • Community mobilization efforts reached most women with information about postpartum haemorrhage and misoprostol (88%), resulting in high comprehension of intervention messages. Women identified TBAs and CORPs as the single most important source of information about misoprostol 41% and 31% of the time, respectively. Availability of misoprostol at the community level gave 79% of enrolled women some protection against postpartum haemorrhage which they otherwise would not have had.
Ngwenya 2011 [456]	Botswana	60 households	Access to reproductive health care (family planning, HIV test, and birth attendance) contributes a lot to child well-being. The majority of caregivers used antenatal health services, and 70% gave birth in a health facility, while about 30% delivered at home. About 70% used some form of family planning, which they accessed at their nearest health facility.
Owais 2011 [255]	Pakistan	541 newborns and infants	Only 24% of families accepted hospital referral. Major reasons for refusal were financial difficulties (67%) and father/elder denying permission (65%). Religious/cultural beliefs were cited by 20% of families. Referral acceptance was higher with recognition of severity of the illness by mother (OR=12.7; 95% CI=4.6–35.2), family's ability to speak the dominant language at hospital (OR=2.0; 95% CI=1.3–3.1), presence of grunting in the infant (OR=3.3; 95% CI=1.2– 9.0), and infant temperature <35.5°C (OR=4.1; 95% CI=2.3–7.4). No gender differential was observed.
Peltzer 2006 [260]	South Africa	870 pregnant women	Results indicated that 55.9% had delivered their last child in a health care facility and 44.1 % at home (mostly without assistance from a traditional birth attendant). The odds of access to the health facility were (1) women who stayed close to the hospital (OR=2.87), (2) those who had higher formal education (OR=1.55), (3) higher traveling costs (affordability) to get to nearest clinic (OR=1.77), and (4) those who were single (OR=1.58). Childbirth experiences of the mother or mother-in-law greatly influenced the delivery choices in terms of home delivery.
Moore 2011 [261]	Nigeria	112 mothers aged 15 years to 49 years	Factors responsible for non-utilization of health facility for delivery include: Long distance to health facility 33(68.7%), onset of labour at night 40(83.3%), unavailability of means of transportation 37(77.1%), Lack of money for transportation 26(54.2%), unsatisfactory services at health facility 26(54.2%), unfriendly attitude of staff of the health facility 34(70.8%), unavailability of staff at health facility 32(64.0%), lack of urgency at health facility 36(75.0%), previous uneventful delivery at the health facility 32(66.7%).
Mohan 2008 [457]	India	63 newborns	31% of the newborn during illness were taken to unqualified or traditional care provider
Okwaraji 2012 [262]	Ethiopia	women of reproductive age (15–49 years) (n=2058)	Children who lived $1.5 hrs from the health centre had a two to three fold greater risk of death than children who lived, 1.5 hours from the health centre (children with travel time 1.5, 2.5 hrs adjusted relative risk [adj RR] 2.3[0.95–5.6], travel time 2.5, 3.5 hrs adj RR 3.1[1.3–7.4] and travel time 3.5,6.5 hrs adj RR 2.5[1.1–6.2]).
Phoxay 2001 [263]	Laos	205 mothers who had children under the age of five	Women's knowledge was positively correlated with ANC and TT inoculation. It was found that the women with strong superstitious belief were less likely to utilize all three types of MHC than the others. Accessibility to health care facilities strongly affected ANC and attendance delivery.
Rashid 1999 [458]	Bangladesh	276 mothers	While TTBAs may have more knowledge and be more willing to disseminate health care information to mothers with new infants than UTBAs, the mother's health practices were independent of the advice provided by the two groups of TBAs.
Rani 2003 [192]	India	22,473 currently married women	Significant differentials in care-seeking by age, caste, religion, education, household wealth, and women's autonomy suggest the existence of multiple cultural, economic, and demand-side barriers to care-seeking. Although socially disadvantaged women were less likely than better-of women to consult private providers, the majority of even the poorest, uneducated, and lower-caste women consulted private providers. Geographical access to public health facilities had no significant association with choice of provider, whereas access to private providers had only a moderately significant association with that choice.
Ndugwa 2008 [193]	Kenya	6756 children aged less than five years,	Predictors for seeking health care were the child's age, type and severity of illness, survival of father and mother, mother's education, mother's work status and wealth class
Enato 2009 [194]	Nigeria	650 pregnant women	Although the level of education of the study participants was relatively high, antimalarial control measures during pregnancy were found to be poorly utilised by the women and malaria care-seeking was often delayed
Regassa 2012 [195]	Ethiopia	1,094 households	• The study revealed that the level of ANC and PNC service utilizations is 77.4 % and 37.2% respectively.

			• Logistic regression, showed that women who are literate, have exposure to media, and women with low parity are more likely to use both ANC and PNC services.
Rahman 2004 [213]	Bangladesh	2883 adolescents irrespective of their marital status	• the factors influencing their health care seeking for reproductive morbidity, multivariate logistic regression analysis found significant positive association with adolescents aged 15-19 years, having autonomy in treatment, working status, adolescents of joint or extended family ($p<0.05$)
Faye 2010 [264] (from abstract only)	Senegal	380 women	Factors related to birth at home are polygamous marriage (OR=2.04 [1.13-3.70]), lack of transportation (OR=2.11 [1.13-5.01]) and residence more than 5 km from a health facility (OR=2.68 [1.56-4.16]). Late (3.90 [2.30-6.65]) or low quality (4.27 [2.25-8.10]) prenatal exams were also risk factors.
Mondo 2010[265] (from abstract only)	Congo	60 women 18-49 years of age	The analysis identified different delays: the delay in danger awareness, the delay in taking the care-seeking decision and the delay due to alternative care linked to cultural perceptions of the disease, the delay in reaching a medical facility related to lack of money or vehicles, the delay in patient care related to an absent or incompetent health staff or by inappropriate choice of structure, and finally the delay in administration of the prescribed treatment.
Kavoo-Linge 1992 [459]	Kenya	2,171 deliveries	• Out of 2171 deliveries recorded that early perinatal mortality rate (EPMR) was 53/1000 (114 losses). • The maternal mortality rate was 2.7/1000 due to 3 ruptured uteri, 1 postpartum haemorrhage, 1 case of cerebral malaria, and 1 care of anaesthetic complications. • In the analysis of factors associated with EPMR, the findings showed that there was a statistically significant difference between married and single/separated status with regard to EPMR. • Although not statistically significant, EPMR was lowest at a parity of 2. • Maternal educational level and socioeconomic status had a statistically significant impact on EPMR. • 70% of the mothers were in the low socioeconomic group, which had the highest rates of mortality. 5% of the birthing mothers did not receive prenatal care and contributed 22% of the perinatal mortality. • There were also an unexpected number of perinatal deaths for mothers who had received prenatal car at a sub-district hospital. • There was a very low EPMR (34/1000) for mothers without any complications, which constituted 81.4% of pregnancies. The highest EPMR of 315/1000 was found among those mothers with "threatened abortion." Malpresentation accounted for an EPMR of 242/1000, and prepartum haemorrhage, for an EPMR of 210/1000. • 1.1% of mothers had a urinary tract infection, .1% had cardiac disease, and .1% had diabetes, but these complications were not associated with EPMR. 17% were premature births; 10% were births after 42 weeks. • Mortality was highest among babies of less than 28 weeks gestation. Among the 82% with the uncomplicated labor the EPMR was 10/1000. The 6% with prolonged labour had an EPMR of 177/1000. • The highest EPMR was found among women with a ruptured uterus an cord collapse.
Swenson 1993 [460]	Vietnam	Demographic and health survey	• Most pregnant women received prenatal care services from midwives or assistant physicians (34.8-51.2%). Less than 5% received prenatal care from a physician. Level of education and utilization of prenatal care were positively associated ($p = .0001$). Higher parity women were less likely to use prenatal care (47.1% vs. 68.8%), perhaps reflecting that they were more confident about pregnancy and felt less need for prenatal care. Maternal age did not affect utilization of prenatal care, regardless of parity. Urban women were more likely to use prenatal care than rural women and those living in the provinces where infant mortality was higher than 40/1000 live births. The lack of transport in rural areas was likely responsible for this difference in prenatal care utilization. Absence of prenatal care services in provinces with high infant mortality rates probably explained the difference in prenatal care use. Among rural women, the factor having the most influence on prenatal care utilization was education.
Martey 1995 [461]	Ghana	1200 women aged between 15 and 49	• Over 50% of respondents married under 20 years, 70% of them attended antenatal clinic at least 4 times in their last pregnancy, • Over 80% had their last delivery in a health facility and over 80% knew about at least one modern method of family planning. • Only 5.5% were currently using a modern family planning method. • 90% of them were willing to stay in a maternity waiting home if advised to do so. • Most would be prepared to stay for a month or 2.

			• 20% of the respondents knew about local herbal preparations used for first aid in bleeding in pregnancy, although they would seek definitive treatment at a health facility
Uyirwoth 1996 [268]	South Africa	2940 mothers	• Only mothers who delivered within 12 months before the date of interview were included. • Antenatal coverage was high at 93.5%, the proportion of health facility deliveries was 74.6% while 26.3% of all births occurred at home. • Inaccessibility of maternity services, lack of money, negative staff attitudes and lack of privacy were the common reasons given for preference of home delivery. • Mothers who delivered at home were more likely to be of higher parity and unbooked than their counterparts who delivered in a health facility. • Postnatal coverage was 50.7% with a 25.4% rate of utilisation of a method of child spacing.
Toan 1996[167]	Vietnam	Women aged 15-49 years	• The contraceptive prevalence increased significantly from 48% in 1991 to 60% in 1994. The most commonly used contraceptive method was intra-uterine devices. • The BCG coverage among children under five years of age increased from 36 to 70%. • The proportion of pregnant women receiving three antenatal check-ups, as recommended by the health authorities was low and increased slightly from 15% in 1991 to 20% in 1994. • About one third of the pregnant women were delivered in health care institutions during this period.
Ray 2000 [462]	Bangladesh		• Caregivers prescribed iron supplementation only in 70% of registered pregnant women when 100% coverage of pregnant women with IFA tablet is our national goal. • Amongst this group 72.2% were partially consuming these tablets. • Main reason for irregular or partial consumption was inability to purchase iron tablets (52.63%). • Around 16% mothers were taking rest for 2 hours in the daytime during pregnancy. • Most important reasons for not consuming iron tablets were that iron was prescribed on the day of study (43.18%) and iron was not prescribed even though mothers were registered (36.23%).
Galvan 2001 [196]	Zimbabwe	3,864 pregnant women	• Women receiving no prenatal care, were more likely to be younger, unmarried and to have been transferred for delivery as compared with women receiving prenatal care. • Women receiving no prenatal care were seven times more likely to deliver an infant weighing less than 1,500 grams, adjusted odd ratio (OR) = 7.22; 95% confidence interval (CI) 4.58 to 11.39 as compared with those who booked for care. • Newborns of unbooked mothers were more likely to have a low APGAR score at birth, adjusted OR = 1.71; to have been admitted to the neonatal intensive care unit, adjusted OR = 2.14, and to require intubation, adjusted OR = 3.35. A large proportion of women (31.4%) initiated prenatal care after 30 weeks gestation.
Khan 2002 [197]	Bangladesh	350 women in postnatal period who had obstetric complications	• 74% had history of home delivery out of which 26% were reported to the hospital. • Majority of them (74%) was reluctant to take the health utilization system. • The major problem was financial burden, which seems to divert the major changing of health care seeking behaviour.
Adegboyega 2005 [463]	Nigeria	450 mothers	• Of these, 426 (86.1%) children belonging to 390 mothers/caregivers had symptoms suggestive of malaria, acute respiratory infections, diarrhoea and measles. • Care was sought Outside the home at the onset of symptoms for 280 (65.7%) while 146 (34.3%) were treated at home. • Of the 280 who were taken for care outside, 23(8.2%) were taken for care at the onset of illness while the others were taken for care after an attempt at self-treatment (68.6%), use of traditional medicines (12.5%) and provision of traditional home care (10.7%). • Only 65 (23.2%) of the children were taken for care within 24 hours of perceived onset of the illness
Mbonye 2006 [272]	Uganda		• Self-medication was common including over the counter drugs, herbs or a combination of both. • When this failed, several options were taken such as seeking care at health units. • People preferred to visit heath units with laboratory facilities, since investigations were valued and perceived useful.
Okusanya 2007 [198]	Nigeria		• Delay was associated with 77.8% of all maternal deaths.

			• Type I delay was the major problem contributing 57.1%. • Identified risk factors for delay in this study are; unbooked status, low socioeconomic status and marital status.
Lawoyin 2007 [464]	Nigeria	972 live births	• MMR was highest in mothers aged 40 years and above and lower in mothers 15-34 years. • Of infant's deaths, 18.8% occurred on the first day of life and 32.8% of deaths occurred within one week of birth. Malaria/fever (23.4%), LBW (17.2%), and Vaccine preventable diseases (neonatal tetanus and measles) (12.5%) were the commonest known causes of infant deaths. • Perinatal risk factors for infant deaths included being first birth order (RR = 3.1, 2.1-4.7), birth outside the health care facility (RR = 2.5, 1.4-4.3), no attendant at delivery (RR = 2.5, 1.4-4.4); low weight at birth (RR = 2.46 1.01-5.9) and traditional birth attendants at delivery (RR = 1.7, 1.2-2.6). Babies born to fathers who were between the ages of 25-34 years had borderline protection (RR = 0.76, 0.6-1.01).
Iyoke 2011 [199]	Nigeria		• Only approximately 43.1% perceived their symptoms as abnormal and 39.5% sought medical attention for their symptoms. • Inaccurate perception was influenced by the severity of symptoms as well as cultural beliefs on what constitutes abnormal symptoms following childbirth. Correct perception of morbidity was dependent on maternal age ($p = 0.002$) and educational status ($p = 0.004$) whereas positive care seeking behaviour was dependent on area of residence ($p = 0.03$). • A greater proportion of mothers aged 30 years or below had accurate perception compared to older mothers ($p = 0.02$).
Okafor 2012 [465]	Nigeria		• FMCHC caused tremendous increases in the uptakes of antenatal booking (202.2%), and hospital delivery (151.8%). • It also resulted in decreased maternal and perinatal mortality by 16.4% and 34% respectively.

Appendix 8: Characteristics of included studies: Qualitative studies - Chapter 3

Study ID	Country	Qualitative method used	Findings
Awasthi 2009 [218]	India (rural community in Uttar Pradesh)	There were 23 in-depth interviews and 5 FGDs. FGDs were conducted with three groups of eligible mothers and two groups of eligible grandmothers or other female relatives. FDGs were also conducted with two groups: one of ANMs and one of TBAs. Key informant interviews were conducted with medical doctors, general practitioners, paediatricians and neonatal specialists, (n = 4), other health workers such as ANMs (n = 4), TBAs (n = 2) and volunteer health workers (n = 2).	**Caregivers** • Most of the respondents considered maternal malnourishment and "small womb" as important risk conditions responsible for producing a "sick" neonate. • Conditions in mothers recognized by some as leading to poor pregnancy outcome were: general sickness, "too little intake, particularly of leafy green vegetables," presence of any illness (fever, vomiting, frequent stools, oedema of legs, "inactiveness" and "maternal overeating and/or eating many times a day") • Pregnant women should avoid tea, rice and certain lentils (urad dal) as these were "hot" or "cold" food, and rice was thought to cause a lot of white layering on a neonate's body at birth. They felt that the mother should not eat fried food or sour food (e.g. pickles). • Pregnant women should not eat large quantities of food for fear that the baby would grow too large and the woman would subsequently experience difficulties during delivery or the mother's stomach would be so full with food that there would not be enough space for the fetus to grow. • Pregnant women should also not take "excessive and unnecessary" rest and should avoid lifting weights, fast walking and climbing stairs. • Few recommended abstinence from sex during pregnancy. • The baby is bathed the same day he or she is born in both winter and summer. Perceived rationale: to remove vernix which is considered "dirty" and must be removed. • Newborn boys are bathed with warm water; girls are bathed with cold water. Perceived rationale: the belief that the girls have more "heat" inside and it is necessary to make their behaviour "calm" and "cool." • Feeding practices: The baby is generally given honey and water and goat's milk for at least the first 3 days. Perceived rationale: it is "light" and "nutritious." • Colostrum is not given. Perceived rationale: "first milk" of the mother is thick and indigestible. • Breastfeeding is delayed until after the first three days. Perceived rationale: mother's milk is not "produced" in the body for the first few days and is only "produced" after a few days when the baby comes in contact with the mother. • Postpartum care Mother is given special diet comprising hareera and sounth laddoos. Perceived rationale: they help to cleanse the mother's stomach to produce more milk for the baby. • Eye care procedures Local preparation kajal is applied to eyes daily. Perceived rationale: child is protected from the evil eye and it improves women's eyesight and makes eyes big. • Skin care procedures the baby is massaged daily with mustard oil. Perceived rationale: to make him or her healthy and to prevent from "drying up." • Cord care procedures Mustard oil is poured onto the cord daily. Perceived rationale: the cord drops off easily. • Protection from evil spirits A sharp iron object is kept beside the newborn or an iron object is tied around the neck of newborn. Perceived rationale: it helps to ward off evil. • The mother and baby are kept together in a room. Perceived rationale: it helps to ward off evil as well as to protect the child from diseases. • The baby should not be taken out in the sun for at least a week. Perceived rationale: protects the child from evil and cold air outside • Nobody touches the mother and baby until the mother is out of saour (a period of isolation when nobody touches the mother and baby and they are constantly confined to a room). Perceived rationale: it helps to ward off evil as well as to protect the child from diseases. • A fire is lit at the entrance of the mother and baby's room. Perceived rationale: to protect child from jamoga (stiff jaw and blue skin) to deter evil spirits to prevent tetanus. **Health workers** • Almost all the health-care workers recognized the following signs requiring medical care during pregnancy: vaginal bleeding, vaginal discharge, anaemia and fever. • All health providers mentioned bathing or washing the baby immediately after cutting of the cord, oil massage and kajal or soot application to the eyes as normal procedures

Study ID	Country	Qualitative method used	Findings
Castro 2000[219]	Mexico	Reviewed all 1995 death certificates of women aged 12–49, relatives of the deceased were interviewed, using the verbal autopsy technique.	**Delay in deciding to seek care:** Estimated from the moment they realized there was a complication, it took 19 women (20%) more than a day to decide to seek help. **Underestimation of the signs (subjective factors):** women or their relatives believe they have to endure the complications and that many of the signs that appear are normal, even when painful or constant **Partner's opposition or violence or both (interactional factors):** The power men hold over their partners is a very important factor in the provision of healthcare for women. Women do or refrain from doing a considerable number of things related to their health depending on their partners' approval or lack thereof. Men's dominance of women includes not only controlling their health but also using violence—emotional, psychological, or physical. **Fear of doctors and a bad impression of health services (interactional factors):** Negative opinion that the woman or her partner has of modern health services, which derives from previous interactions with health providers **Cultural reasons (structural factors):** In some cases, symptoms are interpreted as signs of a traditional disease rather than as signs of pregnancy-related complications. Consequently, the women and their relatives do not seek medical care, as they believe only medicine men and alternative practitioners are competent to treat such diseases. **Lack of money (structural factors):** Being short of resources (economic marginality) is one of the most important reasons why many women do not seek care when danger signs appear. For a family of limited resources, such as the interviewees', seeing a doctor implies spending a significant amount of money in transportation, fees (charged by many public health services and private doctors), and medicine. This situation prompts the women or her relatives to postpone their decisions to seek help, hoping that the problem will disappear. **Delay in reaching a care facility (structural and community factors):** Once a woman decides to seek help, she has to overcome a second barrier. A constant that appears in the collected testimonies refers to the difficulties in transporting the woman seeking medical care and the frequency with which the women and her relatives have to seek attention at more than one facility before actually receiving it.
Essendi 2010[243]	Kenya Slums f Nairobi	All women aged between 12 and 54 years who had a pregnancy outcome in 2004–2005 were selected and interviewed. From this group, those who had life-threatening obstetric complications and failed to seek health care were purposively sampled and participated in focus group discussions	**Barriers to Formal Emergency Obstetric Care Services' Utilization** **Identification of the Danger Signs** Many participants in the discussions reported that some women in labour take a long time before deciding to seek help. **Poor Health Decision Making** Decision making emerged as a complex issue. Without a supportive spouse, family, or social network, the decision to refer a birthing mother with complications takes a long time to reach. Depending on the structure of decision-making power, the decision could either be made by the woman or any other relative, including the mother-in-law and the husband. Women who rely on their husbands for financial support may not be in a position to make referral decisions without their partners' permission. **Unaffordability of Health Care Seeking** They noted that most of slum households are poor and often unable to afford these services, although they want to access formal delivery services. Lack of money to pay for transport or hire a vehicle to transport a pregnant woman to a health facility was highlighted as a major hindrance to accessing referrals. **Poor Physical Access to Formal Care Services** Women with obstetric complications or in labour have to walk or be manually carried to the nearest facility or to public transport out on the main road. It is even more challenging during the rainy season due to the impassable pathways in the slums. It was reported that the situation is worse if complications arise at night, when transport service providers raise their taxi or car-hire charges. **Insecurity at Night** Loss of property, death, and disabilities arising from attacks by thugs make referrals difficult when a birthing woman experiences complications. **Unfriendly Health Providers** Most discussants cited health professionals especially nurses, midwives, and generally female health providers as having a poor attitude towards pregnant women. With regards to maltreatment during delivery, ownership of the health facility emerged as a major determinant. Participants in the discussions reported that health workers in the formal private facilities—those not owned or run by the government—were more hospitable compared with their counterparts in government facilities who abuse patients, a practice that discouraged women from seeking health facility services when in need. **Cumbersome Hospital Procedures/Requirements** Pregnant women usually go through the laborious process of registration before eventually queuing to await their turn to be served. It is widely

Study ID	Country	Qualitative method used	Findings
			expected by health facilities/providers that pregnant women will go for antenatal care so that in an emergency case, the attending health worker can easily refer to the medical history on the antenatal card. **Inadequately Equipped Health Facilities and Poor Accessibility to Referrals** Referral of birthing mothers to appropriate facilities for obstetric care is often a complicated process, characterized by communication and transport challenges where the woman and her family often lack the money to pay for transport to the health facility. Even after arriving at a health facility, one may still need to be referred to a better-equipped facility, causing delays in receiving the required services and further deterioration of the patient's condition, thereby lengthening treatment time. The family also always incurs more costs when additional referrals are made. Sometimes the health facilities are equipped with ambulances, but the woman's family is asked to fuel it before she is transferred to a better facility. It was also mentioned that due to frequent stock-outs of drugs in most health facilities, the mother or her family has to buy the prescribed medicines or carry essential delivery materials when going to the facility, failure of which prolongs delay to receive care.
Farnes 2011 [236]	Ghana	42 childbearing Ghanaian women	**Accessing multiple sources of care to promote health and minimize complications** • The majority of participants (n = 37) sought biomedical care. Teaching by biomedical healthcare personnel was cited as an important reason to attend the clinic. • Herbalists, akomfo, Christian pastors and TBAs provide ethnomedicine for childbearing women in the form of herbal medicine. Herbs are taken with these goals: to prevent sunsumyare, to promote the health of the mother, to promote the health of the fetus, to prevent complications and to treat fever (possibly from malaria). • Faith healing is important in many cultures. There are three major religions practised in this district, with substantial overlap among the three in terms of beliefs about witchcraft and the nature of God. The majority is Christian, but a small group adheres to either the traditional African religion or Islam. Each religion has a specific healer. • Seeking spiritual protection regardless of other sources of care Some participants did not seek care from either biomedical or ethnomedical providers**,**
Fikree 2004[232]	Pakistan (poor women in Karachi)	Five focus group discussions and 15 in-depth interviews were conducted on 525 Muslim women, who were 6–8 weeks post-partum, were then interviewed at home	**Quantitative findings** • Antenatal care coverage was common; more than three-quarters of recent mothers sought antenatal care for their most recent pregnancy • Seriousness of morbidity versus none was associated with mean age, formal education, and the number of antenatal visits, however other maternal care indicators such as place of delivery and birth attendant were not significantly different between the two groups. **Qualitative findings** **Maternal health knowledge, belief and practice** • When the (labour) pains increased, the dai placed mustard oil on her fingers and massaged the vagina walls. The baby was delivered easily • After delivery, the Balochi TBA recommended the insertion of a vaginal and anal herbal pessary to facilitate the ''shrinkage of the uterus'', to ''give strength to the uterus'', and to ''strengthen the backbone and prevent constipation' • Goandh is eaten in order to bleed heavily. Also, turmeric powder, dried dates in milk, and herbs help one to bleed heavily. **Perceived cause of post-partum morbidity** • Women generally did not know the underlying cause of their perceived post-partum morbidity. The most frequently mentioned cause for any serious morbidity was weakness. **Health care seeking behaviour** • Women generally sought care initially from close relatives or traditional healers, however if they continued to suffer, women frequently approached a western trained health care provider in the end. **Perceptions of seriousness and care-seeking behaviours** • The core symptoms that are clinically significant during the puerperium are heavy vaginal bleeding and high fever as these are potentially fatal symptoms if appropriate and timely care is not sought.
Foster 2010[277]	Dominican Republic	Adult women (21–49 years of age), adolescent women (15–20 years of age), and adult men (>19 years of age) if they had	• A man expressed concern that a pregnant woman he knew who was bleeding refused to seek medical care and died • There was a perception among the Dominican nurses that women delayed accessing care because they held beliefs and attitudes regarding obstetric care that caused them to delay seeking help.

Study ID	Country	Qualitative method used	Findings
		experienced the loss of a family member (spouse, daughter, etc.) during childbirth or an infant within a month of childbirth in the public hospital system. Additionally, a cohort of 12 pregnant women (three from each neighbourhood) planning to deliver in the public hospital was recruited from the focus groups or community to be prospectively monitored and accompanied to prenatal visits.	
Hunt 2002[269]	Mexico (rural areas)	Women of ages between 25 and 35 years were interviewed	**Women's Preference for TBA over Medically Attended Births** • **Cost:** Informants' assessment of the cost of hospital/clinic birthing services ranged from "nothing" to "expensive." Even when they were not charged for the birth itself, subjects said they still often had to assume the cost of transportation and prescribed medicine as well as food and lodging for accompanying family, which could result in considerable added expense. On the other hand, although TBA charges may sometimes exceed those of medical institutions, these additional costs are avoided because women attended by TBAs usually birth at home. Still, some women perceived using medical services to be less costly than using TBAs. • **Positions and Techniques for Childbirth:** Comments in the interviews indicate that some women may have been reluctant to seek physicians' care in part due to physicians' insistence that women assume a supine position during labour. Many prefer to give birth in a squatting position, which TBAs not only permit but often promote • **Participation of Relatives and Birthing Location:** Women expressed a strong preference for giving birth in their own homes, rather than in medical institutions. Several women criticized hospital services for excluding relatives from being present during labour and delivery. **Opting for Medically Attended Births** • **Prenatal Care and Identifying Complications:** The women's comments further indicate that prenatal medical services are often sought by women who need medical prenatal care only to identify possible complications prior to delivery. If no complications are found, they will choose to have their babies with TBAs. • **Labour and Birthing Complications:** Complications encountered during the course of labour, such as prolonged labour and poor position of the baby, may also lead women to seek a physician attended delivery. In most cases, when women in our study encountered such problems, the TBA referred them to a doctor. • **Tubal Ligation:** In addition to addressing birth complications, another reason we found that some women had opted for a medically attended birth was that they wanted to have a tubal ligation performed.
Kalim 2009[229]	Bangladesh	We used a mix of qualitative research methods, including free-listing, rating exercises, hypothetical case scenarios, and in-depth interviews. Free-listing exercises were undertaken with both women of reproductive age (15-49 years) and elderly women (50-70 years) who had at least one birth experience in their lifetime. Hypothetical 'case scenarios' were used for eliciting local knowledge	**Case scenarios: knowledge of danger signs and care-seeking for PPH:** • the respondents reported not only physical but also non-physical causes of PPH. 'Evil spirits' were mentioned in both the areas while fate (Allah's will) was mentioned as a causal explanation • Providing care at home was the first consideration in the case of bleeding. In the case of PPH, service providers called were qualified (MBBS) doctors, untrained village doctors, religious healers, and herbalists. **Knowledge of danger-signs and care-seeking for eclampsia** • Treatment for eclampsia was first administered in the home, with a village doctor called to the household to administer care if it were perceived to be needed. Reasons given for choosing a village doctor were that they lived in close proximity, were available at night, and could start immediate treatment. **Postpartum haemorrhage** • **Recognition of complication:** women recognized retained placenta as a possible sign of complication, and they became more certain about the complication when bleeding started.

Study ID	Country	Qualitative method used	Findings
		and attitudes about signs associated with bleeding and eclampsia that triggered recognition and for identifying perspectives about their cause and treatment.	• **Decision to seek care:** In such a situation, a mother must rely on influential, elderly family members who usually make decisions relating to childbirth. As bleeding is not considered a serious complication, the decision to take the woman to facility was often delayed. Even when families recognized the complication, patients often could not be transferred to a facility because it was far away; no male family members were present to accompany the woman to the facility; and it was difficult to arrange transportation at night. **Actual care-seeking pattern** • Home level: when the placenta did not expel normally, the dai would enter her bare hand into the uterus to pull the placenta out. In some cases, hair was put into the mother's mouth to induce vomiting, which is believed to induce pressure and help deliver the placenta. However, when these attempts failed, families called a village doctor to their home or purchased medicine from a homeopathic doctor to increase the pain to deliver the placenta • Facility level: When treatment in the home was perceived to be ineffective, the patient was shifted to a government or private hospital. **Eclampsia** • **Recognition of complication:** causal explanations associated with eclampsia included evil spirits (four respondents), high blood pressure (three respondents), and blood deficiency (two respondents) • **Decision to seek care:** patients were transferred one to one and a half hours after the convulsions began. In three cases, the response was delayed; one of these cases reported that convulsions occurred due to dushi (evil spirits), and therefore, the patient would not be cured if she were transferred to a hospital. **Actual care-seeking pattern** • Home level: family members first administered treatment in the home, involving rubbing warm oil on the woman's body just after convulsions started. • Facility level: first went directly to the government facility (Upazila Health Complex), and were later referred to a higher government health facility as the women's condition was considered critical.
Magoma 2010[221]	Tanzania	Twelve key informant interviews and fifteen focus group discussions were held with women, traditional birth attendants, health care providers, and community members	**Perceptions of the need for professional care and quality of available care:** • Reasons given for high ANC attendance include: perceived health benefits to women and their unborn babies from receiving periodic examinations, vaccinations, and treatment for detected diseases; reassurance of the pregnant woman's wellbeing; referral of women with problems to hospitals for needed care; receipt of antenatal clinic attendance cards that guarantee free health care; and assistance with transport to reach health units for delivery. • Care providers interviewed reported that the ANC services they deliver meet the needs of most of their patients, and that they fully inform women of the benefits the care offers. **ANC and women's Empowerment** • The women interviewed described ANC visits as beneficial for their health, and a rare opportunity to leave their households and exert control over their pregnancies. Although Maasai and Watemi women usually require permission from husbands to leave their households, they do not typically need permission from their husbands to attend ANC clinics. **TBAs** • TBAs are an integral part of a Maasai woman's care during pregnancy, labour, and delivery. Maasai TBAs commonly accompany women to antenatal clinics, examine women at home, and refer them to health units for care if they identify a potential problem. **Labour and Delivery Care** • Most women in Ngorongoro deliver at home assisted by TBAs (Maasai) or other female relatives and neighbours (Watemi). As soon as labour begins, women contact their TBA or female relatives who stay with them through labour and up to five days post-partum. **Barriers to access skilled delivery care - planning in advance, transportation and cost issues** • The women, husbands, TBAs, and Elders interviewed agreed that the largest obstacle to receiving skilled and emergency obstetric care is failure to plan in advance for transport. Planning in advance for delivery is not part of traditional practice in the two communities where home delivery is the norm. **Barriers to seeking skilled delivery care - Social roles** • The Elders and TBAs explained that children in both ethnic groups are cared for by other relatives or neighbours in the mother's absence, and co-wives are expected to assist each other when necessary. These supportive practices, however, do not offset women's perceptions of

Study ID	Country	Qualitative method used	Findings
			the opportunity costs of delivering at health units. **The normal and the natural: Who should deliver in health units?** • Perceptions about the 'naturalness' and safety of home delivery is an obstacle to convincing women in the two ethnic groups of the importance of skilled delivery care in all cases. Although the women, TBAs and Elders from both communities expressed awareness of the potential risks of delivering at home, they stressed that delivering at health units is beneficial only for women with known complications. **Perceptions of the quality of care** • The health care providers and other reproductive health stakeholders interviewed all stated that TBAs and relatives are able to provide better emotional support and continuity of care in comparison to the type of care that is made available at the health units. • They listed health care providers' failure to encourage women with 'normal' pregnancies to deliver at health units as the key reason for the low utilization of skilled delivery care in the study area. **Emergency Obstetric Care** • In general, Maasai and Watemi women are able to leave their households to seek care at health units during emergencies without needing their husbands' permission. **Postnatal Care** • The women participants explained that they attend post-natal clinics to be examined and treated for any post-delivery problems, to have their babies examined and vaccinated, and to receive under-five growth monitoring cards. The latter are required for obtaining birth certificates, free child health care, and to enrol children in primary schools. **PMTCT** • PMTCT services had been introduced at scale into routine antenatal care for less than one year at the time of the study. According to all participants, PMTCT services are widely supported in the Maasai and Watemi communities. PMTCT services such as HIV testing, counselling, and treatment are also prioritized in the study clinics and husbands are encouraged to participate in PMTCT sessions. Messages about the importance of skilled birth attendance are not relayed to couples during PMTCT counselling sessions.
Mathole 2004 [222]	Zimbabwe	Qualitative methods including focus group discussions and individual interviews were combined. A total of 68 women, aged 19–46 years, and men, aged between 24 and 52 years, participated in five FGDs, three groups with 15, 12 and 17 women and two groups with 13 and 11 men.	**Women's reasoning around use of antenatal Care** • However, women, especially the younger women, indicated that they preferred to visit the clinic often, mainly to be reassured that the baby was growing well and was in a proper position • The women, moreover, expressed concern about what the long-spaced visit could mean in terms of care they received. • The older women (above 35 years) were not so concerned about having frequent visits. As a result of the experience they had accumulated from previous pregnancies, they reasoned that they could manage without having to visit the clinic often. **Local beliefs about pregnancy and care of Pregnancy** • They mentioned factors such as distance to the clinic and transport problems, financial constraints, difficulties in crossing big rivers during the rainy season; shame to visit the clinic with torn clothes or tight dresses; shame for having too many pregnancies or being over 40 years old and pregnant, as some of the critical reasons. They also mentioned service-related reasons, for example negative attitudes of service providers, long hours of waiting and poor quality of care. • Besides these socio-economic reasons, another but less obvious reason mentioned for not using ANC at the professionally stipulated first trimester was the local cultural way of seeing and making sense of pregnancy and its care. • Both women and husbands, described how pregnancy is kept secret, and only close family members are informed because of the fear of being bewitched, a fear that is also expressed in relation to blood screening • Besides these socio-economic reasons, another but less obvious reason mentioned for not using ANC at the professionally stipulated first trimester was the local cultural way of seeing and making sense of pregnancy and its care. **The views of women on specific routines** • The routines discussed here include weighing, blood screening and referrals. In the new ANC package the number of visits was reduced from an estimated 14 to five goal-oriented visits. Other routines such as weighing were omitted. The women said they prefer being weighed at all the visits and looked forward to knowing their weight,
Moran 2007[238]	Bangladesh (rural areas)	24 semi-structured qualitative interviews with women who had	• The most prevalent pattern of care seeking was purchasing medicines or other treatments to administer in the home. Typically, a male family member was sent to a provider close to home, described the woman's symptoms and purchased the medicine or treatment offered.

Study ID	Country	Qualitative method used	Findings
		recently given birth to characterize care seeking behaviours in response to perceived complications	Family members sought treatments from a variety of trained and untrained providers; common treatments included allopathic medicines from operators of pharmacies and from medically trained providers, treatments from spiritual healers (amulets, blessed water) and homeopathic medicines. • Women also described leaving the home to seek care in a health facility or a provider's home/office. A variety of providers was consulted, including operators of pharmacies, spiritual healers, homeopaths and medically trained doctors. Seeking this type of care was influenced by type of illness, reputation of provider, the woman's previous experiences and the family's ability to pay.
Myer 2003 [266]	South Africa (rural)	Twenty-nine semi-structured interviews were conducted with women seeking antenatal care at one primary care clinic in the Hlabisa district.	**Beliefs About Pregnancy** • **Limited Facility Access:** Physical access to the clinic was a major barrier in participants' approaches to antenatal care • **Unsure of Pregnancy:** Six of the women said that they booked late because they were unsure whether they were pregnant. • **Perception of Pregnancy:** Most (14 of 22, 64%) participants also commented that it is appropriate to begin antenatal care only once the fetus can be felt moving. • **Lack of Perceived Benefit to Antenatal Care:** Beyond the procurement of the antenatal attendance card, most women appeared to see relatively little direct benefit from antenatal care.
Nabukera 2006[256]	Uganda (rural)	Fifty key informants who were purposefully selected from each study site were interviewed	**Awareness** From the narratives, most of the respondents reported that most mothers were unaware that they had to return to the hospital after delivery. They remarked that the health workers never told them to return when discharged; they were only told about immunizations. **Monetary Costs** Lack of money for transport was mentioned as key reason for why women fail to return for PPC visits. This finding was particularly true for mothers living far from the health facility. **Facility-related Barriers** The negative attitude of staff and lack of drugs in the health facilities discourage mothers from coming to the health facility after delivery. In some cases, the health workers expressed the opinion that they even lack the necessary skills and equipment to facilitate them in their work. **Cultural Barriers** Several cultural and/or normative standards were pointed out as some key factors that may prohibit mothers from attending postpartum visits. **Pre-existing PPC Perceptions** Pre-existing perceptions about postpartum were the most frequently given reasons for not attending PPC visits. Eighty-six percent of the respondents thought that postpartum care was used only to immunize babies. Without a complication after birth, most mothers do not see the need to seek postpartum care.
Patel 2007[235]	India	Three in-depth interviews with family members of deceased neonates, and six focus group discussions with family and community members.	**Community perception and response towards neonatal deaths** • The common phrase heard was 'bhagwan ki marji thi; jo hona tha so hogaya, ab uspe baat karne se kya fayeda?' ('It was the will of God. what had to happen have happened. Is there any use talking about it?') However, this phase of initial resistance was gradually overcome and replaced by an increased willingness to discuss the issue of death of the newborn. From the discussions, it could be surmised that practices during the antenatal, intra-partum and newborn periods are predominantly shaped by traditions long-followed and approved by the community. It was apparent that measures such as modification of the diet during pregnancy; confinement of the mother and newborn for the first 1 week, or in some cases for the first few weeks postpartum in a special room (Saur) fortified against evil spirits; and special regimens for the mother and the baby, were all directed at improving chances of survival of the mother and the newborn. In the event the family recognized signs that they perceived as dangerous for the baby, they followed a sequence of steps consistent with community norms that they believed would best serve the health of the newborn. They utilize their own taxonomy of disease conditions and the probable associated causes and cures, and this combined with limited access to health care and financial constraints usually guide their care-seeking behaviours and referral patterns. • When asked about cultural beliefs, key participants explained that the community had followed certain traditions for generations and individual members of the community were reluctant to venture away from time-tested practices that they perceived had served them reasonably well.
Pettersson 2004 [239]	Angola	Ten focus group discussions were conducted with pregnant and non-	**Patterns of Care-seeking Behaviour** • Ostracized From the Decision-making Process.

Study ID	Country	Qualitative method used	Findings
		pregnant women residing in suburban areas of Luanda	• Reluctant Care of Complicated Cases. • Informal User Fees Amplifying Risk Taking • Women's Own Decision to Avoid Institutional Care. • Discarding Traditional Childbirth Practices • Ambivalence toward Choice of Institution for Delivery. • Willingness to Pay for Care. • Homebirth—A "Back-up" Strategy. • Awareness of Complications—Motivation for Institutional Delivery.
Rosato 2006 [223]	Malawi	Participatory women's groups identified maternal health problems (172 groups, 3171 women) and prioritised problems they considered most important (171 groups, 2833 women). In-depth qualitative data was obtained through six focus-group discussions with the women's groups, three with women's group facilitators, and four interviews with facilitator supervisors.	• 24 different problems were prioritised by 171 groups. The most important problem was anaemia, • Malpresentation (295) and retained placenta (277) were ranked in the top five by 43% of groups. Malpresentation was considered to be very severe because there was almost a certainty that either the mother, the baby, or both, would die. Like anaemia, malpresentation was considered a common problem that many women experience locally. • Obstructed labour (276) was prioritised by 41% of groups, postpartum haemorrhage (275) by 40% of groups, and malaria (195) by 38%. Malaria, in addition to being severe and common, was felt to be important because it could be the cause of other problems such as anaemia and jaundice. • There is still a taboo surrounding HIV/AIDS that makes open discussion or prioritisation of the issue inappropriate within communities, despite the knowledge and acceptance that the disease exists. • Additionally, HIV/AIDS was thought as a general problem that could affect anyone rather than a specific maternal health problem, and considered an untreatable disease and therefore fruitless to address
Schooley 2009[244]	Guatemala	Interviews and FGDs were conducted among 21 clients (current or past) of the traditional birth attendants; 17 female advocates/promoters;and 12 male advocates, including spouses, non-government organisation staff and community health workers.	**Factors that influenced the attitudes of household decision-makers to allow or facilitate receiving care** • One young woman described how valuable it was for her to find the 'optimal time' to negotiate more successfully with her neighbour and have greater success at convincing her of a particular behaviour change. • One TBA related a story of how she was able to change the opinion and the behaviour of the husband of a friend and client. This man had opposed the use of contraception, although his 41-year-old wife had already given birth to 13 children. The TBA had asked her friend's permission to speak with the husband privately, • Some participants reflected that using stronger language might be required to gain the attention of household decision-makers. • Focus group participants reported that word of mouth was an especially effective strategy for convincing other women and their family members • Many women and men commented on the fact that the Casa Materna offers a quality of care that is not offered by most other medical service providers in Guatemala • Couple-based education and health promotion was an effective technique for achieving behaviour and attitude change among both men and women. • Despite these challenges, men and women commented that they felt that outreach efforts were very effective when couples spent time counselling and educating other couples.
Sibley 2009 [224]	Bangladesh	Qualitative and quantitative data obtained through structured interviews with 149 participants living in Matlab, Bangladesh, including women aged 18-49 years, women aged 50+ years, traditional birth attendants (TBAs), and skilled birth attendants (SBAs), were subjected to cultural domain.	**Cultural theories of PPH** • Nearly all agreed that excessive (0.97), forceful (0.86), continuous bleeding (0.84), and bleeding with clots (0.78) require an urgent response while normal bleeding (0.00), slow bleeding (0.10), and bleeding that starts and stops (0.17) do not. Amount of bleeding was measured by both volume and number of different local collection-devices soaked with blood • They agreed that alga batas (malevolent spirits) is a cause of excessive, forceful and continuous bleeding and bleeding with clots. There was no clear pattern of agreement about whether atonic uterus (failure of the uterus to contract after birth), retained placenta, or a bad tear in the birth-area were causes, except that the retained placenta might cause clotted blood. • There was a consensus among the informants that, if the bleeding problem was caused by alga batas, the family should seek help of a traditional healer (kobiraj), and the problem should be treated with spiritual means, i.e. blessings or amulets

Study ID	Country	Qualitative method used	Findings
			• On the other hand, if the bleeding problem was caused by atonic uterus, retained placenta, or a bad tear, the family should seek care of a trained allopathic provider ('big' doctor), and the condition should be treated with medicines, injections and/or intravenous saline. Additional allopathic treatments included stitching for a tear. There was a little consensus about the role of the untrained allopathic provider (village doctor) in the management of these conditions. **Variation in cultural theories of PPH** • Within the subgroups, the SBAs unanimously agreed that alga batas was not a cause of excessive, forceful or continuous bleeding; however, most TBAs and lay women believed that it was. • If the bleeding problem was thought to be caused by alga batas, most lay women believed that they should go to a kobiraj, not a trained allopathic provider. Moreover, the TBAs and lay women agreed that the problem should be treated with amulets and special blessings. • Additionally, some SBAs thought that bleeding to cleanse the womb of old blood after birth is necessary for a woman's health whereas most TBAs and lay women shared this belief.
Sikder 2011 [230]	Bangladesh (rural)	40 semi-structured, in-depth interviews with women reporting severe acute obstetric complications and purposively selected for conditions representing the top five most common obstetric complications.	**Context of Labor and Delivery** • Most women described labour pain as nabi gora theke batha (pain arising from the umbilical cord) that was much greater than abdominal pain they had experienced during pregnancy. • They generally informed only a female member of their family, such as their mother or aunt, who usually advised them to keep silent and endure their pain. • Maintaining silence was seen as a measure of mental and physical composure, while women who were verbally expressive of their pain were considered to be undisciplined. • Of women who had live births, all of them delivered at home and said that they preferred to give birth at home in order to maintain privacy. Women were encouraged by their parents and husbands to stay at home during the birth to avoid the gossip they feared they would endure if they left their homes for health care. • In some cases, women explained that their husbands delayed the decision to seek timely medical care. • During labour, 18 women called female relatives or neighbours, who typically called one or two dhathris (the local term for untrained traditional birth attendants) for assistance. • Dhathris were reported to perform tasks such as holding the woman's waist during delivery, encouraging women to bear down, pushing on the woman's stomach, inserting fingers into the vaginal canal to check the progress of labour, cleaning and washing the baby, and pulling out the placenta **Care Seeking during Severe Obstetric Complications** • About half of the interviewed women said that they waited until they could no longer endure their pain to inform their families of the severe obstetric complication. • More than one-third of women identified their husbands as the main healthcare decision maker, while 35% listed other male relatives, such as fathers, fathers-in-law, and uncles. Even if the husband was absent during the crisis event, some families sought the husband's permission by mobile phone before seeking care. Male relatives, including fathers, brothers, and in-laws, played an important decision-making role as women often reported going to their father's home, especially for a first birth or if the husband was not present. While female family members such as mothers-in-law, mothers, and sisters-in-law were important during the process of labour, women explained that the ultimate care-seeking decisions during their crises were made by their male relatives. • Most often, male family members called village doctors to the home since they did not require full payment upfront. • Women listed proximity of non-certified providers, flexibility in payment schemes, and familiarity with these providers as reasons that their family sought care from these sources. • The majority of women felt that their husbands and/ or other male family members had delayed the seeking of medical treatment from a certified provider. • Families and women usually hesitated to go to the hospital for fear of the hospital environment. Often, neighbours or relatives had told them that the government health facilities were crowded and did not maintain appropriate levels of privacy. In addition, families feared that the woman would be "torn" if a C-section was required. **Narrowly Avoiding Death**

Study ID	Country	Qualitative method used	Findings
			• Once women were seen by non-certified healthcare providers, the providers typically said that they could not handle the emergency situation and advised the family to seek medical treatment at a hospital or clinic. • The husband or male relative used a mobile phone in 75% of these narratives to make arrangements for transportation or money. Most women (55%) were transported to a hospital or clinic by "rickshaw-van," a bicycle-powered flatbed cart. • Village doctors and dhathris were the most likely to advise the husband and other family members to seek care from board-certified medical providers at clinics or health facilities • Women explained that they were ultimately taken to certified providers because their situation had become desperate and their families realized that the non-certified providers would be unable to handle the complications. **Induced Abortions** • Though "menstrual regulation," the vacuum extraction of intrauterine content to stimulate menstruation and terminate pregnancy, is a legal procedure in Bangladesh, most women were secretive about the fact that they had an induced abortion. • Induced abortion is the only category in which women commonly reported themselves as the main health care decision maker. Most women in this group had not informed their husbands that they were pregnant. **Reasons women wanted to terminate their pregnancies** • existing illness • lack of money • enough children or young children **Reasons women used a particular method of pregnancy termination** • other women told her to use this method • other methods were too expensive • other methods were ineffective **Reasons family members** were angry about pregnancy termination • Woman had used an unsafe method • Woman had not informed husband of her pregnancy or abortion
Simkhada 2010 [217]	Nepal	In-depth interviews were conducted with 30 purposively selected antenatal or postnatal mothers (half users, half non-users of ANC), 10 husbands and 10 mothers-in-law in two different (urban and rural) communities.	**Pregnant women's workload** • Most of the women said that they could not attend ANC check-ups due to their workload in the home, which they perceived as heavy and unavoidable. • According to some non-users, their mothers-in-law prioritised household work over their daughters-in-law's health. • Some of the non-users had used ANC in past pregnancies; one such non-user said that her mother-in-law viewed ANC merely as a diversion • Most mothers-in-law expected their daughters-in-law to work during pregnancy as they had worked themselves. • There is a cultural practice in extended families of sending pregnant women to their maternal home, especially when they are unwell. Women mentioned that daughters were sometimes looked after and treated better in their maternal home compared to the care and food which they received in their in-laws' house **Mother-in-law's perceptions and their own experiences of ANC** • Most mothers-in-law believed that as pregnancy is a natural state, there was no need to seek medical care and that ANC was only necessary when complications occurred. • Similarly, a non-user's husband appeared to dismiss ANC on the basis of his mother's views of its usefulness and that of other mothers-in-law known to him. • Mothers-in-law in families of higher status in the community sometimes experienced pressure to send their daughters-in-law for ANC although they personally believed it to be unnecessary. • A user woman said that her supportive mother-in-law helped her to go for check-ups but did not encourage hospital delivery because of the cost involved. **Mother-in-law's power and control over resources**

Study ID	Country	Qualitative method used	Findings
			• Traditionally Nepalese mothers-in-law are powerful as they can access household resources through their close contact with the main family earners (their husbands and sons). • Some women highlighted that their mothers-in law's control over resources prevented them from receiving ANC. They also believed that mothers-in-law see no immediate benefits from ANC and considered the cost involved in preventive care as unnecessary. • Lack of access to resources is a major barrier, especially where mothers in-law control household finances • Women's low status within households prevents them from keeping any income they might earn themselves. • Most rural women did not have earnings of their own and this prevented them from accessing ANC. **Mother and daughter-in-law's relationship** • Poor communication and relationships between mothers- in-law and daughters-in-law were highlighted by some mothers-in-law, husbands and women as influencing the use of ANC. • One non-user's mother-in-law who was positive about ANC, accompanied her own daughter but not her daughter-in-law as she considered that their relationship was poor
Titaley 2010 [166, 242]	Indonesia	Twenty FGDs and 165 in-depth interviews were conducted involving a total of 295 participants representing mothers, fathers, health care providers, traditional birth attendants and community leaders.	**Reasons for using the service of traditional birth attendants** • **Economic and pragmatic reasons** Cost was one of the main reasons stated by participants in all villages for using the services of traditional birth attendants. The average delivery cost for a midwife of IDR 350,000 (~USD 35) was perceived as unaffordable by some community members. In addition, the flexibility of the payment method for traditional birth attendants was more convenient. • **Socio-cultural – Trust** being part of the community, speaking the local language, living in the community and sharing the same culture meant that traditional birth attendants have developed the feeling of trust in the community. • Some participants argued that the services of a health professional (a village midwife) are required only for those experiencing obstetric complications • **Community members' perceptions of care providers' knowledge and skills** For some community members, village midwives were also perceived as too young and inexperienced; whereas traditional birth attendants were more mature, patient and caring compared with the midwife. **Reasons for a home delivery** • **Economic reasons** Particularly among those who did not have the Jamkesmas cost was one of the major reasons for not having an institutional delivery. • **Access to services** In addition to the costs, physical distance was an issue for community members living far away from the health facilities and, therefore, home delivery was preferred. • **Convenience** The convenience of home delivery related to the responsibilities pregnant women felt towards other family members. **Reasons for using trained delivery attendants and institutional delivery** • delivery complications at childbirth were a main reason for using the service of health workers at childbirth (55% of the mother respondents) and for having institutional delivery (20% of the mother respondents). **The partnership practice between midwife and traditional birth attendants** • Health professionals in all six villages were aware of the partnership programs between midwives, traditional birth attendants and cadres. However, the implementation varied across villages. In one village in Ciamis district, the partnership was successfully endorsed by the Desa Siaga program engaging the village midwife, traditional birth attendants and cadres. In fact, in this village a penalty was given by the Desa Siaga officers (mainly the village community leaders from the village) to the delivery attendant if both the village midwife and traditional birth attendants were not present at childbirth **Community perceptions of village midwife and traditional birth attendants** • The data provided positive feedback about the role of village midwives in the community. They were perceived as diligent, kind, friendly, responsive, alert and willing to provide health services. Nevertheless, the role of traditional birth attendants was considered essential especially in remote areas. Having both a midwife and a traditional birth attendant present at a delivery was perceived important so that the tasks and responsibilities could be shared together.
Tlebere 2007[466]	South Africa	Quantitative and qualitative research methods were used,	**Qualitative Case Studies** • The accessibility of health services was a major issue influencing whether or not women sought antenatal care; in particular, the times

Study ID	Country	Qualitative method used	Findings
		including semi structured household interviews, case studies of women with no antenatal care and/or home birth, and verbal/social autopsies of maternal and infant deaths	services were offered, distance and time to services, and money needed for travel to services. • Community-related factors raised by the women who did not attend antenatal care included: limited financial resources, influence of family members, family responsibilities, women not realizing they are pregnant, and difficulty in obtaining time off from work. **Verbal/Social Autopsies of Maternal Deaths** • Lack of transport was considered a possible contributor in only one of the non-hospital deaths. • The majority of women sought health care without delay at the beginning of their illness. The women with chronic conditions clearly had regular contact with the public health care system, and many also had contact with private and traditional health systems. These women appeared to go first to the clinic or hospital in the public sector, and when they did not get better, consulted with a private doctor, traditional healer, or both. • Although the majority of deaths appeared to be HIV/ AIDS-related, there were still deaths caused by direct obstetric factors. **Verbal/Social Autopsies of Infant Deaths** • Themes that emerged from the qualitative results regarding factors that influenced utilization of child health services included: 1) socioeconomic constraints—in particular, no money for transport to a facility; 2) beliefs about causes of illness—Ishawe Yinyoni (witchcraft) was blamed in one case; 3) Lack of awareness of danger signs—several mothers stated that they did not realize the seriousness of the child's condition and therefore delayed seeking care; 4) poor quality of care—in several cases, an infant had been seen at the clinic or hospital the same day they died and been sent home without recognition of the seriousness of the illness; and 5) Role of traditional healers—several caregivers reported consulting a traditional healer if their infant's condition did not improve following care at a clinic or hospital or if the clinic was out of medicine.
White 2006 [245]	Haiti (rural)	Eighty-two pregnant women were interviewed to assess care seeking behaviors during pregnancy, satisfaction with services, reliance on social networks, and management of pregnancy-related illness	**Use of and Satisfaction With Prenatal Care** • Some women stated they sought prenatal care as soon as they realized they were pregnant because "as soon as a woman is pregnant she should go to the hospital • Satisfaction with care varied. A majority of the women (63%) reported being satisfied with their prenatal care. The remaining women in the sample (37%), however reported that they had experienced situations that made them feel uncomfortable or dislike their prenatal care. The most commonly reported (67%) reason for being dissatisfied was the long wait times women faced when seeking care. Women did not like sitting for extended periods; Lack of cleanliness of dispensary and hospital facilities was also mentioned (17%). Dissatisfaction with long wait time for visits was more commonly expressed by women who had children. **Managing Illness During Pregnancy** • The majority of women in the sample (65%) stated they thought the reason Haitian women die during pregnancy was because they did not follow medical advice or neglected to seek medical care. **Social Networks and Health Decision Making** • Husbands or male partners were most often cited as the person with whom women spoke during times of illness when they did not seek or delayed seeking care during previous pregnancies. Some women mentioned that it was their husbands who finally convinced them to seek formal health care. • Six women who did not seek care and 8 women who delayed seeking care during an episode of illness mentioned their husbands or male partners as the main source of health information. • Mothers were also a significant source of health information for women during pregnancy-related illness, mentioned four times by both women who did not seek or delayed seeking care. • Other sources of health care guidance came from other relatives, friends, and neighbours.
Wong 1995 [225]	China	8 focus group discussions conducted by the Women's Reproductive Health and Development Program in Yunnan as part of a comprehensive	**Health and the burdens of women's labour** • Women not only bear with men the role of economic producers through their labour, but do so under the added weight of their roles as biological producers of children, and social reproducers through child-rearing and household management. • Many of the women referred indirectly to gender inequality in work expectations, but seemed to accept it as part of their 'natural' lot. • For some of the participants, their burdens have been exacerbated by their husbands' ability to find wage labour outside the home or

Study ID	Country	Qualitative method used	Findings
		assessment of reproductive health needs in poorer, more remote areas of the two counties	village. Some noted that their husbands are often gone for long periods of time as they search for wage labour elsewhere, including factory labour and housing construction. Others have spouses who work as village cadres. • Illness, the use of and reactions to local health services, and health education the women participating in the focus groups clearly continue to face obstacles in obtaining health care services. Few of them seek care for illness, and their reasons call forth the familiar litany of problems faced by women throughout the developing world. Costs, distance and lack of transportation pose the expected hurdles. • While few women commented on client-provider interactions, some said they are reluctant to go to higher-level health facilities in the township or county seat because they are afraid of being bullied or looked down upon. **Prenatal and midwifery care** • Despite the apparent lack of confidence in curative care services, one encouraging sign of the success of China's primary health care efforts is that the women appear to understand the importance of prenatal care and take the initiative to seek it out when pregnant. • The reasons given by the women for birthing at home varied. Several women said that clinics and hospitals were too far away or too costly. A few women said that they had wanted to birth in a hospital, but by the time labour began it was too late to go, or there was no one around to take them. Others said their labour occurred at night when travel would be difficult. Although a few women said they would be embarrassed to deliver in a hospital with only male doctors available, one older woman related how things have changed in her village. • The women showed a rudimentary understanding of the need for clean or sterile implements when cutting the umbilical cord. A few women made reference to the availability of boiled water in clinic delivery rooms. However, for the women who birthed at home, necessity appeared to dictate the use of whatever implements were available to cut the cord. • In not a few cases, women mentioned rubbing down a knife with alcohol. In one case, a husband prepared for the birth several weeks in advance by going to the local clinic to purchase alcohol. In a significant number of cases, however, the women reported using unsterilized scissors or pottery shards. In Chengmin, some of the women believe that roof tiles are cleaner than scissors, and so use these to cut the cord instead. **Family planning** • Given the tremendous promotion of family planning, the intense nature of its implementation, and the financial hardships and criticisms imposed on those who do not comply, it is unrealistic to think that women will easily offer a frank assessment of family planning policy.
Wulandari 2011 [233]	Indonesia	18 pregnantwomenaged20–35years	**Beliefs on food preferences in pregnancy** • A wide range of beliefs about what types of food should and should not be eaten during pregnancy was stated. A particularly important belief was that vegetables are better than meat because they increase the production and 'freshen' the taste of breastmilk • Beliefs on traditional herbal remedies about traditional and modern medicine, and stated a preference for traditional herbs as being more natural and without side-effects • Some of the beneficial traditional herbal treatments mentioned included tamarind, turmeric, cinnamon, clove and coconut. This woman also stated that health care professionals did not understand the practice of taking traditional herbal remedies **Fetal locus of control** • Women said that they themselves were responsible for the health of their infant (i.e. internal locus of control), but also believed that God or faith determined the infant's health. **Midwives versus traditional birth attendants** • Although women expressed positive views about traditional herbal medicines, none of them were using traditional birth attendants **Important role of husband and other family members** • Pregnant women admitted that they took their family's advice without question because they trusted them. They also admitted that they followed their advice because they wanted their family to be happy with them.
Yadav 2010 [234]	India	Interview and observation techniques were used for data collection in 15 villages of Ramgarh PHC in Jaisalmer district of Rajasthan state, India. A total of 164 mothers were interviewed	• **Identification, classification, symptoms of malaria and action taken for febrile children:** Mothers were observing illness of child by his or her dull appearance and inactive in routine activities and they were calling "TAV" to the fever in their local dialect. They explained TAV is raised temperature of body (hot body) as compared to normal. They confirmed fever by touching body of febrile child and classified as low, moderate and high based on the degree of past experiences and feelings of sensation. • **Available options for treatment of children:** Use of traditional medicine based on the knowledge and experiences of mothers or elderly women of family or experienced and practicing women within their community, consulting health workers at Sub-centre/Primary Health

Study ID	Country	Qualitative method used	Findings
		and observations were made by the investigators in the group discussions who utilized health facility for the febrile children <5 yr of age.	Centre, use of herbs and self-treatment were available options for selection of health care for the febrile children. The net outcome of FGD of mothers, it was noted that it was not necessary to follow the same pattern in all the cases. • **Practices to treat febrile children in desert:** It was the common practice among the study mothers to treat febrile child herself at home. The justifications were given by the mothers for health practices with full confident and beliefs that they were able to get rid of suffering from fever within or before the time period of reaching health facility, non-availability of public transport from the dhanies of febrile child to the health facilities, it was costly for them to use the transport on individual hire basis. Some mothers expressed non-availability of transport facility in and around their dhanies and very few mothers told that health personnel were not available at health facility at the time of urgency of the febrile child due to off time of the health staff at the place. • **Reasons for selection of different treatment options:** The health seeking behaviour of the children was based on the level of educational status of the parents. • **Certain foods preferred and avoided during illness:** Majority of the mothers restricted dietary intake of febrile child during illness and about half (52.4%) of the mothers avoided to give fried foods but at the same time they preferred to give 'rabadi' (local preparation made from millet flour and yogurt), 'Khichchadi' (a semi-liquid preparation from the mixture of rice and pulses) and 'mateera' (fruits of a cucurbitaceous plant akin to water melon) to their febrile children. Almost all the mothers gave milk to febrile children during their illness and as well as after cure for the period of one to two weeks for recovery of health.
Yakong 2010 [275]	Ghana	27 Ghanaian women via in-depth interviews, focus groups and participant observation. Women's ages ranged from 15 to 49 years.	**Women's experiences of intimidation and being scolded** • At clinics women, including those who were pregnant, routinely stood up when speaking to nurses. Nurses were observed to spend very little time with women and disregarded their questions during times that they provided care. Many women recalled experiences in which they were scolded for not seeking care earlier, for not practising birth control, or for asking questions. They were also threatened with treatment withdrawal or denial if they did not comply with instructions from nurses, and were treated 'like children', ignored, and disrespected. **Women's experiences of limited choices** • Women thought that their choices in seeking reproductive health care were limited. In particular, they thought that nurses limited their choices related to labour and birthing. Women's preferences to give birth at home with support from trained traditional birth attendants (TBAs), their mothers-in-law or a peer, were not supported by nurses. Nurses would not come to women's homes to assist them, even when they were called. Instead they required women to walk the distance to the clinics, regardless of the stage of labour or the time when labour began. According to participants, TBAs were only allowed to report labour cases from their communities to nurses and/or accompany women in labour to the clinics. **Receiving silent treatment: women's experiences of nurses withholding information** • When women sought healthcare services at clinics, their expectation was that nurses would not only provide necessary treatments but would also help them understand their health problems, answer their questions, provide the guidance they needed to make informed decisions about reproductive matters (e.g., birth control), and take care of their health. However, their expectations remained unmet. Although it was observed that clinic walls were decorated with posters and pictures containing information about contraceptives and immunizations, these forms of information dissemination had little impact because the majority of women were not educated and had limited literacy. Even if a woman could read, the information displayed was in English and the majority did not speak or read this. Accordingly, there was a strong dependence on, and expectation of, oral advice and information from healthcare providers. **The influence of infrastructure: women's experiences with lack of privacy** • Clinic structures and practices also made it difficult for women to discuss their healthcare concerns with nursing staff. There was little privacy in clinics conducted in open rooms. One clinic was located close to the main highway and every passer-by, both on foot and on a bicycle, could see and identify every woman visiting the clinic. The clinic floor plan and traffic flow from the entrance to the reception area was not unlike a grocery store. There were no dividers to provide privacy. Case histories were taken in the midst of other clients waiting in the reception area. This lack of privacy was further compounded by the tendency of nurses to interview women in loud voices, making it easy for those who were waiting to hear their concerns. The physical clinic structure also compromised privacy during physical examinations. On observation at the clinic, sometimes pregnant women were palpated with curtains opened so others saw their abdomens. This lack of privacy was a prominent theme in women's stories and had a profound effect on their health-seeking patterns.

Study ID	Country	Qualitative method used	Findings
Yassin 2003 [237]	Egypt	244 women were included to collect qualitative information	When analysing FGDs we found that there are six categories of ideas about disease causation in pregnancy, childbirth, and puerperium, referred to here as causation categories. Health problems at these times mainly can be due to (1) attack by an evil eye from a jealous relative or neighbour; (2) attack by an evil spirit; (3) consumption of inappropriate food; (4) physical activities; (5) punishment by God; and (6) lack of personal hygiene. Analysis of the causation categories indicated an implicit judgement of the personal responsibility for the disease. Therefore, participants of the FGDs were asked to indicate their opinions on the degree of personal responsibility as well as the seriousness of each symptom. We show that maternal morbidity can be categorised into four groups: (1) those with high personal responsibility and low seriousness such as abdominal pain, lower limb oedema, and easy fatigability; (2) those with high personal responsibility and high seriousness such as puerperal bleeding, obstructed labour, prolonged labour, and vaginal bleeding; (3) those with low personal responsibility and low seriousness such as vomiting, headache, and blurred vision; and (4) those with low personal responsibility and high seriousness such as loss of consciousness, convulsions, and puerperal fever.
Zoysa 1998 [207]	India	In-depth interviews were conducted with 37 mothers of young infants (between one week and two months of age).	**Birthing Practices And Newborn Care** The majority of these women had received some form of antenatal care in local clinics run by nongovernmental organizations or in a hospital. However, only (14%) had opted for an institutional delivery, primarily because they had experienced complications in earlier deliveries. The rest had preferred a home delivery, which they considered to be `more convenient'. Medical care around the time of delivery was less valued than social support, which enabled the mothers to rest and recover, and ensured that their newborns received the attention that they required. In most cases, support was provided by the dai and female family members, who helped with newborn care and with household chores in early days or occasionally weeks after delivery. During this period, mothers rest as much as they can. However, they move freely in and out of the home, and young infants are readily taken out of the home if this is thought to be necessary. **Recognition and interpretation of illness in Young infants** Recognition of illness is based on the identification of a constellation of signs, such as a change in the frequency, consistency, colour or smell of infant's stools, in the case of dast (diarrhoea) or a change in the infant's body temperature and behaviour, in the case of bukhar (fever), and an interpretation of the circumstances and course of the illness. It is important to note that the illness `types' described to us by our respondents are not rigidly and categorically defined. They include an assortment of illnesses, illness signs and even aetiologies, some of which may be combined with others, such as bukhar with khans| (cough), or develop into others, so an episode of khans| can lead to pasl| chalti hain (laboured breathing). **Patterns Of Care seeking** Mothers generally took prompt action in seeking advice for any problem in their young infant that they judged to be more than a temporary nuisance, especially if it led to a change in the young infant's behaviour or breast milk intake. They also sought advice if they were uncertain about the infant's condition. As expressed by one mother: `We seek care if the problem is above our heads'. Home-based remedies were rarely used, except in the case of zukam (akin to the common cold), and of khans| (cough) which led to a number of treatments, mostly designed to warm up the baby, such as whole body massages with mustard oil and garlic, hot dry poultices and sun baths, or the administration of small amounts of home-made mixtures prepared with spices and a little breast-milk. Home-available or pharmacy-purchased drugs were not given to a young infant without a prior consultation with a health provider. **Quality Of Care** The knowledge base of many (but not all) of the unqualified practitioners was limited and to a large degree they shared the vocabulary and beliefs of their clients concerning disease transmission and management among young infants. The qualified practitioners, on the other hand, including those trained in Ayurvedic or Unani schools of medicine, had more accurate, though often patchy, knowledge of biomedicine. Unfortunately, as a result, they seemed to have greater difficulties communicating with their clients.
Bloom 2001 [200]	India	300 women	Women with greater freedom of movement obtained higher levels of antenatal care and were more likely to use safe delivery care. The influence of women’s autonomy on the use of health care appears to be as important as other known determinants such as education.
Bazzano 2008 [201]	Ghana	Data collected comprised 84 h of participant observation (including following an ill newborn through a hospital visit), 14 in-depth interviews with key informants	Barriers to prompt allopathic care seeking include sequential care-seeking practices, with often exclusive use of traditional medicine as first-line treatment for 7 days, previous negative experiences with health service facilities, financial constraints and remoteness from health facilities.

Study ID	Country	Qualitative method used	Findings
		(older mothers and grandmothers), 45 semi structured interviews with mothers, 28 case histories from women who had recently given birth and 32 expert interviews with local health providers. Thirteen focus groups were held with men and women, and narrative histories of newborn deaths were taken from eight women.	
Barua 2001 [226]	India	302 married girls of this age, and in-depth interviews with 74 girls, 37 husbands and 53 mothers-in-law.	• Household work, protection of fertility and silence arising from embarrassment related to sexual health problems were the strongest factors influencing care-seeking. • Husbands made the decision whether their wives could seek core and mothers-in-law sometimes influenced these decisions; girls had neither decision-making power nor influence.
Abraham 2001[227]	South Africa	103 minimally structured in-depth interviews of 32 pregnant women.	• The findings highlight the importance of women's perceptions of quality of care in influencing their health seeking practices.
Atuyambe 2009[246]	Uganda	This was a qualitative study that employed focus group discussions (FGDs) among adolescent girls (10e19 years) and key informant (KI) interviews with health workers. Age for FGD participants ranged from 16 to 19 years. The FGD participants were recruited while seeking antenatal care for their first pregnancy or immunization service for their first child, not being older than 6 months.	• **Feeling exposed and powerless:** Adolescents who considered themselves too young felt exposed as they gained weight due to pregnancy. They were in dilemma as they felt ashamed to meet their peers and feared to visit health facilities. Moreover, as the men dominated the decision making process, adolescents felt. • **Powerless as they lacked adequate financial and social support:** The dilemma of becoming an adolescent mother. Adolescent girls who conceive tend to live with a feeling that they are too young to manage the pregnancy. Additionally, they often feel that they might not get adequate support to go through the pregnancy and deliver healthy babies. Commonly, adolescent girls lacked stable relations with the father of the baby. • **Lack of decision making power.** Adolescent choice of health care during pregnancy was heavily influenced by partners or parents who could provide financial support. • **Seeking safety and empathy:** In seeking safety, adolescent mothers' expectations were largely not met as they experienced lack of compassion at health facilities. • **Cultural practices and beliefs about birth.** Some Ugandan cultural practices for childbirth include placenta rites. Like adult mothers, adolescents have a strong traditional belief surrounding the placenta. To be able to access the placenta was considered an important factor that influenced the choice of place for delivery. Often in public health facilities, adolescents were not given the placenta because it was considered biological/medical waste and was incinerated or thrown into a placenta pit. • **Expectations and experiences**. Respondents indicated that there was a relatively high degree of laxity among health workers with regard to patient care at the health unit. This discouraged adolescents to seek ANC and delivery services. • **Transport, a key determinant to health seeking.** The mode of transport to the health units posed a threat to pregnant adolescents' health. The common mode of transport in the district is by bicycle or motorcycles. In some areas the homesteads are far from regular routes of commuter taxis. The commonly used type of transport is uncomfortable to expecting mothers. Bicycles were described as either inappropriate or too slow to address the urgent needs of adolescents in labour. • **Dealing with constraints**. In search for wellbeing, adolescents face situations that require a secure referral system in case of emergencies, financial security, clean and safe delivery places and competent health staff. Respondents
Khadduri 2008 [240]	Pakistan	43 semi structured interviews and 34 focus group discussion	• Home delivery with dai was the norm • Knowledge of some danger signs was common but timely action upon recognition was not.
Lubbock 2008 [247]	Nicaragua	37 semi-structured in-depth interviews with women	**Logistical barriers to seeking care** • While the services are theoretically free, indirect costs such as financing travel to and from the clinic, leaving work to seek care, and paying for prescribed medicines were reported as considerable barriers to accessing care and treatment.

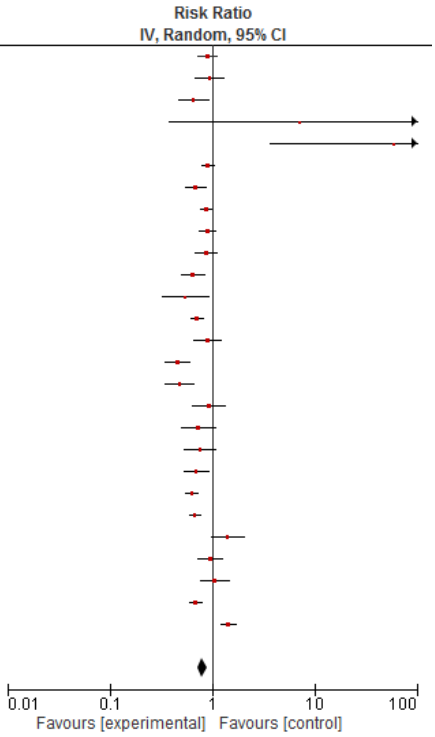
Study ID	Country	Qualitative method used	Findings
			• Women also cited their need to prioritize spending money on food and school-related expenditures for children and other family members as an economic barrier to service utilization. **Value of health care** • Women's knowledge and acceptance of the importance of maternal health care and healthy pregnancy practices are shaped by previous experiences as well as formal and informal communication within the community and households. • Many women who utilized maternal health services believed it was important as a means of reducing the risks of complications and ensuring the health of the unborn child. • Women—often those who delivered healthy babies—praised the quality of care and attention they received during pregnancy and delivery, noting the importance of receiving vitamins, vaccinations, and examinations during pregnancy and the benefits of such care in regard to the healthy delivery of the new baby. **Security of health facilities** • Health facility–based care increased women's sense of security and safety, which contributed to their perception of the value of institutional care and encouraged further utilization of services. • Women's perception that facility- based care provides a safe environment for receiving care evolved from the quality of care they received and their delivery outcomes with previous pregnancies. • Many women who experienced complications with previous births or low parity had an increased fear and awareness of the risks involved in failing to seek care and thus sought care to avoid complications. **Communication** • Many women stated that their knowledge of pregnancy and delivery practices came from health workers, prior experience, or other more experienced women in the community, especially their mothers and mothers-in law. • Open communication with one's husband about the importance of seeking care also facilitated a woman's utilization of services. **Traditional practices** • Many of the women who did not seek prenatal or delivery care stated that they were not accustomed to using prenatal care and were familiar with delivering at home like other women in their families. These women often only experienced minor (if any) complications during labour and delivery. • Women's persistent disdain and distrust for health care workers, including parteras, strengthened their desire to rely on familiar, traditional forms of care. While a majority of people in Nicaragua maintain strong religious conviction, women often attributed health care seeking behaviours and both positive and negative outcomes of past experiences to fate. • Women's strong fatalistic beliefs were used to justify failure to seek care and reflected a sense of limited control over health outcomes. **Previous experiences** • Women's past experiences with poor-quality care or unclear information in health facilities influenced future behaviours. • Poor communication or miscommunication with health professionals also contributed to women's misperceptions and lack of understanding regarding healthy behaviours and potential complications, as revealed in the interviews. • Reported misdiagnoses or unclear communication from health workers and other women in the community have led to delayed antenatal care visits and home deliveries. • Uncomfortable or negative past experiences receiving care—including lack of attendance, excessive waiting times, lack of agency regarding one's health, and embarrassing physical examinations—discouraged women from seeking care at health facilities. • A few women who experienced complications and had to deliver via caesarean section believed returning to the health facility for a future delivery would result in the same outcome. • Complications that resulted after having received care from a partera have deterred women from seeking future care at facilities or from parteras. **Shared information** • Women's decisions to seek care were affected by prevailing rumours of other women's adverse experiences, negative perceptions, and shared misconceptions that remained uncorrected by health workers or other formal sources of information.

Study ID	Country	Qualitative method used	Findings
			• A woman's fear of receiving vaccinations, being touched or examined by health workers, and taking unsafe transportation to reach a health facility prevented some women from attending prenatal visits. • Women reported that their fear of delivering in health facilities is related to the shared perceptions that delivering in a health facility causes illness or guarantees a caesarean section delivery. **Gender and power issues** • Women's lack of autonomy and mobility in the study region is illustrated by their need to receive permission from their bosses or partners to seek care. • Women working and living in haciendas (farms) or working outside of their own agricultural land or home reported having to receive permission from bosses or managers to seek prenatal care. • Women reported that men expressed jealousy if their wives were examined by a health practitioner and, as a result, women were not permitted to seek care or chose not to in order to avoid potential violence or conflict.
Head 2011 [241]	Bangladesh	17 women in three sites in Bangladesh	• The most frequent and usually first action was to seek care from untrained attendants at home, then from professional attendants outside the home. • Care-seeking outside the home occurred a median of 19 h after perceived labour onset. • Delays in care-seeking arose for reasons related to: (1) confusion over the onset of labour, (2) power processes inhibiting women's disclosure of labour symptoms, (3) the practice of "waiting for delivery," and (4) preferences for home delivery. Strategies to encourage lay recognition of and response to prolonged labour should consider women's misinterpretation and non-disclosure of labour pain, health beliefs surrounding the labour process, and fears of medical intervention.
Okyere 2010 [231]	Ghana	30 in-depth interviews and two focus groups with recently delivered/pregnant women, 20 in-depth interviews and six focus groups with birth attendants /grandmothers, 12 in-depth interviews and two focus groups with husbands, and six in-depth interviews with asram healers.	• The study confirmed that asram is characterised by symptoms which include green/black veins, a big head and the newborn growing lean. • However, a complex classification of 14 types of asram covering a wide array of symptoms was identified. Asram was perceived as a common illness which cannot be treated at health facilities and to which many danger signs in the newborn are attributed, and thus it affects care-seeking. • Asram treatment includes frequent cold herbal baths and air-drying; however, oral treatments and preventive bathing are also used. • Any modification of asram treatment was reported to require the sanction of a healer.
Mrisho 2009 [267]	Tanzania	Eight focus group discussions were also conducted with women who had babies younger than one year and pregnant women	• Women were generally positive about both antenatal and postnatal care. Among common reasons mentioned for late initiation of antenatal care was to avoid having to make several visits to the clinic. • Other concerns included fear of encountering wild animals on the way to the clinic as well as lack of money. Fear of caesarean section was reported as a factor hindering intrapartum care-seeking from hospitals. Despite the perceived benefits of postnatal care for children, there was a total lack of postnatal care for the mothers. • Shortages of staff, equipment and supplies were common complaints in the community.
Pritham 1993 [248]	Korea	40 native-born pregnant	**Family Life and Women's Roles** • Women are considered to be inferior to men. Confined to the home, the traditional woman fulfils her role of giving birth to children, preferably male so that the family line may continue unbroken. • Regarding the importance of prenatal care, 75% of the women agreed it was important, 17.5% were uncertain, and 5% did not think it was important.
Gurung 2008 [228]	Nepal	(VDCs) of Kailali. Altogether 17 Focused Group Discussions (FGDs) were conducted with 106 parents.	Most people are unaware of importance of immediate care of newborn and many unsafe behaviour do exist such as common use of untrained attendants, unsafe cord care, immediate bathing of baby. Most of the existing practices are based on deep-seated traditional beliefs. Some used Clean Home Delivery Kit (CHDK) and a few had used knife to cut the cord. All had tied stump with thread and applied mustard oil to prevent infection.

Appendix 9: Overall neonatal mortality: all studies – Chapter 3

Study or Subgroup	log[Risk Ratio]	SE	Intervention Total	Control Total	Weight	Risk Ratio IV, Random, 95% CI
Azad 2010	-0.1054	0.1068	4457	4441	4.4%	0.90 [0.73, 1.11]
Baqui 2008 (1)	-0.0513	0.1632	3009	1436	3.6%	0.95 [0.69, 1.31]
Baqui 2008 (2)	-0.4155	0.1732	2812	1436	3.4%	0.66 [0.47, 0.93]
Bashour 2008 (3)	1.9872	1.5096	284	148	0.1%	7.30 [0.38, 140.61]
Bashour 2008 (4)	4.0877	1.4238	293	148	0.1%	59.60 [3.66, 970.97]
Bhandari 2012	-0.0943	0.0657	29667	30813	4.9%	0.91 [0.80, 1.04]
Bhutta 2008	-0.3704	0.1181	2932	2610	4.2%	0.69 [0.55, 0.87]
Bhutta 2011	-0.1324	0.0601	12028	11005	4.9%	0.88 [0.78, 0.99]
Colbourn 2013	-0.1054	0.093	10055	9931	4.5%	0.90 [0.75, 1.08]
Darmstadt 2010	-0.1393	0.1257	4616	5214	4.1%	0.87 [0.68, 1.11]
Fottrell 2013	-0.4308	0.1339	8819	9896	4.0%	0.65 [0.50, 0.85]
Gill 2011	-0.5978	0.2606	1889	1466	2.4%	0.55 [0.33, 0.92]
Jokhio 2005	-0.3425	0.0692	340	439	4.8%	0.71 [0.62, 0.81]
Kirkwood 2013	-0.0943	0.1562	7721	7898	3.7%	0.91 [0.67, 1.24]
Kumar 2008 (5)	-0.7765	0.1394	1522	539	3.9%	0.46 [0.35, 0.60]
Kumar 2008 (6)	-0.734	0.1612	1087	540	3.6%	0.48 [0.35, 0.66]
Lewycka 2013 (7)	-0.0726	0.1828	4494	1653	3.3%	0.93 [0.65, 1.33]
Lewycka 2013 (8)	-0.3147	0.1931	4610	1653	3.1%	0.73 [0.50, 1.07]
Lewycka 2013 (9)	-0.2744	0.1839	4680	1654	3.3%	0.76 [0.53, 1.09]
Manandhar 2004	-0.3567	0.1419	2899	3226	3.9%	0.70 [0.53, 0.92]
Midhet 2010 (10)	-0.4529	0.0697	622	447	4.8%	0.64 [0.55, 0.73]
Midhet 2010 (11)	-0.393	0.0634	740	448	4.9%	0.68 [0.60, 0.76]
More 2012	0.3507	0.184	7944	7759	3.3%	1.42 [0.99, 2.04]
Persson 2013	-0.0408	0.1397	11818	10559	3.9%	0.96 [0.73, 1.26]
Sloan 2008	0.0583	0.1691	2121	2044	3.5%	1.06 [0.76, 1.48]
Tripathy 2010	-0.3711	0.0713	9388	8819	4.8%	0.69 [0.60, 0.79]
Wu 2011	0.365	0.081	2094	2062	4.7%	1.44 [1.23, 1.69]
Total (95% CI)			**142941**	**128284**	**100.0%**	**0.80 [0.72, 0.89]**

Heterogeneity: Tau² = 0.06; Chi² = 149.64, df = 26 (P < 0.00001); I² = 83%
Test for overall effect: Z = 4.11 (P < 0.0001)



Footnotes
(1) CC
(2) HC
(3) 4 visits
(4) single visit
(5) ENC
(6) ENC + thermo spot
(7) community mobilization + home visitation
(8) home visitation
(9) community mobilization
(10) C-IECC
(11) W-IECC

Annex 10: Interview guide for focus group discussion and in-depth interviews – Chapter 4

Maternal morbidity and mortality
Antenatal care attendance

Q1: What are the pregnant women's health care needs while they are pregnant?

Q2: In your opinion, should pregnant woman go for ANC check-up during pregnancy?
If yes, why she should go? (i.e. Reason)
If no, why she should not go? (i.e. Reason)

Q3: What are the barriers that pregnant woman faced while seeking ANC care, in your area?
Probe: Constraints: Social, Economic, Access, Knowledge, and Cultural

Q4: Have you received antenatal care check-up?
If yes,

- When did you go?
- Whom did you seek care and why you choose *said* provider? (i.e. Care provider)
- Where did you seek care and why? (i.e. Place)
- What did you receive in ANC? (i.e. Services received)
- How many times you sought care during your last pregnancy (i.e. If < four, reason behind)?
- Did anyone refer you for ANC? Who and where? Compliance?
- Who took decision?

If no,

- Why you did not receive ANC? (i.e. Constraints: Social, Economic, Access, Knowledge, and Cultural)

Q5: In your opinion, what can be done to ensure, pregnant women receive ANC? OR what are the motivational factors that encourage pregnant women to receive ANC during her pregnancy?

Recognizing danger signs during pregnancy

Q6: What are the common occurring problems that pregnant women may face during pregnancy?

- Name of illness (and variants or other names)
- Occurrence (usual time of year when illness occurs)
- Etiology (causes)
- Treatment (what is usually done, and by whom)

Q7: Have you faced any problems or complications during your pregnancy?
If yes,

- What was the problem?
- When it occur (trimester)?
- Did you seek care for the problem?
  - From where and why you choose that provider?
  - Did you face any problem in seeking care for this complication?
  - If no, why you did not seek care? (i.e. Constraints: Social, Economic, Access, Knowledge, and Cultural)

Birth preparedness

Q8: Have you taken any measures (steps) for your expecting delivery?
If yes, what are these?

- Selection of skilled birth attendant?
- Selection of place of delivery?
- Selection of place to go in case of emergency?
- Arranging transportation in case of emergency?
- Arranging money in case of emergency (i.e. for transportation; HCP)?

If no, why you have not taken any measures?

Q9: In your opinion, what are the barriers against birth preparedness, in your area?
Probe: Constraints: Social, Economic, Access, Knowledge, and Cultural

Q10: Is there a community fund for use in maternal or newborn emergences?
If yes,

- How do families gain access to funding? Please tell us something about this?

Care during labor and delivery
Skilled delivery attendance and place of delivery

Q11: In your opinion, who is the most trusted health care provider for the delivery? and why?

Q12: In your opinion, where pregnant women usually prefer to delivery? and why?

- What are the barriers against the institutional deliveries?
- How hospital deliveries can be encouraged?

Q13: Where you are planning to deliver the baby?

- If home; why prefer home?
- If hospital; why prefer hospital?
- Who takes the decision to deicide place of delivery? (and why?)

Q14: By whom, you will prefer to deliver? (Birth attended)

- Why do you prefer the provider mentioned? (i.e. Reason)
- Who takes the decision to decide HCP? (and why?)

LHW presence at the time of delivery

Q15: In case of home delivery, are you planning to call LHW to attend the delivery? If yes, why?
If not, why not?

Q16: Do you think that presence of LHW is necessary?
If yes,

- Why?
- What role do you want LHW could play at home birth?

If no, why not?

Q17: In your opinion, what can be done to ensure, LHW presence at the time of home birth? OR what are the motivational factors that encourage families to call LHW at the time of home birth?

Recognition of danger signs

Q18: In your opinion, what are the common problems or complication that women face during delivery?

- Name of illness (and variants or other names)
- Occurrence (usual time of year when illness occurs)
- Etiology (causes)
- Treatment (what is usually done, and by whom)

Clean delivery

Q19: In your opinion, why it is important to wash hands before, during and after delivery?

Newborn Morbidities and Complications
Knowledge about danger sings

Question 20: In your opinion, what are the common newborn danger signs? and why?					
Probe:	Danger sign	Local term	How do you recognize, if newborn has this danger sing?	How do you respond to it, if newborn has this danger sing? (First preference)	Preferred health care provider for the treatment of this danger sign?
Danger sign in your newborn					

Q21: In your opinion, if the baby I suffering from breathing problem immediately (within five minutes) after birth, what should be done?

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