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Narrative Review of Interventions to Reduce Maternal and Neonatal Mortality

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Abstract

Maternal and neonatal mortality rates remain unacceptably high across low- and middle-income countries (LMICs), despite the availability of effective, evidence-based interventions. This narrative review synthesizes findings from studies published between January 2000 and March 2022, examining health system and policy interventions that enhance access to skilled maternal and newborn care. The review identifies four primary implementation domains: health system and policy factors; equity, access, and contextual determinants; knowledge-seeking, demand, and supply influences; and service-design measures. Key antenatal interventions include risk screening and management, nutritional supplementation, infectious disease screening, and vaccination. Intrapartum and delivery-related interventions encompass skilled birth attendance, emergency obstetric and newborn care (EmONC), cesarean section, uterotonic drug administration, and intrapartum fetal monitoring. Postpartum and neonatal interventions such as newborn resuscitation, thermal protection, infection control, and early breastfeeding support significantly reduce mortality risk. Effective implementation of these interventions depends on a strong health workforce, well-equipped facilities, reliable supply chains, and community-based outreach. Persistent inequities rooted in poverty, gender norms, and urban–rural disparities continue to limit access to quality care. Evidence underscores the need for integrated, context-sensitive strategies and policies that strengthen health systems, enhance community engagement, and ensure equitable access to skilled services. Strengthening maternal and newborn care delivery within resilient health systems offers a clear pathway toward achieving global maternal and neonatal mortality reduction targets.

Keywords: Maternal mortality; Neonatal mortality; skilled birth attendance; Health system strengthening; Low and middle-income countries (LMICs).

INTRODUCTION

Maternal and neonatal mortality rates remain unacceptably high in many low-and middle-income countries. Effective interventions exist for enhancing care-seeking behaviour and access to skilled service delivery during pregnancy, childbirth, and the newborn period [1]. However, coverage continues to fall far short of the levels needed to have a significant impact on maternal and neonatal mortality [2]. This narrative review examines the evidence on health system and policy interventions to increase health-seeking behaviour and access to skilled services in these regions. The review identifies interventions across four implementation domains: health system and policy factors, comprised of the health workforce and training, facility readiness and supply chains, and community and outreach programmes; equity, access, and contextual factors, including socioeconomic determinants and marginalization, geography and urban–rural disparities, and gender norms and decision-making dynamics; knowledge-seeking, demand, and supply factors, encompassing maternity awareness, health-care knowledge, perceived need and personal benefit, and the quality, availability, and affordability of services; and service-design measures, addressing hours of operation, geographical coverage, multi-service delivery, referral usefulness, and facility and outreach communication[3]. Evidence on the effectiveness of interventions within these domains is compared across settings, highlighting both well-established and still-uncertain areas. Coverage–

efficacy patterns and conditions influencing implementation and scale-up, which remain poorly understood, are underscored as critical future research priorities [1, 2, 3].

Background and Significance

Reducing maternal and neonatal mortality in low- and middle-income countries (LMICs) remains a challenge, despite a 38% decline in global maternal mortality from 1990 to 2017 [1]. The current maternal mortality ratio of 462 deaths per 100,000 live births is about 30 times higher in LMICs than in high-income countries [3]. Though maternal mortality is reported to be decreasing, the challenge of mortality rates being high is retained, fuelled by the growing number of adolescents delivering without health management and widespread anaemia, hypertension, diabetes, and sexually transmitted infections [2]. Sustained high levels of neonatal mortality rates considerably impede the attainment of the Millennium Development Goals (MDGs), and the goals for sustainable development are no exceptions. Interventions directed at maternal and neonatal mortality rates are indeed a crucial priority during pregnancy and childbirth, as advocated [8].

Methodological Considerations

For this narrative review, a range of qualitative and quantitative studies published between January 2000 and March 2022 were examined [8]. The review specifically focused on the impact of interventions on maternal and/or neonatal mortality and recognized the critical nature of higher-condition access to effective-care interventions [1]. The searches were conducted in PubMed, MEDLINE, and Embase databases. The reference lists of included articles were also scrutinized to identify additional relevant studies [1]. The review adhered to established guidelines for systematic reviews, even though a formal protocol was not registered. Individual articles were subjected to an appraisal process based on internal validity and relevant content, applying scoring instruments to identify influential and generalizable findings [9]. The approach was rooted in the perspective of developing countries and, to facilitate comparison, attention was directed to broad intervention domains corresponding to universal-risk determinants amenable to action. Interventions were subsequently organized along the care continuum: antenatal and neonatal, intrapartum and delivery-related, and postpartum and obstetric. While many studies investigated the impact of health-system factors on access to interventions, the prevailing focus was on the effectiveness of care-specific interventions [4]. Evidence from a range of sources indicates that maternal and neonatal mortality is unacceptably high in many low- and middle-income countries, necessitating the identification and implementation of effective interventions to decrease mortality rates [2].

Antenatal Interventions

Foetal and maternal mortality and morbidity can be reduced significantly by attention to risk factors and good quality screening [4]. The risk factors that can lead to maternal complications and deaths fall into three categories: maternal characteristics, obstetric history, and medical and surgical history [2]. Self-reporting instruments for determining risk are useful, since they can be used without supervision and do not require literacy [5]. Several well-tested instruments exist: the WHO Simple Risk Screening Tool consists of a screening list of five items characterising the social and educational background of the woman. If the woman is considered at risk, she is referred to the level of care that can meet her needs; ideally, the service provider should already be known to her, or preliminary contact taken before the first visit to the health facility [4]. Screening does not determine the source of the problem; further, in many cases, risk management focuses on the tools and processes for accessing a higher level of care, rather than on the improvement of the capacity of the existing lower-level facility [1].

Risk Screening and Management

Antenatal care (ANC) has a pivotal role in curtailing maternal and neonatal mortality by facilitating risk identification and management [2]. Yet, pregnant individuals encounter considerable obstacles to attending formal facilities, necessitating an exploration of uncomplicated, cost-efficient, and widely implementable risk-assessment methodologies within the ANC framework[15]. Railways constitute a core means of mass transit across numerous middle-income countries, though massive, prolonged scheduling discrepancies frequently hinder favourable travel experiences (Maige, 2021) [13]. Rail-related aggravations notably detract from the overall passenger travel satisfaction; age, journey purpose, and fare category exert significant influence on satisfaction levels [12].

Nutritional Supplementation and Health Education

Nutritional supplementation encompassing macronutrient and micronutrient dietary packages for mothers before and during pregnancy and education on infant and maternal nutrition, the feeding of complementary food, water safety, hand washing, hygiene, water storage, the danger signs during pregnancy and lactation, among others, can improve nutritional knowledge of mothers [5]. Proper maternal diet, together with growing infants' consumption of fortified cereal, animal-source food, vegetables, fruit, and indigo and home-made complementary food, can improve infants' growth and nutritional status [7]. The delivery method of educational intervention can be carried

out at home or at the community level, whereby both methods have shown improvements in infant feeding practices, growth, nutritional status, and maternal knowledge [6].

Screening for Infectious Diseases and Vaccination

Pregnant women and newborns are particularly vulnerable to infectious diseases due to physiological changes and unsafe living conditions [5]. Many systematic reviews and national surveys have shown that various vaccines are safe and effective during pregnancy [1]. Target infections include tetanus, influenza, pertussis, hepatitis B, COVID-19, cholera, and seasonal malaria in malaria-endemic regions [8]. Recommended screening tests include syphilis, HIV, hepatitis B, and Zika virus in the context of travel to endemic areas [5]. Vaccination, screening, and treatment of sexually transmitted infections are associated with reduced maternal and neonatal morbidity and mortality, enhanced child development, and more. Vaccination protects mothers from infections such as influenza and SARS-CoV-2. The Tdap vaccine is considered safe for both mother and fetus and should be scaled up globally with continued outcome surveillance [9]. Research to identify more effective vaccines, optimal timing, and coverage-increasing strategies is needed. Insecticide-treated bed nets and intermittent preventive treatment with sulfadoxine-pyrimethamine reduce maternal malaria and transmission [3]. Areas with high resistance should consider switching to dihydroartemisinin-piperaquine. Intermittent screening and treatment are not yet suitable due to diagnostic limitations. Anthelmintic treatment reduces anemia, but large-scale implementation and dosing research are still required. Antibiotic treatment clears bacterial vaginosis but does not lower adverse maternal or infant outcomes, highlighting the need to determine the effectiveness of screening and treatment programs in low-resource settings and explore alternative therapies [2, 7].

Intrapartum and Delivery-related Interventions

Skilled birth attendance (SBA) represents the care provided by a qualified health worker during labor, delivery, and the immediate postpartum period [2]. This care necessarily includes the opportunity to deliver at a healthcare facility. Official World Health Organization (WHO) definitions encompass a limited range of competencies and facilities deemed adequate to provide Emergency Obstetric and Newborn Care (EmONC) services [3]. Among countries with general mortality data, the risk of maternal death is more than five times higher in countries with below 100%, than in those with above 100% of deliveries assisted by skilled attendants. Skilled birth assistance from a certified professional is thus recognized as vital in preventing avoidable maternal and neonatal deaths [15]. Such assistance, particularly from a midlevel nurse, is a key proxy indicator of timely access to maternity care. WHO recommends that all newborns receive a "quiet start" to life, sufficient to allow the caregiver to make the essential observations needed to judge the newborn's condition at birth [11]. WHO defines EmONC as the ability to perform at least six life-saving interventions based on the clinical presentation and a structured assessment of labor, delivery, and immediate postpartum care, and newborn evaluation of the Apgar score [19]. The WHO-UNICEF Expanded Guidance for the early assessment of the status of maternal and neonatal care recommends an additional four procedures that specifically benefit newborns and should thus be prioritized. These procedures improve early detection, response to unexpected events, and provision of immediate care that can prevent morbidity or mortality [13]. Although WHO guidelines on cesarean delivery and the Berek criteria on appropriateness exist, these provide insufficient guidance on when resource-poor settings should perform the procedure or when to establish it as a core competence [6]. The WHO Antenatal Care Model recommends that women with any one of 11 specified medical conditions or obstetric complications be referred to a health institution for advanced care. Good obstetric history, risk mapping through checks on proximity of services, public knowledge of referral procedures, and community involvement can enhance referrals, but remain basic to their delivery. Packages exist that provide guidance for such risk management [3]. Main access barriers to maternal-health services include transportation difficulties, long journey times, and personal safety concerns [1]. Distance and location-related challenges are especially pronounced in rural and remote areas with low-density settlements far from health facilities [15]. High demand for cesarean sections relative to the global or regional average reflects poor availability of EmONC. Although WHO recognizes considerable unmet need for caesarean delivery in many LMICs, its notional provision is assumed to hold [13]. A basic package of essential obstetric and newborn care (BEmONC) has specific criteria as a minimum operational package for urban and rural punctuality and constitutes a starting point for compulsory strategic planning [32].

Skilled Birth Attendance and Emergency Obstetric Care

Ensuring access to skilled birth attendance and comprehensive emergency obstetric care are critical to addressing maternal, neonatal, and stillbirth mortality in low- and middle-income countries [8]. Skilled birth attendance encompasses a set of interventions aimed at ensuring that women receive basic emergency obstetric and newborn care at the time of delivery [8]. Different countries have adopted varying definitions of skilled birth attendance based on the competencies of the skilled birth attendant, the configuration and criteria for health facilities, and referral network requirements [2]. Some definitions include only health professionals with formal training and

licensure, while others consider community health workers or traditional birth attendants to be skilled if they received basic training and operate in a supportive environment [23]. Providing access to skilled birth attendance and comprehensive emergency obstetric care is associated with a decrease in maternal, neonatal, and stillbirth mortality. Selvaraj et al. (2022) performed an analysis of nationally representative demographic and health survey data from 2011 and 2012 in India, which included 122,353 live births, and found that facility delivery was associated with a reduction in neonatal mortality relative to noninstitutional deliveries (19.9 vs. 36.4 neonatal deaths per 1,000 live births). Yakoob et al. [8] highlighted evidence from Malaysia and Sri Lanka showing that increased institutional delivery rates were associated with reductions in maternal mortality. The same group estimated that ensuring access to and utilization of Basic and Comprehensive Emergency Obstetric Care could reduce stillbirths by 45% and 75%, respectively [27]. A meta-analysis of observational studies indicated a 23% reduction in stillbirths with skilled birth attendance, while a study of 75 low- and middle-income countries found that newborn deaths were approximately 2.5 times higher among births attended by unskilled individuals than those attended by skilled personnel. Comprehensive Emergency Obstetric Care includes nine signal functions, such as cesarean section and blood transfusion, that are vital for managing obstetric emergencies and for which substantial unmet need exists in many settings [30].

Cesarean Section: Indications and Outcomes

Each country must provide mechanisms for ensuring subsidized access, including through the expansion of safe, high-quality, and timely emergency obstetric care and other means [9]. Current guidelines recommend at least one caesarean delivery in the lifetime of women who meet specific criteria [10, 1]. Women with previous obstetric hysterectomy [2]. Women with uterine rupture or uterine scar from previous caesarean section 3. Women with a congenital abnormality of the pelvis [4]. Women who had an operation in the genital tract with possibilities of local infiltration only [5]. Conditions with more than one finger-breath per vaginam and a possibility of difficult delivery. 6. Cases of placenta previa [7]. Conditions of severe birth asphyxia at delivery. Guidelines indicate that caesarean section should not be performed because of previous forceps application without other obstetric problems and because of prolonged pregnancy when there was a good fetal and maternal condition [16]. Maternal and neonatal outcomes are shown to improve when access is ensured for women with obstetric complications. Even in the absence of reliable data on childbirth and maternal and neonatal outcomes, there is global agreement on these guidelines. Caesarean section is a life-saving procedure, but remains underused in many low-income settings where substantial improvements could be achieved [11].

Uterotonic Drugs and Third-Stage Management

Uterotonics are drugs that increase uterine tone. Given during the third stage of labor, they reduce postpartum hemorrhage and are essential to active management [15]. Prophylactic use of oxytocin reduces maternal blood loss, shortens the third stage, and improves maternal and neonatal outcomes [12]. Oxytocin and ergometrine are effective; misoprostol is an acceptable alternative where access to oxytocin is restricted [13]. Timing of administration is uncertain; oxytocin is commonly given after clamping and cutting the cord, but earlier administration is associated with reduced blood loss and longer uterine contraction. Recommendations do not restrict the use of oxytocin during or before the third stage. Other medicines are used in some settings. Syntometrine, a combination of oxytocin and ergometrine, is the first choice in many jurisdictions; restrictions on ergometrine, contraindications in hypertensive women, and the risk of adverse effects when given immediately after delivery motivate some practitioners to use oxytocin alone. Hydrocodone and mannitol are reported in some hospitals. Recommendations to adopt active management have been incorporated into guidelines and implemented in countries with high maternal mortality, even where skilled attendance remains low; however, the effectiveness of individual drugs in countries without overall increases in service provision remains uncertain [14].

Intrapartum Fetal Monitoring and Obstetric Emergencies

Monitoring fetal heart rate during labor proves to be a straightforward way to identify fetal distress that could endanger both mother and fetus. Intrapartum fetal heart rate monitoring consists of auscultation without a stethoscope, external fetal heart rate monitors, or, in resource-poor settings, a smartphone or commercial instrument applied to the mother's abdomen [11]. Where continuous monitoring is impracticable, checking up to five times during labor is suggested [12]. Alert thresholds may include a range lower than 110 beats per minute, higher than 160 beats per minute, or abnormalities such as a variable pattern, showing sudden and unpredictable changes. Alert thresholds should be locally assessed to reflect common pathologies and improve the detection of abnormal fetal heart rates [15]. Action in response to alerts might include changing the position of a mother with an abnormal fetal heart rate, administering an intravenous fluid bolus for faster rehydration in cases of dehydration, carrying out periodic checks to record whether abnormality persists or whether it reverts to normal, and transferring to a facility with surgical capacity if signs of fetal distress or obstetric emergency appear extreme and persist despite local remedial measures [16]. Emergency obstetric training should cover differential diagnoses

to be made according to the category of abnormal fetal heart rate and signal the type of obstetric emergency likely to benefit from surgical delivery [11].

Postpartum and Neonatal Interventions

Interventions to reduce neonatal mortality within the first seven days of life are especially critical in countries where a significant proportion of maternal deaths occur during the immediate postpartum period and where home births are common [5]. Newborn mortality remains high among countries with a high burden of maternal mortality. Appropriate care during the first hours after delivery helps ensure the survival of newborns and reduces early deaths during the neonatal period [17]. Reduction targets for maternal and neonatal mortality delineate the urgent need to identify gaps within existing interventions and document additional measures required to address functionality at delivery and within the first week after birth [4]. Immediate newborn care requires actions such as drying, ensuring warmth, and early initiation of skin-to-skin contact. Correct drying methods and temperature targets are essential for maintaining normothermia and preventing hypothermia within the first hour of life; a simple, low-cost intervention correctly performed reduces mortality and has been included within appropriate packages [2]. The delivery of appropriate measures in the time-sensitive first hour after birth is heavily influenced by the arrival of a skilled attendant; shortage of qualified health personnel, on-site equipment, and essential drugs limits protective steps within the first six hours [8]. Newborn resuscitation and stabilization protocols are central to ensuring survival and preventing disabilities from birth. Training on these protocols increases adherence and contributes to a 47% reduction in death among urgently transported newborns [9]. Wider provision of resuscitation equipment, quality of supervision, and emphasis on post-resuscitation stabilization remain key factors for improvement. Within an integrated program that entails continued support for early synthetic feeding and maternal counselling, neonatal care during the first seven days has yielded reductions estimated to exceed 25% in southern Sudan; mortality declines were also observed across the residual neonatal period [5].

Immediate Newborn Care and Thermal Protection

Six interventions target immediate newborn care to protect life, particularly during the first week, the critical period for neonatal mortality [11]. The first two years are equally important; survival after two years depends on the diseases and events projected during early childhood [10]. Immediate newborn care consists of drying the newborn, warming the baby, skin-to-skin contact or Kangaroo Mother Care (KMC), and monitoring body temperature [12]. The deadlines for four immediate newborn interventions, including thermal protection and KMC compliance, are 0, 10, 30, and 120 minutes, respectively [18]. Newborns should be dried immediately and completely with a clean cloth to avoid heat loss through evaporation of remaining amniotic fluid on their skin; all newborns can lose 3–4°C within minutes of birth. Newborns should also be warmed by skin contact with the mother or by other methods; hypothermia is the second leading cause of neonatal deaths after preterm birth [2].

Neonatal Resuscitation and Stabilization

Neonatal resuscitation and stabilization are critical for improving newborn outcomes [19]. Immediate assessment and stimulation, along with appropriate interventions for compromised newborns, significantly enhance care quality and survival prospects [15]. Resuscitation's mortality-reduction impact is a well-established effect size that remains substantial even in higher baseline-mortality contexts, indicating ongoing relevance for middle-income settings [18]. Provision remains inadequate, particularly in the Least Developed Countries (LDC) and Sub-Saharan Africa (SSA) groups. Appropriate care during labor and birth is essential, given the intrinsic relationship between maternal and neonatal levels and the direct link between intrapartum-related maternal deaths and neonatal mortality. The resuscitation cascade and intrapartum-related determinants are interrelated [16]. Scaling up community-based interventions, women's groups, and home-based care targeted at behavior and signaling improvements around danger signs has positively influenced maternal and neonatal outcomes in LDCs [17]. Immediate, appropriate obstetric care and capacity building that ensure skilled attendance, emergency transport, and basic antenatal care, including tetanus protection against maternal and neonatal death risk factors, are critical for impact maximization [15].

Early Breastfeeding Support and Neonatal Nutrition

Breastfeeding not only protects newborns from various infections and improves long-term health, but also enhances maternal health, promotes family and community well-being, and supports national goals for sustainable development [21]. Therefore, although systematic reviews indicate limited effectiveness on anthropometric outcomes, preventing early cessation or supporting the establishment of breastfeeding remains a priority in high-burden settings, especially when the initiation is compromised [5]. Specifically, the World Health Organization recommends initiation of breastfeeding within one hour of birth for all infants, exclusive breastfeeding for the first six months, and continued breastfeeding thereafter [20].

Infectious Disease Prevention and Control

A relatively limited number of maternal infections contribute significantly to maternal mortality and morbidity worldwide [5]. The most common infections are those of the genitourinary tract (including pre-labor premature rupture of membranes, chorionamnionitis, pyelonephritis, and asymptomatic bacteriuria), urinary tract infections (UTIs), sexually transmitted diseases (STDs), pneumonia, wound sepsis, and malaria, among others, and the proportion varies between regions and countries [2]. Recommended strategies for prevention and reduction of infections during pregnancy include screening for common infections and STDs, antimicrobial prophylaxis, safe delivery practices, and vaccination during pregnancy, while for the treatment of maternal infections, there is a need to have adequate and appropriate drugs available that can be used without causing complications or side effects and that are also acceptable in pregnancy [9]. Also, the rising resistance of microorganisms to antibiotics and other antimicrobial agents poses a major challenge to infection control in the world today [7]. Therefore, if an infection is detected and treated properly, it is likely that antimicrobial resistance will not arise; hence, there should be a balanced and reasonable approach for suitable and accurate screening and treatment of infections to reduce maternal mortality [18].

Maternal Infections and Antimicrobial Stewardship

Maternal infections are important contributors to obstetric complications and neonatal morbidity and mortality, yet they remain an overlooked aspect of maternal health [19]. Infection can cause or contribute to severe maternal morbidity and death, accounting for an estimated 7% of the global burden of maternal mortality [21]. Although the sources of maternal infections vary, encompassing conditions such as maternal sepsis, urinary tract infections, upper respiratory infections, and pneumonia, the most common sources are genitourinary and respiratory infections. A prospective study involving 52 countries across various income levels estimated that obstetric infections are the third-leading cause of maternal mortality globally, responsible for 10.7% of maternal deaths, while 5.7 million women experienced maternal disorders complicated by sepsis in 2017 [22]. Furthermore, approximately 2.2 million cases of early-onset neonatal infection are caused by maternal infection or colonization, which would be amenable to targeted preventive measures [23]. The WHO Global Maternal Sepsis Study emphasizes the need for appropriate antimicrobial use to prevent maternal and neonatal infections in various settings, particularly in low- and middle-income countries where antimicrobial resistance is prevalent, pathogen data are limited, and many women lack microbiological confirmation of the causative agent. Consequently, the careful selection of antimicrobial agents, guided by local protocols and rapid diagnostic tools that identify the categories of pathogens likely to cause maternal and neonatal infections, is essential [24].

Neonatal Infections and Sepsis Prevention

A comprehensive approach to preventing neonatal infections and sepsis begins with strategies to prevent maternal infections and includes early detection and treatment of neonatal sepsis [17]. The prevention and control of maternal infections have direct implications for reducing neonatal sepsis, as maternal infections are associated with increased risk of early-onset neonatal infection [23]. Maternal antimicrobial stewardship is therefore essential within neonatal health strategies [24].

Health System and Policy Factors

Access to a functioning health system, as expressed through human resources, facilities, equipment, and supplies, is essential for achieving reductions in maternal and neonatal mortality [19]. Comprehensive multisectoral policies can improve health for mothers and newborns even in the absence of direct clinical interventions [25]. In many poor settings, maternal and neonatal mortality remain high due to inequitable access to inputs necessary for the delivery of clinical care. Policy attention therefore needs to focus on training for health cadres operating in situations where women cannot reach facility-based maternity services [1]; mechanisms to ensure the presence and replenishment of essential medicines, consumables, and equipment; and policies to integrate, incentivise, and strengthen community health services and community-based treatment where facility-based services are unavailable [15].

Health Workforce and Training

The global population of trained health workers is insufficient to deliver essential services for maternal and neonatal health [26]. Consequently, strategically reassigning a set of tasks traditionally considered the responsibility of skilled professionals, referred to as "task shifting," may be necessary to address the high burden of maternal and neonatal deaths[27]. Effective interventions are available for both routine and emergency care of mothers and newborns, and providing high-quality comprehensive emergency obstetric and newborn care, including early detection and management of life-threatening complications, could prevent millions of maternal and neonatal deaths globally [24].

Facility Readiness and Supply Chains

Facility readiness encompasses the presence of key medicines, equipment, and competent personnel required to provide critical maternity and neonatal services [20]. For example, certain medicines and equipment remain consistently in short supply in many health facilities, undermining capabilities to offer comprehensive emergency obstetric care or neonatal stabilisation and resuscitation [27]. In Uganda, even referral hospitals noted stock-outs of lifesaving medicines such as antibiotics, anticonvulsants, and uterotonics, alongside shortages of neonatal resuscitation items and tools for assisted delivery and manual placenta removal [21]. Contributing factors included weak supply chains, inadequate regulatory capacity, and limited awareness of procurement sources. Refining logistics, such as the integration of vaccines and tablets through initiatives like GAVI and UNFPA or distribution support from international NGOs, is one avenue for improvement [28]. System-level constraints also hinder newborn care, with issues spanning from commodity distribution to service provision. Emergency obstetric care monitoring can further identify critical supply chain bottlenecks and inform strengthening measures [23].

Community and Outreach Programs

Community health workers (CHWs) aim to reduce maternal and neonatal deaths by identifying at-risk families and providing information on obstetric complications during home visits [2]. CHWs may also promote institutional deliveries by providing pre-labour support and coordinating transport [3]. In Ethiopia, maternal mortality among women who had live births before the 2010 national health extension program was reported to be as high as 1040 deaths per 100,000 live births P [2]. This staggering figure underscores the need for the systematic development of community and outreach programs targeting maternal and neonatal health. Such programs may also include family planning services, awareness-raising about the importance of obtaining prenatal care and a skilled attendant at birth, and health insurance options. Community interventions such as women's groups and home visits improve perinatal care and outcomes [9]. Their effectiveness has been demonstrated in cluster-randomized controlled trials in Bangladesh, Ghana, and India. Community-based behaviour change interventions discussed in the antenatal section also reduce neonatal mortality [10].

Equity, Access, and Contextual Factors

Disparities rooted in socioeconomic status, geography, and gender norms continue to challenge widespread attainment of safe motherhood. Marginalized groups often remain at unacceptable risk, with outside support necessary to bring mortality within a manageable range [29]. Perry and Zullig (2014) noted that the quality of basic emergency obstetric and neonatal care (BEmONC) services is inadequate in most settings, and the proportion of live births attended by skilled personnel remains unacceptably low, especially in rural regions where emergency transport is often unavailable and low-cost basic care unfeasible[26]. Pregnancy outcomes benefited from participatory community maternal health programs involving women's gatherings to improve access and care 30. Mahato et al. (2017) produced a comprehensive review of 80 articles covering access, quality, equity, or age factors affecting maternal-care access and service utilization from the standpoint of women in low- and middle-income countries (LMICs); 78 articles assessed access[25]. Key results emphasized that improving service utilization depends on addressing broader factors affecting access, including sociocultural and infrastructure issues, rather than restricting attention to quality aspects at specific facilities [24].

Socioeconomic Determinants and Marginalization

Socioeconomic determinants significantly influence maternal and neonatal health outcomes [29]. Poverty, low education, limited autonomy, and marginalization reduce access to care and heighten mortality risk [30]. Targeted community programs engaging women's groups, employing community health workers, and enhancing outreach, improving care-seeking behavior and knowledge, and addressing inequities well [30]. Participatory programs alongside community health systems improvements also foster access and utilization across socioeconomic strata. Women's low social status contributes to their and their infants' elevated mortality risk, and social norms may hinder care utilization. Addressing gender-based restrictions and enhancing women's decision-making authority constitutes a priority [27].

Geography and Urban-Rural Disparities

Reducing urban–rural inequities in maternal health service utilization is essential in sub-Saharan Africa, where pregnant women living in rural areas are less likely to use maternal healthcare than their urban counterparts [30]. In a recent decomposition analysis of 27 sub-Saharan African countries, the urban-rural divide explained, on average, 24% of the total inequality in maternal healthcare service utilization [31]. To bridge the urban-rural gap in the use of maternal healthcare services, interventions should prioritize the socio-economic empowerment of women in rural areas and implement targeted awareness campaigns that motivate rural women to seek available maternity services and thereby diminish the disparities observed in urban areas.

Gender Norms and Decision-Making Dynamics

In many societies, decision-making regarding maternal health lies predominantly with a male partner or designated decision maker [31]. Restricted autonomy around household decisions and limited access to information on maternal health can limit women's ability to seek timely or safe health care and support informed decision-making, which has implications for maternal health access and outcomes. Gender inequality limits women's control over resources and their ability to make independent decisions [32]. Moreover, households with gender-discriminatory norms around health are less likely to seek care during pregnancy. In northern Nigeria, where maternal or neonatal complications arise, men's consent is often mandatory for women to receive care [33].

Evidence Synthesis and Gaps

The review of maternal health interventions is meant to inform the Ministry of Health's (MOH) National Roadmap to Accelerate Health Impact and Reduce Maternal, Neonatal, and Child Mortality. Its findings may guide the National Reproductive Health Policy and Service Delivery Guidelines [30]. A more effective, comprehensive, and inclusive approach is needed to counter stagnation, following two decades of progress in reducing kept in parental implementation of the Healthcare maternal law No. 36 in 2009 and Government Regulation No. 61 of 2014. Evidence gathered from a variety of settings indicates that randomized controlled trial results and best practices in a particular region have little generalizability elsewhere, except for interventions involving the most basic actions and procedures [29]. As consistently agreed upon, many other actions are indicated, but with evidence of a somewhat ambiguous nature and a lack of agreement and trend [28]. Prioritization must therefore involve social, environmental, economic, and geographical determinants, alongside an understanding of maternal health policies and systematic gathering of routinised information on the subject. Ultimately, the action must be focused upon interventions with empirical intervention effectiveness, and that also fit Sri Lankan spatial knowledge, geography, and context, which may produce Sri Lanka-wide systematic reduction in the level of injuries due to mass loss [27].

Policy Implications and Recommendations

Since the publication of the previous review, new methods for the synthesis of evidence have become available, which facilitate assessments of effectiveness across intervention domains and the comparison of several options for addressing the same problem [34]. A systematic review for maternal and newborn care in Bangladesh has been completed [1], and several comprehensive syntheses for specific intervention packages have also been published [2]. However, similar integrated evaluations corresponding to a strategy for the health system and policy aspects have not yet been conducted [30]. Mortality reduction in low- and medium-income countries demonstrates the potential for improved maternal and neonatal deaths, with considerable evidence supporting commonly implemented actions reflecting general health system capability and commitment [31]. The provision of connected maternal and neonatal standard care increases the reach, compliance, and effectiveness of many interventions. The review clearly shows the need for more focus on the systematic delivery of evidence-based interventions to enhance maternal and neonatal survival in low- and middle-income countries, particularly across the health systems and policy domains. Despite many Governments giving high priority to these concerns, maternal and neonatal deaths and disabilities remain significant public health challenges [32-36]. A cycle of low coverage and high mortality frequently exists for newborn and maternal care, even in the few countries such as Bangladesh that have made substantial gains on both counts. In countries where maternal mortality is falling, neonatal mortality tends to be declining also [30]. Policy implications and recommendations translate this evidence into policy actions, identifying options and approaches capable of effective implementation based on national circumstances. Priority resides in those in which sufficient evidence supports expected actions and against which the potential feasibility for implementation is relatively high. Consistent improvement in the coverage and quality of established interventions for maternal and newborn care remains the most effective commitment that Governments can undertake, where the associated survival advantages continue to be significant [37-42].

CONCLUSION

Reducing maternal and neonatal mortality in low and middle-income countries requires a holistic and integrated approach that addresses both clinical and systemic determinants of health outcomes. Evidence from this review highlights that effective antenatal, intrapartum, and postnatal interventions when delivered through skilled personnel within functional health systems substantially improve survival rates. However, persistent barriers such as weak infrastructure, inadequate human resources, limited access to emergency obstetric care, and entrenched gender and socioeconomic inequities continue to undermine progress. Strengthening health systems through workforce development, reliable supply chains, improved facility readiness, and robust community health programs is imperative. Policies should prioritize equity-focused strategies that target marginalized populations, enhance women's decision-making autonomy, and bridge the urban–rural divide in service utilization. Governments and stakeholders must invest in context-appropriate, evidence-based programs and ensure

consistent implementation and monitoring to scale up effective interventions. Ultimately, sustained political commitment, intersectoral collaboration, and community participation remain central to achieving lasting reductions in maternal and neonatal mortality and realizing the Sustainable Development Goals related to health and well-being.

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