

Reducing Neonatal Mortality in Ethiopia: A Call for Urgent Action!

Full Report



Included:

- Description of a problem
- Viable options for addressing this problem
- Strategies for implementing the options



Not included: recommendations

This policy brief does not make recommendations regarding which policy option to choose



Who is this evidence brief for?

Policymakers, their support staff, and other stakeholders with an interest in the problem addressed by this evidence brief for policy

Why was this evidence brief prepared?

To inform deliberations about health policies and programs by summarizing the best available evidence about the problem and viable solutions

What is evidence brief for policy?

This evidence brief for policy brings together global research evidence (from systematic reviews*) and local evidence to inform deliberations about health policies and programs

***Systematic review:** A summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise the relevant research, and to collect and analyze data from this research

Executive Summary

The evidence presented in this Full Report is summarized in an [Executive Summary](#)

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Preface

The purpose of this report

The Evidence Briefs for Policy (EBP) are research syntheses in a user-friendly format, offering evidence-informed policy options. The purpose of this report is to inform deliberations among policymakers and other stakeholders. This evidence brief summarizes the best available evidence regarding the urgency of the current problem and the need to adopt the preferred alternatives or strategies of intervention to reduce neonatal mortality in Ethiopia. This evidence brief involves systematic and transparent efforts to contextualize the results of systematic reviews (review of systematic reviews) and to integrate that evidence with setting-specific research results to support well-informed policy decisions.

The report was prepared as a background document to be discussed at meetings attended by those engaged in developing policies on maternal, neonatal, and child health and people with an interest in such policies (stakeholders). It is not intended to prescribe or proscribe specific options or implementation strategies. Rather, its purpose is to allow policymakers and stakeholders to systematically and transparently consider the available evidence about the likely impacts of different options in reducing neonatal mortality in Ethiopia.

How this report is structured

This Evidence brief for policy document is structured depending on the SURE guide. The report contains the problem section (background, how big is the problem and cause of the problem), policy option, and implementation consideration. The report also has a separate executive summary. The executive summary provides key messages and summarizes each section of the full report. Although this entails some replication of information, the summary addresses the concern that not everyone for whom the report is intended will have time to read the full report.

How this report was prepared

This evidence brief brings together global research evidence (from systematic reviews) and local evidence to inform deliberations about reducing neonatal mortality in Ethiopia. We searched for relevant evidence describing the problem, the impacts of options for addressing the problem, barriers to implement those options, and implementation strategies to address these barriers. We searched particularly for relevant systematic reviews (review of systematic reviews) of the effects of policy options, their relevance and implementation strategies. We supplemented

information extracted from the included systematic reviews with information from other relevant studies and documents. (The methods used to prepare this report are described in more detail in Appendix 1)

Limitations of this report

This evidence brief for policy is based largely on existing systematic reviews (review of systematic reviews). For options where we did not find an up-to-date systematic review, we have attempted to fill in these gaps through other documents, through focused searches and personal contact with experts, and through external review of the report.

Summarizing evidence requires judgments about what evidence to include, the quality of the evidence, how to interpret it and how to report it. While we have attempted to be transparent about these judgments, this report inevitably includes judgments made by review authors and judgments made by ourselves.

Why we have focused on systematic reviews

Systematic reviews of research evidence constitute a more appropriate source of evidence for decision-making than relying on the most recent or most publicized research study.^{i,ii} We define systematic reviews as reviews of the research literature that have an explicit question, an explicit description of the search strategy, an explicit statement about what types of research studies were included and excluded, a critical examination of the quality of the studies included in the review, and a critical and transparent process for interpreting the findings of the studies included in the review.

Systematic reviews have several advantages.ⁱⁱⁱ Firstly, they reduce the risk of bias in selecting and interpreting the results of studies. Secondly, they reduce the risk of being misled by the play of chance in identifying studies for inclusion or the risk of focusing on a limited subset of relevant evidence. Thirdly, systematic reviews provide a critical appraisal of the available research and place individual studies or subgroups of studies in the context of all of the relevant evidence. Finally, they allow others to appraise critically the judgments made in selecting studies and the collection, analysis and interpretation of the results.

While practical experience and anecdotal evidence can also help to inform decisions, it is important to bear in mind the limitations of descriptions of success (or failures) in single

instances. They may be useful for helping to understand a problem, but they do not provide reliable evidence of the most probable impacts of policy options.

Uncertainty does not imply indecisiveness or inaction

Uncertainty about the potential impacts of policy decisions does not mean that decisions and actions can or should not be taken. However, it does suggest the need for carefully planned monitoring and evaluation when policies are implemented. ^{iv}

“Both politically, in terms of being accountable to those who fund the system, and also ethically, in terms of making sure that you make the best use possible of available resources, evaluation is absolutely critical.”

(Julio Frenk 2005, former Minister of Health, Mexico) ^v

The problem: Unacceptably High Neonatal Mortality in Ethiopia

Background

Neonatal mortality is a core indicator of neonatal health defined as death during the first 28 days of life (WHO, 2015). For too many babies, their day of birth is also the day of death making the first 24 hours of a baby's life the most vulnerable time for survival. Of the total 5.2 million under-five deaths in the year 2019 globally, 47% (2.4 million) deaths, occurred within the first 28 days of life. About a third of these neonatal deaths occurred within the first day after birth while close to three-quarters occurred within the first week of life (UNICEF, 2020). Almost all neonatal deaths (98%) occur in low- and middle-income countries, with 78% in Southern Asia and Sub-Saharan Africa. Eight of the 10 countries with the highest neonatal mortality are in Africa including Ethiopia (WHO, 2018).

The world has made substantial progress in child survival since 1990. However, the decline in neonatal mortality from 1990 to 2019 has been slower than the decline in death among post-neonatal and under-5 children (WHO, 2020b). This is amplified by the fact that neonatal mortality (mostly from preventable causes) is becoming an increasingly prominent contributor to overall under-five mortality. When we come to the Ethiopian situation, between the years 2000 and 2016 a lower decline of 41% was seen in neonatal mortality compared to that of 60% reduction in under-five mortality and 50% reduction in infant mortality (CSA, 2016). However, in recent years, Ethiopia recorded an increase in neonatal mortality with 33 deaths per 1,000 live births according to the 2019 Mini DHS (EPHI & ICF, 2019; FMoH, 2020) compared to the 2016 DHS report which was 29 deaths per 1,000 live births.

The preparation of this evidence brief for policy came to our attention for two reasons: 1) While the world has targeted to reduce neonatal mortality to at least 12 per 1,000 live births in 2030 (UN, 2016), neonatal mortality in Ethiopia is persistently high in the last decade, and 2) there is big gap observed between the current national plans and performances which indicate the country is off-track to achieve the global commitments and national commitments. The objective of preparing this evidence brief for policy is, therefore, to summarize the best available evidence describing the problem of neonatal mortality in Ethiopia and potential solutions for addressing the problem.

How big is the Problem?

In 2019, Ethiopia was one of the top five countries where almost half of all the global neonatal mortality occurred (WHO, 2020b). The national average of neonatal death (33 per 1,000 live births) is also higher than sub-Saharan Africa (27 per 1,000 live births) and Southern Asia (25 per 1,000 live births) (EPHI & ICF, 2019; WHO, 2020b). The current level of neonatal death reflects that Ethiopia is far behind the goal set by the national Health Sector Transformation Plan (HSTP) which was 10 deaths per 1,000 live births by 2020 (FMoH, 2015a). The possibility of achieving the global commitment, sustainable development goals (SDGs), of reducing neonatal mortality to 12 deaths per 1,000 live births by 2030 is also uncertain (FMoH, 2015a; UN, 2015).

In Ethiopia, the under-five mortality rate has declined by more than half from 123 in 2005 to 59 deaths per 1,000 live births in 2019. As shown in figure 1, though neonatal mortality has reduced by 25% between 2005 to 2016, it has shown an increment between 2016 and 2019 (EPHI & ICF, 2019; FMoH, 2020).

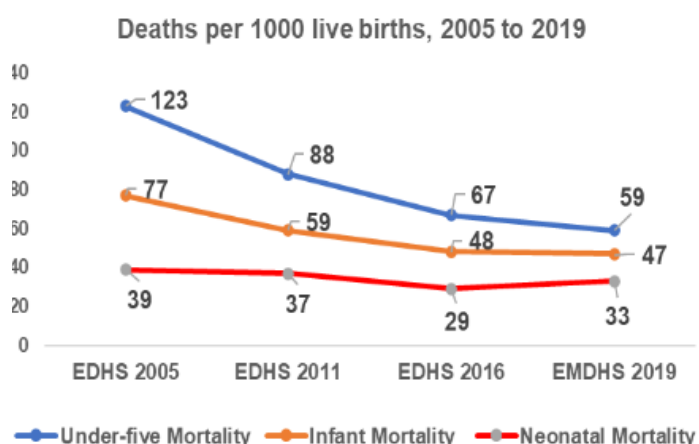


Figure 1: Trend in early childhood mortality rates, EPHI, 2019

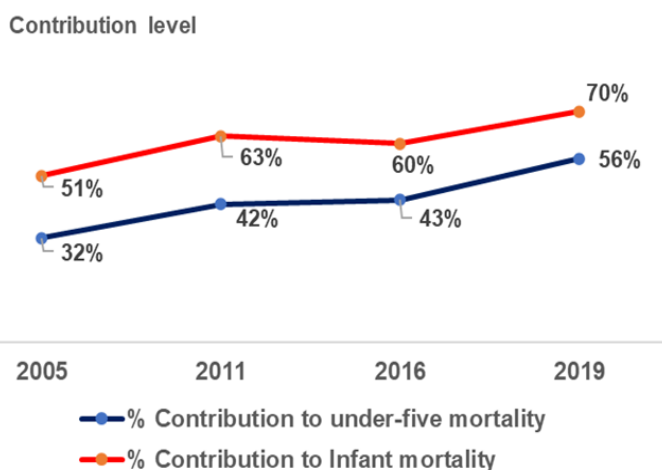


Figure 2: Percent contribution of neonatal mortality to under-five mortality and Infant mortality, Ethiopia (2005-2019)

The contribution of neonatal mortality to the overall under-five mortality and Infant mortality is also significant and has increased from 2005 to 2019 as indicated in figure 2 (EPHI & ICF, 2019).

In addition to the high rate of neonatal mortality at the national level, it is also critical to note that there is a significant sub-national disparity (CSA, 2016).

Causes of the problem

After looking through different literature to frame the causes of the problem, UNICEF's conceptual framework for maternal and neonatal mortality and morbidity (UNICEF, 2009) was adapted. This framework was found to be suitable to appropriately frame the causes and effective interventions to improve neonatal health in Ethiopia (figure 4). In order to appropriately examine the underlying factors for neonatal mortality in Ethiopia, Thaddeus and Maine's "Three Delays" model was used in this cause analysis (Thaddeus & Maine, 1994). This model was originally developed for cause analysis of maternal mortality; however, several studies found the model very useful to analyze the causes of perinatal and neonatal mortality in recent years (Nasratullah Ansari, 2012; Waiswa et al., 2010). This approach of adapting the UNICEF framework for neonatal mortality cause analysis was also done in Afghanistan (Nasratullah Ansari, 2012).

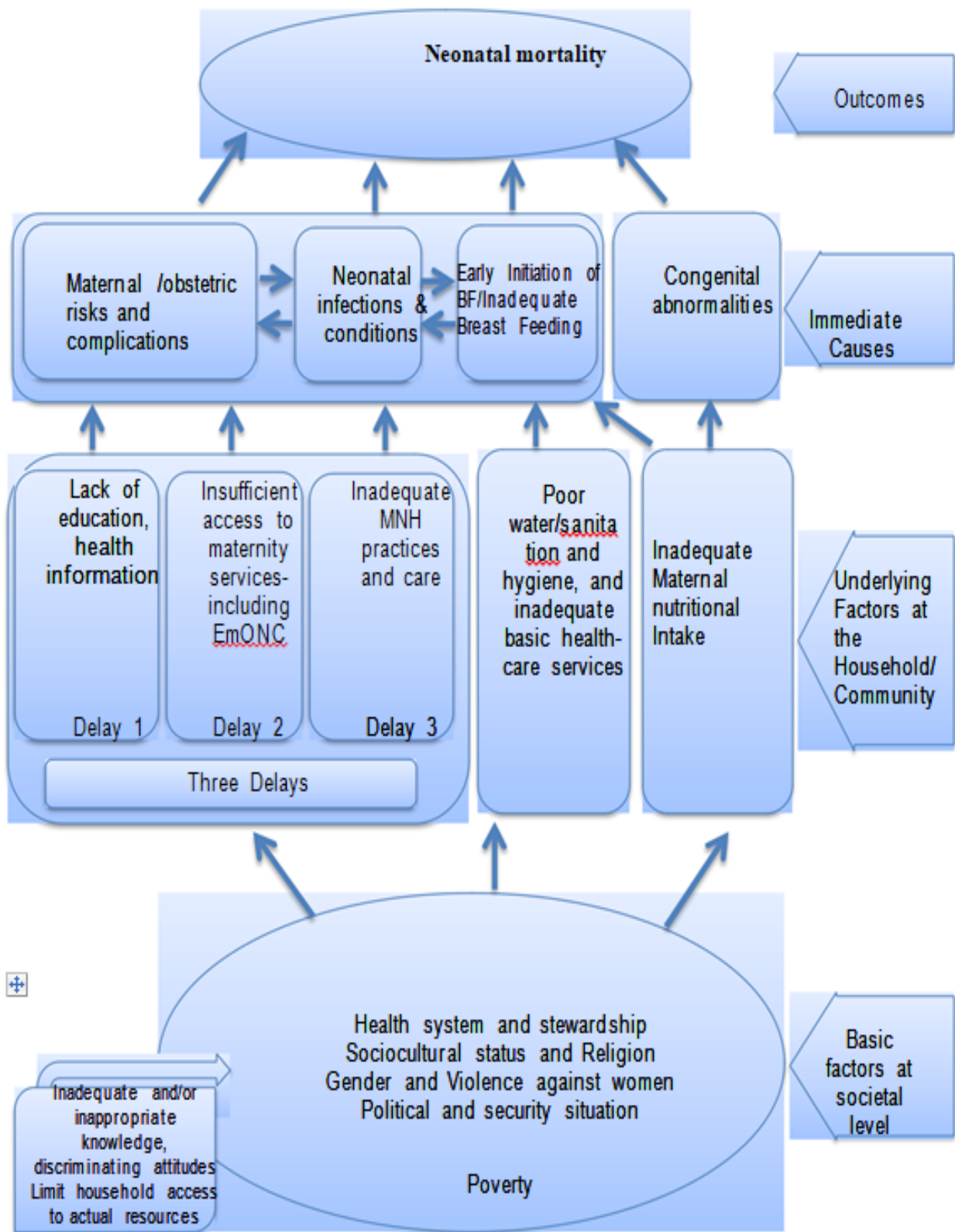


Figure 4: Adapted from UNICEF Conceptual framework (UNICEF, 2009)

1. Immediate causes

1.1. Maternal/obstetric risks and complications

Maternal risks and complications during the antenatal and intrapartum period have been identified as one of contributing factors for neonatal death. These maternal conditions include high-risk mothers, maternal infections, teenage pregnancy, inadequate ANC visits, short birth spacing, and many more (UNICEF, 2009). There are pocket studies conducted in different regions of Ethiopia that also identified maternal-related risks and complications as contributors to the death of a newborn. In a study conducted at Jimma University medical center, it was reported that frequency of antenatal care use, place of delivery, gestational age at birth, premature rupture of membrane, complications during labor, twin births, size of the neonate at birth and neonatal care practice were determinants of neonatal mortality (Seid et al., 2019). Other obstetric factors for higher risk of neonatal death include maternal age (neonates born to mothers aged <18 years) and short birth spacing (those born within 2 years of the preceding birth) (Mekonnen et al., 2013).

A systematic review on the impact of antenatal care on neonatal mortality in Ethiopia showed that neonates born to women with ANC follow-up had about two-third (65%) lower probability of death compared to those babies born to women who had no ANC follow-up (Tolossa et al., 2020). Similarly, neonates who are born from mothers who had no antenatal care (no single visit) are about three times at risk of death (Belachew et al., 2020; Kolobo et al., 2019). Furthermore, the death of a mother by itself was found to be a risk to the death of a neonate; a study in southern Ethiopia signified that households with maternal deaths had an increased risk of neonatal death as well (Yaya et al., 2014).

1.2. Neonatal infections and conditions

The large majority (80%) of newborn deaths are related to the three preventable and treatable conditions: preterm birth, Intrapartum related events (including birth asphyxia), and infection (UNICEF, 2019; WHO & UNICEF, 2020). The proportion of causes of neonatal deaths due to preterm birth, birth asphyxia, and infection (such as sepsis, pneumonia, meningitis, and tetanus) is estimated to be 35%, 24%, and 23% respectively (Liu et al., 2016). Several studies done in Ethiopia are also in line with the above global findings where prematurity, birth asphyxia, and sepsis were reported as the major contributing factors to neonatal death (Demisse et al., 2017; HNN, 2017; Liu et al., 2016; Mekonnen et al., 2013; Mengesha & Sahle, 2017; Seid et al., 2019).

1.3. Problem with early initiation of breastfeeding/Inadequate Exclusive breastfeeding

The early initiation of breastfeeding which is putting newborns to the breast within the first hour of life safeguards infants from dying during the most vulnerable time in their lives. However, less than half of all newborns are put to the breast within an hour of birth (UNICEF, 2016). Although the proportion of early initiation of breastfeeding increased from 49% in 2000 to 75% in 2016 in Ethiopia, the progress has remained slow compared to the national target (Ahmed Y et al., 2019).

Neonates who initiated breastfeeding after the first hour and through the remainder of the first day of life had about 41% greater risk of death (Oot et al., 2018). Studies in Ethiopia also showed that the lack of early initiation of breastfeeding within the first one hour of birth is a predictor of neonatal mortality (Desalew et al., 2020).

It is recommended that neonates should be exclusively breastfed; however, more than a quarter of neonates were not exclusively breastfed according to the 2019 mini DHS (EPHI & ICF, 2019).

1.4. Congenital Abnormalities

Worldwide, an estimated 295, 000 newborns (11% of total newborn deaths) die within 28 days of birth every year due to congenital abnormalities (Liu et al., 2016; WHO, 2020a). In Ethiopia, the proportionate contribution of congenital abnormalities to neonatal death is also estimated to be 11% (HNN, 2017). Several terms are used to describe congenital abnormalities such as, congenital malformations, congenital anomalies, and birth defects; and can be defined as either structural or functional abnormalities such as metabolic disorders that occur during intrauterine life and can be identified prenatally, at birth, or later. The most common severe congenital abnormalities are heart defects, neural tube defects and Down's syndrome. Although congenital anomalies may be the result of one or more genetic, infectious, nutritional or environmental factors, it is often difficult to identify the exact causes (WHO, 2020a).

There have been few studies on congenital abnormalities in Ethiopia and their incidence at birth at a national level is unknown. The few pocket studies conducted in the country indicated that the prevalence of congenital anomalies was 2% in Addis Ababa and Amhara region (Taye et al., 2019), and 6% among neonates at Jimma medical center (Silesh et al., 2021). The 2020 annual performance report of the Federal Ministry of Health of Ethiopia also indicated the

increasing trend in the incidence of congenital anomalies such as neural tube defects (FMoH, 2020; Tessema et al., 2019).

2. Underlying factors at the household/community

Multiple underlying factors contribute to neonatal mortality. The underlying factors at the household or community level in this document were framed as the “three delays”, poor water, sanitation and hygiene (WASH), and inadequate maternal dietary intake/early and exclusive breastfeeding (UNICEF, 2009).

2.1. First delay

The first delay is the delay in the decision to seek both preventive and curative health services primarily due to a lack of education and health information (Thaddeus & Maine, 1994). Mothers' education increases knowledge of the benefits of health care, raises awareness on the available health services, increases receptiveness to the new health information, empowers women to have more access to household resources, and strengthens women's decision-making ability. Husband education is also crucial because it makes them aware of the benefits of maternal health services and they may put fewer constraints on women's decision-making and mobility (Gabrysch & Campbell, 2009). Socioeconomic, cultural and religious factors could also affect the women, family, and community's decision to seek healthcare although these are considered as basic factors (UNICEF, 2009).

The findings from DHS and other pocket studies in Ethiopia also support the above fact and thus neonates are at greater risk of dying if they are born to women with no education and household headed with illiterates (CSA, 2016; Mekonnen et al., 2013; Wolde et al., 2019; Yaya et al., 2014).

2.2. Second Delay

The second delay describes the situation when reaching healthcare services is delayed (Thaddeus & Maine, 1994). Geographical barriers, poor and unpaved roads, unavailability of public transport, lack of newborn friendly ambulance services, lack of appropriate communication modes in referral linkages, and distance to the health facilities are delay factors thus inhibit the access of maternal and neonatal care services including basic and emergency maternal and neonatal care (Thaddeus & Maine, 1994; UNICEF, 2009). Pocket studies that were done throughout the country also support the findings and the mentioned delay factors

were found to be predictors of neonatal mortality in Ethiopia (Orsido et al., 2019; Roro et al., 2019; Seid et al., 2019).

2.3. Third delay

The third delay occurs due to poor quality of care i.e., the delay in the provision of healthcare services at health facilities caused by shortages of staff, staff competency, availability of equipment & supplies, and inadequate management (Thaddeus & Maine, 1994; WHO, 2010). According to the EmONC survey, unavailability of adequate trained staff, shortage of equipment, drugs and supplies, facility readiness, and management were mentioned gaps in the Ethiopian health sector which might be the indirect contributors to neonatal death by resulting in the third delay (EPHI, 2018a). Other pocket studies on the status of care for neonates in Ethiopia have also indicated that the essential newborn readiness score of the health facilities was low, calling for improved BEmONC service readiness in particular (Abebe et al., 2021; Delele et al., 2021).

2.4. Poor water/sanitation and hygiene, and inadequate basic healthcare services

Lack of access to clean water and unhygienic practices contributes to maternal and neonatal mortality and morbidity especially during delivery (UNICEF, 2009). Infections such as sepsis, tetanus, pneumonia, and diarrhea account for a substantial proportion (around a quarter) of neonatal deaths. These are directly related to Water, Sanitation and Hygiene (WASH), circumstances during childbirth and the immediate postpartum period through practices such as birth attendant hand washing, cleanliness of the perineum and delivery surface, hygienic cord care/cord-cutting, bathing, and feeding practices (A. Ahmed et al., 2013; Blencowe et al., 2011; Karumbi et al., 2013; Rhee et al., 2008; Winani et al., 2007).

Further analysis of Ethiopian DHS (2016) has indicated that no latrine facility and unprotected water sources were associated with a higher risk of neonatal mortality (Fenta et al., 2021). In Ethiopia, almost two-third of health facilities do not have an improved water source in the facility (EPHI, 2018b) and according to UNICEF report, the proportion of the population using unimproved sanitation facilities is about 63% in the country (UNICEF, 2017).

2.5. Inadequate maternal nutritional intake

Insufficient access of women to nutritious food and micronutrients is associated with increased maternal and neonatal mortality and morbidity. Women who are undernourished at the time of

conception are unlikely to improve their nutritional status during pregnancy when they have additional demands due to the growing fetus. In most developing countries, maternal under-nutrition is persistent and an important contributor to poor birth outcomes (e.g. low birth weight) and neonatal mortality (T. Ahmed et al., 2012; Osmani & Sen, 2003; Smith et al., 2003; UNICEF, 2009, 2017; WHO, 2006). The high risk of spontaneous preterm birth is associated with low body mass index (BMI) of women before pregnancy. Women with lower than normal levels of micronutrients such as iron, folic acid, or zinc during pregnancy lead to a greater chance of having preterm births (Goldenberg et al., 2008). This could be true in the Ethiopian situation where micronutrient intake by women of reproductive age is low (EPHI, 2016).

3. Basic factors at a societal level

The underlying factors of neonatal mortality are influenced by some basic interrelated factors such as political, economic, cultural, religious, and social systems, including women's status that limits the utilization of potential resources (environment, technology, and people). Besides, inadequate and/or inappropriate knowledge and discriminating attitudes could limit household access to actual resources (UNICEF, 2009). The details of the basic causes are not entertained in this evidence brief since our focus is on the immediate and underlying causes.

Policy Options

The recently ended National Newborn and Child Survival Strategy and the HSTP had set an objective to reduce neonatal mortality to 10 per 1000 live births by the year 2019/2020 (FMoH, 2015b, 2015a). However, the neonatal mortality of the country paradoxically increased from 29 per 1000 live births in 2016 to 33 per 1000 live births in 2019 (EPHI & ICF, 2019; FMoH, 2020). Despite the efforts and implementation of various interventions by the government, the desired impact did not transpire. In addition to this, Ethiopia accepted a global commitment, SDG target, of reducing preventable neonatal mortality to 12 deaths or less per 1000 live births by the year 2030 (UN, 2016). Unfortunately, the country is making little/no progress and it is unlikely to achieve the target with the current levels of investment or approach. Therefore, this evidence brief tries to indicate the proven and cost-effective interventions which are contextualized to our setting to reverse the current neonatal mortality trend.

Eighty percent of the causes for all neonatal deaths are preventable and treatable (UNICEF, 2020). A review of systematic reviews by Lassi et al (2015) looked at the effect of different interventions on neonatal mortality across the life course (Lassi et al., 2015). Accordingly, the interventions are classified as effective, promising and ineffective. See the details of the interventions and their impact on neonatal mortality in table 1 below.

Table 1: Impact of interventions on neonatal mortality (life course approach)

Intervention	Outcomes and Impact	Effectiveness	Study design, Number of studies, and setting	Evidence Quality
Pre-pregnancy interventions				
– Family planning, Folic acid supplementation		Ineffective for neonatal mortality reduction		
Pregnancy interventions				
– Antenatal care (ANC)	Perinatal Mortality: RR=1.14 (95% CI: 1.00, 1.31) – <i>Reduced number of ANC visits was associated with 14% higher risk of perinatal mortality</i>	Promising	Experimental (5 studies)	⊕⊕⊕○ Moderate
– Tetanus immunization in pregnancy	Neonatal Mortality: RR=0.06 (95% CI: 0.02, 0.20) – <i>There is a significant impact of TT immunization on reducing neonatal mortality</i>	Promising	Experimental and observational (2 studies)	⊕⊕⊕○ Moderate
– Antenatal corticosteroids for prevention of neonatal respiratory distress syndrome	Neonatal Mortality: RR=0.69 (95% CI: 0.58, 0.81) – <i>Reduces neonatal deaths by 31%</i>	Effective	Experimental (18 studies) All countries	⊕⊕⊕⊕ High
– Iron and folic acid supplementation, calcium supplementation, prophylactic antimalarial, promotion and provision of ITNs, smoking cessation, prevention and treatment of eclampsia, external cephalic version, induction of labor for PROM & antibiotics for PROM		Ineffective for neonatal mortality reduction		
Childbirth interventions				
– Induction of labor for prolonged pregnancy	Perinatal Mortality: RR=0.31 (95% CI: 0.12, 0.81) <i>69% reduction in perinatal mortality with induced labor at term or post-term</i>	Promising	Experimental (17 studies)	⊕⊕⊕○ Moderate
– Active management of the third stage of labor		Ineffective for neonatal mortality reduction		
Newborn intervention				
– Early initiation of breastfeeding	Neonatal Mortality: RR=0.56 (95% CI: 0.40, 0.79) <i>Reduces neonatal deaths by 44%</i>	Effective	Observational (3 studies)	⊕⊕⊕○ Moderate

– Hygienic cord care (including chlorhexidine cord cleansing)	Neonatal Mortality: RR=0.77 (95% CI: 0.63, 0.94) <i>Reduces neonatal deaths by 23%</i>	Effective	Experimental (3 studies)	⊕⊕⊕○ Moderate
– Kangaroo mother care (KMC) for preterm	Neonatal Mortality: RR=0.49 (95% CI: 0.29, 0.82) <i>Reduces neonatal deaths by 51%</i>	Effective	Experimental (3 studies)	⊕⊕⊕⊕ High
– Case management of neonatal sepsis, meningitis and pneumonia	All-cause neonatal Mortality: RR=0.73 (95% CI: 0.65, 0.82) <i>27% reduction in all-cause neonatal mortality</i>	Promising	Experimental	⊕⊕⊕○ Moderate
– Prophylactic and therapeutic use of surfactant	Neonatal Mortality: RR=0.84 (95% CI: 0.74, 0.95) <i>16% reduction in neonatal mortality</i>	Promising	Experimental (6 studies)	⊕⊕⊕○ Moderate
– Continuous positive airway pressure (CPAP) for neonatal resuscitation	Neonatal Mortality: RR=0.52 (95% CI: 0.32, 0.87) <i>48% reduction in neonatal mortality</i>	Promising	Experimental (6 studies)	⊕⊕⊕○ Moderate
– Thermal care for all newborns, neonatal resuscitation with bag and mask, presumptive antibiotic therapy		Ineffective for neonatal mortality reduction		
– Home visits across the continuum of care	Neonatal Mortality: RR=0.62 (95% CI: 0.44, 0.87) <i>38% reduction in neonatal mortality</i>	Promising	Experimental (5 studies)	⊕⊕⊕○ Moderate

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.

N.B:

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

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

Ineffective interventions: Indicating that the review found low or very low-quality evidence of effectiveness or lack of effectiveness for an intervention

Current Status of the effective and promising interventions in Ethiopia

Most of the effective and promising interventions are recognized in the strategic documents like the national newborn and child survival strategy (NCSS). Though we have not found an evaluation report of this strategy, there are documents indicating gaps in the implementation of these interventions and their monitoring and evaluation. See table 2 below.

Table 2: Current Status of the effective and promising interventions in Ethiopia

Intervention	Recognized in NCSS or HSTP	Current status	Current Indicator/ Source of data	
Effective	– Antenatal corticosteroids for prevention of neonatal respiratory distress syndrome	– Yes	– No data	– Percentage of women with Preterm labor (<34 weeks of gestation) receive steroid/ DHIS2, surveys
	– Early initiation of breastfeeding	– Yes	– 73% (CSA, 2016)	– Proportion of newborns put to breast within an hour of birth/ EDHS
	– Hygienic cord care (including chlorhexidine cord cleansing)	– Yes	– No data	– Number of newborns that received at least one dose of Chlorhexidine to the cord on the first day after birth/ HMIS report, DHS, surveys
	– Kangaroo mother care (KMC) for preterm	– Yes	– 60.7% (FMoH, 2021)	– Percentage of low birth weight and premature newborns for whom KMC was initiated/ EDHS, DHIS2
Promising	– Antenatal care (ANC)	– Yes	– 43% (EPHI & ICF, 2019)	– Proportion of pregnant women who receive ANC 4+/EDHS
	– Tetanus immunization in pregnancy	– Yes	– 41% (CSA, 2016)	– Percentage of newborns protected against tetanus/ EDHS 2016, EPI survey
	– Induction of labor for prolonged pregnancy	– No	– No data	– No indicator
	– Case management of neonatal sepsis, meningitis and pneumonia	– Yes	– No data	– Percent of newborns with severe bacterial infection managed with antibiotics at community level/ DHIS2, surveys
	– Prophylactic & therapeutic use of surfactant of care	– No	– No data	– No indicator
	– Continuous positive airway pressure (CPAP) for neonatal resuscitation	– Yes	– No data	– No indicator
	– Home visits across the continuum of care	– Yes	– No data	– No indicator

In order to successfully implement the above effective and promising interventions, different arrangement mechanisms such as delivery, governance and financial arrangements should be considered. Considering these arrangements, we have identified the following approaches.

1: Community-based Interventions

In the last three decades, rates of neonatal mortality in low-income countries have declined much more slowly than the rates of infant and maternal mortality. A significant proportion of these deaths could potentially be addressed by community-based intervention packages, which are defined as delivering more than one intervention via different sets of strategies. These intervention packages include additional training of outreach workers/CHWs, building community-support or women's group, community mobilization, antenatal and postnatal home visitation, antenatal and delivery home visitation, and home-based neonatal care and treatment; usually supplemented by strengthening linkages with local health systems (Zamorano & Herrera, 2017). The details of each community-based intervention packages are addressed below.


A) Intervention packages consisting mainly of building community support or women's groups

These interventions consisted of monthly meetings of mothers' groups to identify maternal and neonatal health problems, prioritization of problems and implementation and monitoring strategies. Some also implemented a participatory learning cycle, where they identified and prioritized maternal and newborn health problems in their community, selected relevant strategies to address these problems, implemented the strategies, and evaluated the results (Zamorano & Herrera, 2017).

Impact: A SUPPORT summary (Zamorano & Herrera, 2017) of a systematic review (Lassi & Bhutta, 2015) evaluated the impact of intervention packages consisting of building community-support or women's groups in reducing neonatal mortality. The systematic review based on studies from communities in LMIC found that (also see Table 3):

- ❖ *Intervention packages consisting of mainly building community-support groups or women's groups probably decrease neonatal mortality*

Table 3: Effect of Intervention packages consisting mainly of building community-support groups or women’s groups on neonatal mortality reduction.

People	Pregnant women at any period of gestation			
Settings	Communities in low- and middle-income countries			
Intervention	Building community-support groups or women’s groups			
Comparison	Usual maternal and newborn care services provided by local government and non-government facilities			
Outcomes	Absolute effect		Relative effect (95% CI)	Certainty of the evidence (GRADE)
	Without support or women's groups	With support or women's groups		
	Difference (Margin of error)			
Neonatal mortality	28 per 1000	24 per 1000	RR 0.84 (0.73 to 0.96)	 Moderate
	Difference: 4 fewer deaths per 1000 newborns (Margin of error: 8 to 1 fewer)		– <i>Reduces neonatal mortality by 16%</i>	
Margin of error = Confidence interval (95% CI) RR: Risk ratio GRADE: GRADE Working Group grades of evidence (see above in table 1)				


B) Intervention packages consisting mainly of community mobilization and antenatal and postnatal home visitation

These interventions included home visits and promotion of antenatal care, iron and folate use during pregnancy, immediate newborn care including early initiation of breastfeeding, promotion of exclusive breastfeeding, promotion of maternal nutrition and rest, recognition of danger signs and lay health workers (community health workers such as health extension workers in the Ethiopian context) visits to pregnant women during pregnancy and in the postnatal month.

Impact: A SUPPORT summary (Zamorano & Herrera, 2017) of a systematic review (Lassi & Bhutta, 2015) evaluated the impact of intervention packages consisting mainly of community mobilization, antenatal and postnatal home visitation in reducing neonatal mortality. The systematic review based on studies from communities in low- and middle-income countries found that (also see Table 4):

- ❖ *Intervention packages consisting of mainly building community-support groups or women's groups probably decrease neonatal mortality*

Table 4: Effectiveness of intervention packages consisting mainly of community mobilization, antenatal and postnatal home visitation

People	Pregnant women at any period of gestation			
Settings	Communities in low- and middle-income countries			
Intervention	Community mobilization and antenatal and postnatal home visitation			
Comparison	Usual maternal and newborn care services provided by local government and non-government facilities/Without mobilization and visitation			
Outcomes	Absolute effect		Relative effect (95% CI)	Certainty of the evidence (GRADE)
	Without mobilization & visitation	With mobilization & visitation		
	Difference (Margin of error)			
Neonatal mortality	28 per 1000	17 per 1000	RR 0.60 (0.49 to 0.72)	 High
	Difference: 11 fewer deaths per 1000 newborns (Margin of error: 14 to 8 fewer)		– Reduces neonatal mortality by 40%	
Margin of error = Confidence interval (95% CI) RR: Risk ratio GRADE: GRADE Working Group grades of evidence (see above in table 1)				

C) Other community-based intervention packages

Other community-based intervention packages include home-based neonatal care and treatment, education of mothers and antenatal and postnatal visitation and community mobilization and home-based neonatal treatment.

Impact: A SUPPORT summary (Zamorano & Herrera, 2017) of a systematic review (Lassi & Bhutta, 2015) evaluated the impact of other community-based intervention packages in reducing neonatal mortality. The systematic review based on studies from communities in low- and middle-income countries found that:

- ❖ **Home-based neonatal care and treatment/community case management may decrease neonatal mortality.**
- ❖ **Education of mothers and antenatal and postnatal visitation may decrease neonatal mortality.**
- ❖ **Community mobilization and home-based neonatal treatment probably reduce neonatal mortality.**

Relevance of community-based intervention packages to Ethiopia

Applicability

The reviews included in the SUPPORT summary were from low-and middle-income countries. The study populations included were also women in urban and rural areas with diverse socioeconomic conditions (Zamorano & Herrera, 2017). Though the applicability of community-based intervention packages might vary in different low-income countries due to the availability of trained health professionals and health system infrastructure, the likelihood of its applicability in the Ethiopian setting is high. However, the intervention might be less effective in urban areas if there are less community cohesion and interaction among women included in women's groups, and higher baseline use of health services (Chi & Amer, 2017).

Equity

Since community-based intervention packages are targeted at disadvantaged populations; they are likely to decrease inequities (Zamorano & Herrera, 2017). However, community-based intervention packages might require more resources to implement in underserved areas. Interventions that are targeted at populations with different levels of access to health services could increase inequities if additional resources are not invested in underserved areas (Chi & Amer, 2017; Ciapponi A, 2017).

Economic Considerations

Packages of care to prevent neonatal mortality were more cost-effective than vertical interventions (Maredza et al., 2016). The cost, resources available for implementing the packages and training health workers, supervision and support need to be considered when assessing whether the interventions can be implemented. Resources for increased use of healthcare resources also need to be considered, including resources for transportation, social services, human resources (time), and facility admissions. The intervention may be cost-effective according to the WHO standards (Chi & Amer, 2017). Costing should be considered before scaling up in community case management (Ciapponi A, 2017).

Monitoring and Evaluation

Process measures (quality of care), outcomes and costs should be monitored if community-based intervention packages are implemented. Consideration should be given to conducting

randomized trials and economic studies to evaluate the effects and cost-effectiveness of packages of interventions (Chi & Amer, 2017; Ciapponi A, 2017; Zamorano & Herrera, 2017).

Current Practice in Ethiopia

The Ethiopian government has implemented nationwide strategies to improve access to basic health services and enhance health outcomes. Accordingly, the country has expanded primary health care services to households and communities through its Health Extension Program (HEP) which was launched in 2003. To strengthen HEP, the second-generation health extension program was started in 2016. In 2011, the government also introduced the Health Development Army (HDA). HDA is a women-centered community movement inspired by military structures and discipline, designating one individual (preferably a woman) to assist with discussions and oversight of every 5 households throughout the country. The village-level HDA is the vehicle not only to improve the identification and location of pregnant women but also to encourage pregnant women to use facilities for birth. As part of strengthening community engagement platforms, the Women's Development Army (WDA) currently called the women's development group was also established (FMoH, 2016, 2020). However, there is a gap in the monitoring and evaluation of such community-based interventions.

2: Strengthening Continuum of Care

Mother, newborns, and children are inseparably linked in life and healthcare needs. Thus, a continuum of care is considered key to improving the health status of these populations. The continuum of care is a series of care strategies starting from pre-pregnancy to motherhood-childhood to avoid preventable diseases (Johnson et al., 2006; Kikuchi et al., 2016; PMNCH, 2010).

Impact: A systematic review (Kikuchi et al., 2016) assessed the effectiveness of the continuum of care (linking pre-pregnancy to motherhood-childhood care) compared to the standard care provided in health facilities in improving neonatal mortality. The systematic review, based on studies from communities in low- and middle-income countries found that:

- ❖ ***Interventions linking pre-pregnancy, pregnancy and postnatal care probably reduce neonatal mortality by 21%.***

If a substantial reduction in neonatal mortality is desired, both, community and facility-based interventions are required, linked by functioning referral systems, giving the potential to prevent

avoidable newborn deaths every year (Zaidi et al., 2011). However, ensuring access to healthcare by pregnant women is a challenge in low- and middle-income countries. Even if access is possible, a lack of adequate personnel or equipment may mean that complications cannot be treated when they arise. Thus, emergency referral interventions have been advocated to reduce both maternal and neonatal mortality.

Interventions to improve referrals are usually complex but can generally be addressed through organizational interventions (those involved, for example, in overcoming obstacles to emergency transport, particularly cost) and structural interventions (the purchasing of equipment, such as motorcycles/ambulances or communication equipment, or the building, for instance, of maternity homes) (Karumbi, 2016). The impact and relevance of organizational and structural interventions in reducing neonatal mortality are discussed below.

A) Organizational Interventions

Organizational interventions are complex and include financing and incentive schemes, integration between different health care providers, education, and raising awareness of the complications of pregnancy, childbirth, and newborn health (Karumbi, 2016).

Impact: A SUPPORT summary (Karumbi, 2016) of a systematic review (Hussein et al., 2012) evaluated the effectiveness of emergency obstetric referral interventions in reducing maternal and neonatal mortalities. The systematic review based on studies from rural areas in low-income countries found that (also see Table 5):

❖ *Organizational interventions probably reduce neonatal deaths.*

Table 5: Organizational interventions during referral compared to no intervention

People	Pre-pregnant women and postpartum women		
Settings	Rural areas in low-income countries		
Intervention	organizational		
Comparison	Standard care		
Outcomes	Impact	Number of studies	Certainty of the evidence (GRADE)
Neonatal mortality	<i>Organizational interventions probably reduce neonatal deaths. One study in India reported an average reduction in neonatal mortality of 52%</i>	4 studies	⊕⊕⊕⊕ Moderate
GRADE: GRADE Working Group grades of evidence (see above in table 1)			


B) Structural Interventions

The structural interventions are complex and include the use of communication technologies (telephones and radios), building maternity waiting homes, and purchasing ambulances.

Impact: A SUPPORT summary (Karumbi, 2016) of a systematic review (Hussein et al., 2012) evaluated the effectiveness of emergency obstetric referral interventions in reducing maternal and neonatal mortalities. The systematic review found that (also see Table 6):

❖ *Structural interventions may reduce neonatal deaths.*

Table 6: Structural interventions during referral compared to no intervention

People	Pre-pregnant women and postpartum women		
Settings	Rural areas in low-income countries		
Intervention	Structural		
Comparison	Standard care		
Outcomes	Impact	Number of studies	Certainty of the evidence (GRADE)
Neonatal mortality	<i>Structural interventions may lead to a reduction in neonatal mortality</i>	2 studies	 Low
GRADE: GRADE Working Group grades of evidence (see above in table 1)			

Relevance of organizational and structural interventions to Ethiopia

Applicability

Organizational and structural interventions are likely to be applicable in low-income countries like Ethiopia and are interlinked with delay one (delays in the recognition of the problem and the decision to seek care at a household level), delay two (reaching an appropriate level of health facility), and delay three (delays in the care received once a woman reaches a facility), and cannot be implemented as stand-alone approaches (Karumbi, 2016).

Equity

The interventions were tested in rural areas. Therefore, they are likely to benefit poor people living in rural areas who have limited access to health services. These interventions might help to increase facility-based deliveries for disadvantaged populations (Karumbi, 2016).

Economic Consideration

Preventive interventions at the community level for newborn babies and at the primary care level for mothers and newborn babies are extremely cost-effective (Adam et al., 2005). Capital costs (such as the cost of constructing a maternity home, buying ambulances, hiring professionals) could be high (Karumbi, 2016).

Monitoring and Evaluation

Evaluations of the interconnection between various interventions in the three phases of delay using both qualitative and quantitative research are needed. Most of the included studies in the review were uncontrolled before-after studies, which have a high risk of bias. Controlled studies, particularly randomized trials, would provide a more robust assessment of the impact of emergency obstetric referral interventions (Karumbi, 2016). Innovative community-based strategies combined with health systems strengthening may improve childbirth care for the rural poor, help reduce gross inequities in maternal and newborn survival and stillbirth rates and provide an effective transition to higher coverage for facility births (Darmstadt et al., 2009).

Current Practice in Ethiopia

Continuum of care is a well-recognized approach in the 2015/16-2019/20 Ethiopian national newborn and child survival strategy (FMoH, 2015b). However, there are gaps in the implementation of these strategies and their monitoring and evaluation.

Implementation Considerations

Community-based interventions and interventions on strengthening the continuum of care are the potential approaches identified in this evidence brief to implement the effective and promising interventions to reduce neonatal mortality in Ethiopia. Implementing these options might require other changes, including policy changes. Strategies for implementing the interventions and approaches should take advantage of factors that enable their implementation as well as addressing barriers.

Enablers for reducing neonatal mortality in Ethiopia include:

For Community-based Interventions:

- ✚ Presence of women's development group previously named 'Women's Development Army'
- ✚ Political commitment and presence of coordination (from woreda to kebele)
- ✚ Presence of trained model families in the community
- ✚ Presence of trained HEWs in all kebeles and pregnant women conferences
- ✚ Expansion of health facilities both in urban and rural areas
- ✚ Presence of standard guides, protocols, and strategic documents

For strengthening of the continuum of care:

- ✚ National initiatives for the continuity of care, and expansion of health facilities
- ✚ Institutionalization of Vital Event Registration
- ✚ Presence of Maternal, Perinatal Death Surveillance & Response (MPDSR) system
- ✚ Political commitment and strong advocacy for maternal health
- ✚ Improvement in the mix and specialization of the health workforce
- ✚ Increasing engagement and investment of the private sector
- ✚ Service Exemption for delivery and neonatal care at public facilities
- ✚ Initiation of Maternity Waiting Homes and standardized national protocol
- ✚ Procurement and dispatch of ambulances
- ✚ Growing mobile penetration rate, the existence of digital health strategy, and telemedicine

Barriers to the above options and implementation strategies that address those barriers are summarized in Tables 7 and 8.

Table 7: Barriers and Implementation strategies for community-based interventions

Barriers	Description	Implementation strategy
- A gap in the functionality of women's group	<ul style="list-style-type: none"> - Women's group (WDG) engagement outside of the main role - Low applicability across different communities (urban, agrarian & Pastoralist) due to limited contextualized approach - Lack of support from partner/husband - Ongoing political reforms in the country might have impacted the functionality of WG - Absence of appropriate guidelines in line with their level of literacy 	<ul style="list-style-type: none"> - Optimize WG functionality through creating a conducive environment to focus on their main role, context-specific approaches, and advocate on male involvement - Revitalize women's group - Prepare guidelines and user-friendly innovations and technologies (e.g., show cards, speaking book)
- Dispersed community settlement and geographic barrier	<ul style="list-style-type: none"> - A mismatch between the number of HEWs & population size in some areas - Transportation & related infrastructure barriers 	<ul style="list-style-type: none"> - Use innovative approaches (e.g., mobile clinic, m-health) - Use of motorbikes and animal transportation systems
- Burn out of Health extension workers	<ul style="list-style-type: none"> - Burn out of HEWs due to long stay in the community providing routine services and task overload 	<ul style="list-style-type: none"> - Create a suitable career development scheme & health service delivery platform that matches their career development
- HEWs engagement outside of their role	<ul style="list-style-type: none"> - HEWs in different activities other than their main assignment - They spend only 9 percent of their time on the neonatal program (Mathewos et al., 2017) 	<ul style="list-style-type: none"> - Enforce HEWs engagement in their defined role and responsibility
- Community fatigue	<ul style="list-style-type: none"> - Fatigue due to uncoordinated engagement in various multi-sector development activities 	<ul style="list-style-type: none"> - Coordinated multi-sectorial approach
- Community health workers skill & knowledge gap	<ul style="list-style-type: none"> - HEWs may lack skills & knowledge in provisions of community-based neonatal care 	<ul style="list-style-type: none"> - Regular supportive supervision, mentorship, and coaching
- Poor services utilization behavior of the community	<ul style="list-style-type: none"> - Communities may not utilize services due to family preference, lack of trust, lack of knowledge of services provided (community) & cultural barrier 	<ul style="list-style-type: none"> - Family engagement in decision-making - Awareness creation among household and community - Strengthen referral system - Cultural adaptation of the services provided
- Poor reporting mechanism	<ul style="list-style-type: none"> - Absence of reporting format for neonatal mortality at the community level 	<ul style="list-style-type: none"> - Incorporate neonatal mortality report with existing community-based surveillance system

Table 8: Barriers and Implementation strategies for strengthening the continuum of care/referral linkages

Barriers	Description	Implementation Strategy
- Poor health infrastructure for newborns	- Below standard NICU - Inequity in access to health facilities and related infrastructure to rural and remote areas of the country	- Standardization of NICU at health facilities - Improving equitable expansion (consider population size and geographic location) - Inter-sectorial approach to the expansion of infrastructures including roads, communications, and transportation - Consider mobile health care for the pastoralist
- Shortage of equipment and supplies	- There might be a lack of infrastructure, shortage of equipment and supplies that don't meet created demand	- Action-oriented activities/mobilizations - Health facility quality improvement interventions - Include in the regular supply chain as for health post - Sustainable financing system for newborn care commodities - Newborn friendly preparation (IV bags, blood bags)
- Lack of intra-sectorial and inter-sectorial collaboration	- Weak linkage within and among facilities across the health system	- Strengthen collaborative efforts within and outside of the health sector
- Inadequate Quality of services delivered	- Inadequate quality of health care service provision in terms of client centeredness, efficiency & timeliness	- Strengthen of standardization of care for each service area - Strengthen quality improvement activities (mentoring, coaching, supportive supervision, and feedback mechanism) - Provision of culturally adapted health services - Build up coordination and communication within and among health facilities to improve workflow & linkages
- Insufficient advocacy for newborn health	- Poor advocacy for newborn health despite the magnitude of the problem	- Stress on advocacy and awareness creation for newborn health - Adapt best practices and experiences learned from maternal health initiatives - Improve commitment and leadership to neonatal health
- Lack of skilled personnel particularly in hard-to-serve areas	- Health Personnel preference to work in towns or Addis Ababa rather than hard-to-reach areas	- Improve human resource plan including training, deployment, retention, team skill mix, regulation of informal and qualified health workers - Hardship allowances for rural assignment and strengthen staff retention mechanism
- unaffordable services in private-for-profit facilities and lack of strong Public-Private Partnership (PPP)	- The prices in private-for-profit facilities are unaffordable for the majority of the community	- Placement of systems to improve PPP (involvement from inception to implementation) - Contracting out certain or all aspects of health services for neonates to the private health sector

	- Neonatal health care services in the private health sector are not exempted	- Service cost reimbursement schemes should be in place for private health facilities for neonatal healthcare services.
- Lack of clear guideline in system management (reimbursement) for exempted services	- Lack of clear direction on reimbursement of exempted health services for health facilities as well as the clients	- Improve the reimbursement system for exempted maternal and neonatal health services - Ensure uninterrupted and continuous logistics and supplies for exempted services
- Trained staff turn-over & internal rotations	- Inappropriate recruitment of trainees - Poor mentorship after training - Frequent rotations in neonatal care trained staff within health facilities as well the overall staff turnover	- Create a staff retention mechanism and devise a mechanism to maintain trained staff remain in a neonatal care unit like incentive - Expansion of specialty training program like a neonatal nurse - Facilitate skill transfer/ training by learning
- Weak reporting and review of perinatal & neonatal death	- Low performance of perinatal & neonatal death surveillance & response system (MPDSR) both at community and facility level	- Improve ownership & accountability among stakeholders (reporting rate & review of neonatal deaths) & initiating newborn death audit strategy - Strengthening MPDSR system
- Weak civil and vital statistics registration system	- Civil and vital registration system lacks continuity, completeness and responsible body particularly at a lower level	- Coordination and improve linkage through systems for vital registration (digitalize) - Strengthen civil and vital registration system through the assignment of dedicated body and personnel - Coordinate civil and vital registration system with HEWs
- lack of clear guidelines, culturally sensitive and women-friendly Maternity Waiting Homes	- Poorly contextualized maternity waiting homes	- Expansion of client-friendly maternity waiting homes (contextualized to the socio-cultural environment)
- Family refusal of referral	- Family refusal due to fear of the unknown, low expectations for referral outcomes, and financial constraints	- Community mobilization and awareness creation on newborn health - Provision of ambulance services with trained staff for newborn referrals
- Lack of appropriate team mix at health posts	- The health posts lack health workers with appropriate and different professional background	- Make sure that health posts do have the right mix of caregivers equipped with appropriate knowledge & skills. - Recruit and deploy additional health workers with varied health background to health posts

<ul style="list-style-type: none"> - Weak referral system 	<ul style="list-style-type: none"> - Absence of standard referral protocol for newborn referral - Limited capacity on the referral process - Unavailability of phone/radio at receiving health facilities - Lack of referral bi-directional feedback - Maintenance & running cost for ambulances - Misuse of ambulances and ambulance scarcity - Long-distance, poor road network, and lack of appropriate transportation mechanism - Lack of sense of urgency in newborn referral 	<ul style="list-style-type: none"> - Sensitization and training of health care providers on national protocols/guidelines, and setting expectations for adherence - Government investments in newborn referral systems - Standardizing and initiating receiving facility referral communication - Improving the monitoring & evaluation system of the referral system for accountability and improvement - Developing Legal framework for ambulance use - Advocacy and capacity development on newborn care during the referral - Private sector involvement in improving ambulance services accessibility and maintenance - Strengthening multi-sectorial collaboration and coordination at all levels of the referral system - Promotion of local innovations (traditional ambulance) where road accessibility is a challenge
<ul style="list-style-type: none"> - Lack of strong tracking mechanisms on the continuum of care along with the referral linkage (pre-pregnancy to postnatal period) 	<ul style="list-style-type: none"> - Lack of uniform in tracking mechanisms along a continuum of care 	<ul style="list-style-type: none"> - Strengthen and standardize tracking mechanism

Next Steps

The aim of this evidence brief for policy on reducing neonatal mortality in Ethiopia is to foster dialogue and judgments that are informed by the best available evidence. The intention is *not* to advocate specific options or close off discussion. Further actions will follow from the deliberations that the evidence brief is intended to inform.

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Appendices

Appendix 1. How this policy brief was prepared

The methods used to prepare this evidence brief for policy are described in detail elsewhere.^{vi,vii,viii}

The problem that the evidence brief addresses was clarified iteratively through discussion among the authors, review of relevant documents and research. Research describing the size and causes of the problem was identified by reviewing government documents, routinely collected data, searching PubMed and Google Scholar, through contact with key informants, and by reviewing the reference lists of relevant documents that were retrieved.

Strategies used to identify potential options to address the problem included considering interventions described in systematic reviews (review of systematic reviews) and other relevant documents, considering ways in which other jurisdictions have addressed the problem, consulting key informants and brainstorming.

We searched electronic databases of systematic reviews, including SUPPORT Summaries, Health Systems Evidence, PDQ Evidence, Epistemonikos, the Cochrane Library (CENTRAL, Cochrane Database of Systematic Reviews), and supplemented these searches by checking the reference lists of relevant policy documents and with focused searches using PubMed, Google Scholar, and personal contacts to identify systematic reviews for specific topics. The final selection of reviews for inclusion was based on a consensus of the authors.

Potential barriers to implementing the policy options were identified by brainstorming using a detailed checklist of potential barriers (SURE guide for identifying and addressing barriers) to implementing health policies. Implementation strategies that address identified barriers were identified by brainstorming and reviewing relevant documents.

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- vii Supporting the Use of Research Evidence (SURE) in African Health Systems. SURE guides for preparing and using policy briefs: 5. Deciding on and describing options to address the problem. www.evipnet.org/sure
- viii Supporting the Use of Research Evidence (SURE) in African Health Systems. SURE guides for preparing and using policy briefs: 6. Identifying and addressing barriers to implementing the options. www.evipnet.org/sure

Acronyms and abbreviations

ANC – Antenatal Care
BEmONC – Basic Emergency Obstetric and Newborn Care
CI – Confidence Interval
CDP – Continuous Distending Pressure
CPAP – Continuous Positive Airway Pressure (CPAP)
CSA – Central Statistical Agency, Ethiopia
DHS – Demographic Health Survey, Ethiopia
EmONC – Emergency Obstetric and Newborn Care
EPHI - Ethiopian Public Health Institute
FMOH - Federal Ministry of Health
HEW - Health Extension Worker
HSTP – Health Sector Transformation Plan
LMIC – Low- and middle-income countries
MPDSR – Maternal, Perinatal Death Surveillance & Response
RDS – Respiratory distress syndrome
RR – Relative Risk
SDGs – Sustainable Development Goals
UN – United Nations
UNICEF – United Nations Children’s Fund
WHO – World Health Organization