

MANAGEMENT OF NUTRITIONALLY AT-RISK MOTHERS AND INFANTS UNDER SIX MONTHS IN INDONESIA



A REVIEW OF CURRENT HEALTH SYSTEMS CARE PRACTICES

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Acknowledgments

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The authors thank UNICEF Indonesia for organizing and facilitating interviews with health workers and policymakers. We would also like to thank all the study participants we interviewed and the Ministry of Health in Indonesia for facilitating this study.

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UNICEF is grateful for the support received from the Foreign, Commonwealth & Development Office (FCDO) to conduct this study.

ABBREVIATIONS AND ACRONYMS

CHW	Community Health Worker
C-IMCI	Community-based Integrated Management of Childhood Illnesses
DHS	Demographic and Health Survey
F75	Therapeutic Milk - Formula 75
F100	Therapeutic Milk- Formula 100
HIV	Human Immunodeficiency Virus
IMCI	Integrated Management of Childhood Illness
LBW	Low birth weight
MAMI	Management of Small and Nutritionally At-Risk Infants Under 6 Months and their Mothers
MOH	Ministry of Health
MUAC	Mid-Upper Arm Circumference
ORS	Oral Rehydration Solution
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SGA	Small for Gestational Age

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EXECUTIVE SUMMARY

This review was conducted by UNICEF East Asia and the Pacific Regional Office (EAPRO) to understand how nutritionally at-risk infants under six months and nutritionally at-risk pregnant and lactating women are identified and cared for within the health system in four countries in East Asia Pacific: Cambodia, Indonesia, the Philippines, and Vietnam.

This report describes findings from Indonesia.

Rationale for the Study

Nutrition vulnerability among infants under six months is often overlooked in planning and delivering health and nutrition services, leaving unmet needs. Traditionally, at-risk infants were identified as low birth weight (LBW) due to prematurity or being small for gestational age (SGA). However, recent years have seen acute malnutrition in this age group emerge as a pressing public health concern. With 8.5 million children affected globally, the risk of mortality, neurodevelopmental impairment, and ongoing malnutrition is heightened.

Current community-based interventions primarily target older children, missing a critical prevention and early action window. Globally, there is growing recognition of the need to optimize nutrition outcomes for this vulnerable group, as evidenced by guidelines from the World Health Organization (WHO), UNICEF's *No Time to Waste* strategy, and initiatives like the *Management of Small and Nutritionally At-risk Infants under Six Months and their Mothers (MAMI)* global network. Addressing maternal malnutrition is crucial, given its association with adverse pregnancy outcomes and heightened risks for infants, particularly in low- and middle-income countries where adolescents are particularly vulnerable, requiring comprehensive support for both physical and mental well-being.

The healthcare system is uniquely positioned to identify, care for, and link infants at risk of poor growth and development and at-risk mothers with essential support services.

This study aims to provide an understanding of current prevention and care services provided through Indonesia's health system for infants under six months and mothers who are malnourished or at a high risk of malnutrition. The findings will inform evidence-based policies and programs to address the nutritional needs of this vulnerable population and support optimal growth and development in both infants and their mothers.



Methodology

A desk review of national health and nutrition surveys, policy documents, national health and nutrition plans and guidelines, peer-reviewed publications and grey literature was undertaken. This review assessed how these documents describe the criteria for screening, management and treatment, and follow-up care for nutritionally vulnerable infants and mothers of infants under six months. A standardized tool, guided by the MAMI framework, was used to extract data from these documents. For documents not in English, local assistance was sought for translation and extraction of relevant information. A total of eight documents and six peer-reviewed publications were reviewed. This phase helped in evaluating the extent to which existing documents addressed the needs of these vulnerable groups.

Due to logistical constraints, a second phase involving interviews with health workers was not pursued for Indonesia, as it would have necessitated additional ethics approval, which was not factored into the project's timeline.

Nutritionally "at-risk" for this study was defined using the categories listed under the MAMI framework and adapted to the country context based on the definitions that were used in the policy documents.

Nutritionally at-risk infants under six months were defined as infants with low anthropometric measures, breastfeeding challenges, weight loss or failure to gain weight, and those with illnesses or disabilities hindering feeding and weight gain.

Nutritionally at-risk mothers included mothers who are malnourished, with chronic illnesses, clinically depressed, adolescent mothers, and other challenges that could impede effective feeding, growth, and caregiving. At-risk pregnant women were defined as those with poor weight gain, with anaemia, and adolescent pregnancy (below the age of 18 years).

Key Findings

Indonesia has the most extensive criteria for identifying at-risk infants of the four countries reviewed. However, infants with disability and twins, as well as at-risk mothers, are excluded. Five groups of nutritionally at-risk infants under six months and their mothers are included in government policy documents and plans. These include malnourished and wasted infants under six months, LBW infants, newborns with illnesses (e.g., infection, jaundice, diarrhea, HIV), low weight-for-age or breastfeeding problems, and premature infants.

High rates of prematurity, low birth weight (LBW), inadequate rates of exclusive breastfeeding, and adolescent pregnancies constitute significant risk factors that compromise the health and nutritional well-being of infants under six months in Indonesia. The country is ranked fifth worldwide for prematurity rates and reports a 7.1 percent prevalence of LBW. Additionally, only 42 percent of infants in Indonesia are exclusively breastfed. Research varies, but estimates suggest that 5.1 to 10.2 percent of Indonesian infants under six months, including those with LBW, experience wasting.

The 2018 Indonesia Basic Health Report (Riskesdas) found the prevalence of severe and moderate wasting in infants under six months to be 5.1 percent and 7.7 percent, respectively. However, the most recent Demographic and Health Surveys (DHS, 2017) did not include information on the nutrition status of infants younger than six months and children under five years.

Assessment of breastfeeding adequacy and feeding challenges is not included in the screening criteria for detecting infants under six months who are at risk of poor growth and development. The primary method for screening these infants and their mothers has been anthropometric measures, particularly weight. Clinical danger signs are also used. However, there is a lack of clarity regarding the methods for screening and identifying mothers of infants under six months who are nutritionally at-risk.

Current guidelines and policies lack specific criteria for identifying mothers at nutritional risk.

Nevertheless, recent studies have highlighted adolescent mothers and pregnant women with illnesses as particularly vulnerable groups, facing a higher risk of delivering premature and LBW infants.

Guidelines on post-discharge and follow-up are missing. While there are detailed guidelines for in-patient treatment of malnutrition in preterm and LBW infants and management of at-risk breastfeeding mothers, there is a dearth of guidance for post-discharge follow-up and community management, particularly for non-acutely ill, malnourished infants under six months.

The scope of follow-up care community health workers (CHWs) provide for nutritionally at-risk infants and their mothers is inadequately detailed in government policies. While CHWs play a crucial role in assessing basic health issues and directing critically ill infants to medical facilities, the range of community-based interventions they offer for these at-risk groups, particularly beyond breastfeeding support, is not well-defined. This lack of clarity limits understanding of the support services available for these vulnerable populations within community settings.

The key challenges identified by this study as limiting appropriate assessment and care for at-risk infants under six months and their mothers include:

- 1. Underreporting and lack of data:** Nutritionally at-risk infants under six months are underreported, and nutrition surveys generally exclude this age group. This leads to a perception among health workers of a low prevalence of at-risk infants and a complete gap in identifying at-risk mothers.
- 2. High prevalence of prematurity:** Indonesia ranks fifth in the number of preterm births globally, which poses a significant burden on the health care system. Prematurity is associated with poor nutritional outcomes in infants under six months. Significant risk factors for premature births in Indonesia include adolescent pregnancy, hypertension during pregnancy, infections, and nutritional deficiencies.
- 3. Lack of clear community guidelines:** There is an absence of clear guidance for community health systems on post-discharge follow-up and the management of non-acutely ill, nutritionally vulnerable infants.
- 4. Overburdened community health workers:** The broad scope of work for community health workers may lead to ineffective implementation of their roles and tasks in managing both infant and mother at-risk groups.

Below are some recommendations drawn from the desktop review:

- Strengthen maternal nutrition and health programs to address the high prevalence of low birth weight and prematurity.** Maternal nutrition programs should focus on improving access to affordable healthy diets, essential nutrition services, and quality antenatal care services before and during pregnancy and breastfeeding, including in humanitarian crises. They should integrate access to social safety programs targeted at vulnerable adolescent girls and women that link recipients with services to improve nutrition. Moreover, it is essential to reinforce policies and mandatory legal measures to protect adolescent girls and women from the detrimental health impacts of nutrient-poor and unhealthy ultra-processed foods and beverages.
- Routinely include data collection on nutrition status for infants under six months into DHS and all national nutrition surveys.** This will ensure the availability of relevant data to enhance understanding of this age group's nutrition status and risk factors. Moreover, researchers should consider disaggregating data for infants under six months within their datasets to gain more precise insights into this age group's prevalence and nutrition risk factors.

- **Revise and update current guidelines to incorporate evidence-based recommendations for assessing, managing, and post-discharge care of infants under six months and their mothers.** This update should align with the 2023 WHO guidance on the Prevention and Management of Wasting and Nutritional Oedema, which includes specific recommendations for managing infants under six months of age at risk of poor growth and development.

Key areas for guideline enhancement include:

- **Broadening screening and identification criteria:** Expand current screening criteria to include feeding difficulties and maternal well-being assessments, including mental health. This should be integrated into the guidelines for newborn care and the prevention and management of SAM. Develop and disseminate clear protocols and training materials to healthcare providers for implementing the expanded screening criteria.
 - **Comprehensive nutritional assessment and support of infant-mother pairs:** Expand the screening and identification process for at-risk infants to encompass maternal health assessments, including mental health. Also, ensure that every infant/mother pair receives a thorough nutritional assessment and appropriate support during all community and health service contact points to promote their survival and optimal development.
 - **Feeding difficulty screening:** Update newborn care guidelines and severe acute malnutrition (SAM) management to include comprehensive feeding assessments and provide clear recommendations for the post-discharge management of at-risk mothers and infants. These guidelines should be interconnected to ensure a continuum of care.
 - **Mental health and breastfeeding assessment tools:** Introduce tools for mental health screening and structured breastfeeding assessment tools into routine maternal and child health services.
 - **Post-discharge care:** Provide specific recommendations for home-based care and post-discharge follow-up for CHWs. This should be accompanied by creating a follow-up system that involves CHWs in monitoring and supporting these infants and their mothers after hospital discharge.
- **Leverage the existing system of trained community health worker cadres to include the management of nutritionally at-risk infants and their mothers.** Various CHW cadres are trained to identify infants' danger signs at home. Their roles could be extended to include breastfeeding support, screening for maternal illness and mental well-being, and receiving and caring for recovering infants under six months and their mothers after discharge from the hospital. This expansion should be supported by revising the training curriculum to include skills in assessing breastfeeding difficulties and screening for maternal illness and mental well-being. In addition, advocacy to review and distribute the workload of the various CHW cadres, given the extensive scope of the work they are tasked with.
 - **Create a continuum of care linkages between different levels of the health system:** Develop cross-references within various guidelines addressing different groups of at-risk infants to establish a continuum of care. This should include linking hospital and community management guidelines for seamless transition and follow-up. A care pathway algorithm should be developed to trace the journey of at-risk infants within the health system, identifying gaps and potential linkages for improvement.



1

INTRODUCTION



Nutritional vulnerability during pregnancy and lactation significantly impacts birth outcomes and infant growth. Women who are malnourished before pregnancy are at a higher risk of experiencing micronutrient deficiencies, pregnancy complications, and adverse outcomes, such as small for gestational age (SGA) births, preterm births, and low birth weight (LBW) births.¹ These factors, along with breastfeeding challenges, contribute to a higher prevalence of stunting, wasting, and micronutrient deficiencies in infants.

Globally, approximately 170 million women are underweight.² Micronutrient deficiencies, particularly iron, folate, vitamins B12 and D, iodine, and zinc, are also high among women of reproductive age.³ In Indonesia, the situation is compounded by high rates of maternal and neonatal mortality. The 2018 Riskesdas data reveals that half of the pregnant women in Indonesia are anaemic, one-sixth are underweight, and one-third are short in stature. This underscores the widespread issue of maternal malnutrition in the country.⁴

Age plays a critical role in nutritional vulnerability during pregnancy. A significant number of adolescent girls, primarily in low- and middle-income countries, give birth each year while malnourished. This group is more likely to deliver prematurely or have babies with low birth weight, necessitating additional support for their mental well-being and the care of their young children.⁴ In Indonesia, the prevalence of early marriage — 18 percent of girls are married before the age of 18 and 2 percent before the age of 15 — contributes to high rates of low birth weight, illustrating the correlation between early marriage and early childbirth.⁵

Traditionally, at-risk infants under six months have been identified primarily as those with LBW due to prematurity or SGA and those facing breastfeeding challenges. However, acute malnutrition² or

wasting in this age group has recently become a significant public health issue. It is estimated that around 8.5 million infants under six months globally suffer from moderate to severe wasting,⁶ placing them at an increased risk of mortality from common infections in the community⁷, during hospital admission⁸, and post-discharge⁹, as well as subsequent neurodevelopmental impairment and ongoing childhood malnutrition.¹⁰

Despite the growing concern, the management of wasting in infants under six months has predominantly relied on in-patient care. This approach, focused on children aged 6-59 months, neglects a crucial window for early prevention and intervention in younger infants, contributing to the overall burden of wasting in children and its subsequent health consequences. The needs of infants under six months have, thus far, mainly been unaddressed, indicating a significant gap in current healthcare strategies.

The 2023 WHO Guidelines updates on the Prevention and Management of Wasting and Nutritional Oedema in Infants and Children under five years old specify that *“Mothers and their infants less than six months and at-risk of poor growth and development must be identified early and cared for as an inter-dependent unit. Effective and culturally appropriate care—especially for breastfeeding support is vital for their current health as well as one of the most important preventative actions to reduce the prevalence of wasting and nutritional oedema in later infancy and childhood.”*¹¹

UNICEF’s **No Time to Waste**¹² strategy recognizes the burden of malnutrition in infants under six months and commits to intensify efforts for early detection and intervention on growth faltering and wasting, prioritizing the ‘youngest of the young’ within facility and community health services. The strategy refers to the “Management of small and nutritionally at-risk infants under six months and

their mothers” (**MAMI Care Pathway**¹³) as a promising development focusing on this neglected area.

The MAMI global network definition of nutritionally vulnerable infants under six months, used in this study, includes the following key domains:

- i) Infants with low anthropometric measures when compared to a reference population, such as those having a low weight-for-length, low weight-for-age, or low MUAC,¹⁴ LBW infants, both premature and SGA
- ii) Infants experiencing breastfeeding challenges, e.g., those not exclusively breastfeeding or infants not breastfeeding
- iii) Infants experiencing consistent weight loss, rapid weight loss, or failure to gain weight
- iv) Infants with illness or disabilities that prevent effective feeding and/or weight gain, such as diarrhoea, vomiting, breathing difficulties, cerebral palsy, cleft lip and palate, congenital heart disease, etc.

In most cases, nutritionally vulnerable infants exhibit a combination of these issues, putting them at a much higher risk of poor outcomes.

Within the context of MAMI, an “at-risk mother” is defined as a mother of an infant aged under six months currently experiencing challenges that may hinder effective feeding, growth, and care of their infant. The definition generally includes the following groups:

- i) Malnourished mothers assessed using body mass index or MUAC.
- ii) Sick mothers (chronic ailments, tuberculosis, HIV, etc.)
- iii) Clinically depressed mothers (mothers in difficult socio-economic circumstances)
- iv) Adolescent mothers (below the age of 18 years).

Key updates in the management of infants less than six months of age at risk of poor growth and development (WHO, 2023)

- Mothers/caregivers and their infants less than six months of age at risk of poor growth and development should receive regular care and monitoring by health professionals.
- Both the mother/caregiver and infant should be cared for as an interdependent pair for both to survive and thrive.
- Assessment of the physical and mental health status of mothers or caregivers, including micronutrient deficiencies, should be promoted, and relevant treatment or support should be provided.
- The immediate goal is the early detection of any acute medical or psychological problems and preventing infants from becoming severely underweight or severely wasted.
- The longer-term goal of regular care and monitoring is to foster healthy growth and development in infants while supporting the health and well-being of their mothers/caregivers.

[WHO guideline on the prevention and management of wasting and nutritional oedema \(acute malnutrition\) in infants and children under 5 years](#)



Focusing on the mothers alongside the vulnerable infants enables health workers to identify key risk factors for nutrition vulnerability and target them with appropriate interventions.

This study aimed to identify gaps and opportunities for strengthening current prevention and care services provided through Indonesia's health system for infants under six months and mothers who are malnourished or at a high risk of malnutrition. The findings will inform evidence-based policies and programs to address the nutritional needs of this vulnerable population, contributing to better nutrition outcomes throughout the lifecycle.

UNICEF East Asia Pacific Regional Office (EAPRO) commissioned this review to characterize how well nutritionally at-risk infants under six months and women (pregnant and lactating) are identified and cared for within the existing guidelines and health system in four study countries in East Asia Pacific: Indonesia, Cambodia, the Philippines, and Vietnam. Various components of the MAMI framework approach were contextualized and employed in the design of the data collection tools for this review. This occurred prior to the release of the WHO wasting guidance, which encompasses the management of infants under six months at risk of poor growth and development. A fundamental alignment exists in management principles between the MAMI framework and WHO guidance.



2

METHODS



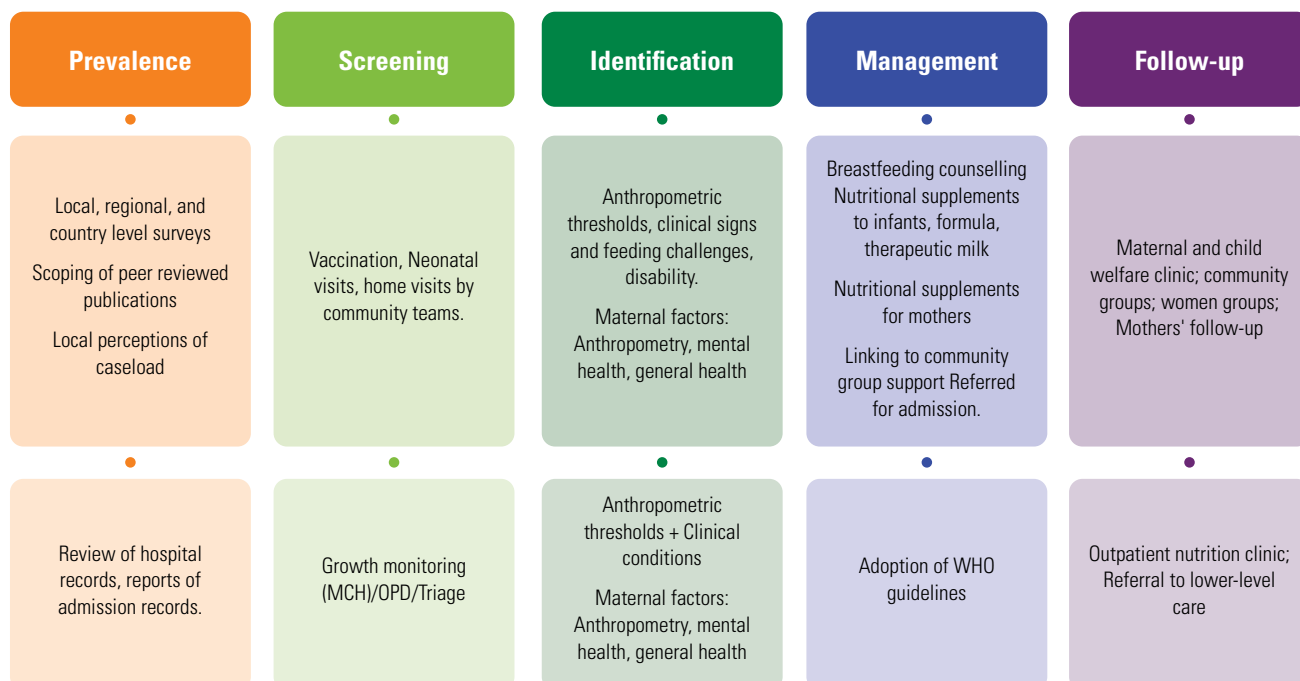
Study Design

This study employed a desktop scoping review, examining relevant publications, guidelines, and policies related to identifying and caring for nutritionally vulnerable infants, including neonates. The aim was to assess how effectively infants under six months and their mothers are identified and managed within the national health system. This review specifically targeted documentation regarding these vulnerable groups but intentionally excluded nutritionally at-risk pregnant women. Initially, the study was planned to expand to include these women through key informant interviews and surveys in its subsequent phase. However, this extension was not realized due to the need for additional ethics approval, which would have introduced significant delays to the project timeline.

Study Procedure

A designated focal person was appointed and connected with the lead researcher. The focal person was responsible for gathering and submitting pertinent documents, including guidelines, policy documents, and survey reports that provided statistics and information on identifying and managing nutritionally vulnerable infants under six months and their mothers. A standardized tool was developed to facilitate systematic data extraction from these documents, as outlined in Appendix 1. This tool was designed based on the principles of the MAMI framework approach, illustrated in Figure 1. This structured methodology ensured a comprehensive and consistent review of the relevant literature and data.

Figure 1: The proposed MAMI framework of approach



If relevant documents were published in local languages (not English), the tool was shared with the focal person who assisted in translating and extracting relevant information from the documents to be added to the tool.

In addition, the researcher also looked through PubMed and Medline for published literature (mainly open access) from each country that contained relevant prevalence and risk factor information on nutritionally vulnerable infants and their mothers and used this information to complement data from the document review.

Sample Size

There was no defined sample size for the document review. All documents, including guidelines, policies, and reports identified as relevant to the study, were considered for data extraction.

Data Collection

The standardized tool (Appendix 1) was used to extract data from all shared government policy documents, guidelines, and reports.

Data Management and Analysis

Excel spreadsheets were used to put together and analyze document review data. Data on prevalence and risk factors from the literature search of peer-reviewed and grey literature were synthesized and presented separately under the prevalence and risk factor subheading.

Information Collected

i. Document review

For Indonesia, most documents were not available in English. A total of 8 policy and guideline documents and 6 peer-reviewed publications were reviewed. The standardized tool (Appendix 1) was shared with a native Indonesian speaker for data extraction. The table below summarizes the documents that were included.

Table 1: Documents included in the document review

No.	Author (year) (Ref)	Document Title	Type of document
1	Indonesia Ministry of Health (2017) ¹⁵	Demographic and Health Survey	Report
2	Agency of Health Research and Development (2018) ¹⁶	Indonesia Basic Health Research	Summary statistics
3	Indonesia Ministry of Health (2017) ¹⁷	Indonesia Health Profile	Survey
4	Indonesia Ministry of Health (2018) ¹⁸	Essential Newborn Care	Technical guidelines for primary health care
5	Indonesia Ministry of Health (2019) ¹⁹	Guideline for Prevention and Management of Severe Acute Malnutrition in Under-five Children	Technical guidelines
6	Indonesia Ministry of Health (2013) ²⁰	Regulation of the MOH of The Republic of Indonesia, Number 70 of 2013: Organising Community-based Integrated Management of Childhood Illness (C-IMCI)	Policy document

No.	Author (year) (Ref)	Document Title	Type of document
7	Indonesia Ministry of Health (2014) ²¹	Neonatal Essential (Regulation of the MOH of The Republic of Indonesia, Number 53 of 2014: Neonatal Essential Health Care)	Policy document
8	Indonesia Paediatric Society (2016) ²²	Consensus-Nutrition Care for Preterm Babies	Guideline
9	JKKI. 2018;9(2):68–71.	Taki S. Malnutrition among children in Indonesia: It is still a problem	Journal article
10	Siramaneerat I, Agushybana F, Meebunmak Y. TOPHJ. 2018;11(1):376–83.	Maternal Risk Factors Associated with Low Birth Weight in Indonesia.	Journal article
11	Aryastami NK, Shankar A, Kusumawardani N, Besral B, Jahari AB, Achadi E. BMC Nutrition. 2017;3(1):16.	Low birth weight was the most dominant predictor associated with stunting among children aged 12–23 months in Indonesia.	Journal article
12	Beal T, Tumilowicz A, Sutrisna A, Izwardy D, Neufeld LM. Matern Child Nutr. 2018;14(4): e12617.	A review of child stunting determinants in Indonesia	Journal article
13	Haksari EL. Neo Reviews. 2019;20(10): e548–60.	Historical Perspectives: Low Birthweight and Preterm Infants in Indonesia.	Journal article
14	Lumbanraja SN, Yaznil MR, Siregar DIS, Sakina A. Open Access Maced J Med Sci. 2019;7(4):594–8.	The Correlation between Haemoglobin Concentration during Pregnancy with the Maternal and Neonatal Outcome.	Journal article

General study challenges

The major challenge for the implementation of this study was the COVID-19 pandemic. The study was conceived in 2019 and was to be implemented in six months. After the desktop review, it became clear that country visits to conduct interviews would not be possible, and alternative methods of data collection would need to be considered.

It was not possible to conduct online surveys or telephone interviews for this project, but this could be useful in the future.

The desk review findings are a first step to outlining strengths and gaps and could be followed up with in-country interviews later if required.



3

FINDINGS



The results have been presented with the actual findings and a summary of key findings.

Definition of nutritionally at-risk infants under six months and their mothers

In the reviewed documents, several categories of at-risk infants under six months were identified.

- i. Malnourished/wasted infants under six months.^{16, 19}
- ii. LBW infants.^{15, 16, 18, 21}
- iii. Newborns with illness (infection, jaundice, diarrhea, HIV, low weight-for-age or breastfeeding problem).^{18, 21}
- iv. Infants under six months with illness.
- v. Prematurity.²²

None of the documents reviewed identified categories of at-risk mothers of infants under six months.



Key findings

The reviewed documents identified a comprehensive but incomplete list of five criteria for identifying at-risk infants. These can be expanded to include infants under six months with disability and twins.

Categories of at-risk mothers of infants under six months were missing.

Prevalence and risk factors

The prevalence of wasting, including LBW, among infants under six months in Indonesia is well documented. According to the Indonesia Basic Health Research, approximately 5.1 percent of infants under six months are severely wasted, while an additional 7.7 percent are moderately wasted.¹⁶ In Indonesia, it is recognized that malnutrition begins in utero. Unless interventions are put in place, infants continue to progress in poor health and development for most of their childhood.²⁴

The Indonesia DHS report did not report childhood malnutrition estimates (wasting/stunting) for any age group but had estimates for the prevalence of LBW: 7.1 percent.¹⁵ A similar prevalence of 6.2 percent was also reported in the Basic Health Research.¹⁶ However, a much higher prevalence of LBW of 10.2 percent was reported when the Indonesia DHS data for 2011 and 2012 were combined (N=15,126 births) and analyzed together.²⁵ This estimate is also quoted in the Global Nutrition Report 2019.²⁶ Furthermore, in Indonesia, LBW and non-exclusive breastfeeding are the predominant predictors associated with stunting among children.^{27, 28}

Risk factors associated with LBW in Indonesia were the low level of maternal education, poor maternal weight gain during pregnancy, short intervals between pregnancies, previous history of LBW delivery, and maternal illness, including anaemia during pregnancy.^{25, 29, 30}

In 2010, Indonesia was ranked fifth in the world for the number of premature births.²⁹ The risk factors for preterm birth in Indonesia have been identified as limited antenatal care, young maternal age (adolescent mothers), having a history of preterm birth, maternal diseases such as anemia and hypertension, antepartum hemorrhage, leukorrhoea, and premature rupture of membranes.²⁹

Not being breastfed is identified as an important risk factor for growth faltering in the first six months of life. Approximately 42 percent of infants under six months in Indonesia are exclusively breastfed.^{15, 24, 26} The proportion of infants

exclusively breastfeeding diminishes with age. By four months, only 27 percent of infants are exclusively breastfeeding; the preferred complementary food at this age is fortified baby food (40 percent of infants).¹⁵

Table 2: Summary of prevalence data from document review and literature search

At-risk group	Prevalence per cent	Reference
Severely wasted infants under 6 months	5.1	Indonesia Basic Health Research 2018
Moderately wasted infants under 6 months	7.7	Indonesia Basic Health Research 2018
LBW	7.1	Indonesia DHS 2017
	6.2	Indonesia Basic Health Research 2018
	10.2	Indonesia DHS data 2011 and 2012



Key findings

The estimated prevalence of wasted and LBW infants is well documented in various reports and publications.

The prevalence of LBW infants and premature births are high and attributed to maternal nutrition deficiencies and adolescent pregnancies.

LBW and not being breastfed are crucial factors in growth faltering during the first six months of life.

The proportion of infants exclusively breastfed is low and diminishes by age as fortified baby food is introduced early.

Screening and Identification

Information on screening at-risk infants has been provided in only one of the documents reviewed.¹⁹ Malnourished children, including infants, are identified through community mobilization and outreach.

During screening, at-risk infants, including LBW and infants with wasting, are identified using anthropometric thresholds and other clinical signs using the IMCI approach.^{18, 20} Thresholds applied for in-patient care of wasted infants under six months are the same as those applied for children older than six months.¹⁹ The box below summarizes the IMCI approach applied in Indonesia. There is no information on how to identify at-risk mothers.

Box 1: Summary of the IMCI approach

1. **Classification in pink row** (very ill or severe bacterial infection, severe jaundice, severe dehydration, confirmed HIV, exposed to HIV): very ill newborn infants must be referred directly after getting treatment.
2. **Classification in a yellow row:** the newborn can be treated in an outpatient facility and needs specific treatment and/or counselling.
3. **Classification in a green row:** The newborn is healthy or has a mild illness, and there is no need for specific treatment, such as antibiotics or other. They may need counselling on home care

Criteria for infants who can be treated at primary health care:

1. LBW with weight 2000 - <2500 grammes
2. LBW's condition is stable (heart rate >100 x/min, respiratory rate <60 x/min, active)
3. No medical complication or any suckling/drinking problem
4. Hypothermia: body temperature <36°C

Preterm infants are identified using gestational age: extremely preterm if <28 weeks; very preterm if gestational age is 28-32 weeks; moderate to late preterm if gestational age 32-<37 weeks.²²

**Key findings**

Anthropometric criteria and clinical signs are used to screen and identify nutritionally at-risk infants under six months.

No additional criteria for in-patient admission, such as breastfeeding and feeding difficulties, have been included.

No information on how at-risk mothers of infants under six months, such as mothers who are ill or have mental health issues, may be screened and identified.

Management and treatment

Within the documents reviewed, detailed descriptions of how to manage infants with wasting, LBW, and premature infants within the health facility have been given. In the technical guidance for essential newborn care,¹⁸ the management of LBW newborns has been described in detail. Box 2 provides a summary of the recommendations.

Box 2: Summary of management of LBW newborn

Keeping LBW infants warm or avoiding hypothermia using the Kangaroo Method or a 60-watt lamp with a minimum 60cm distance from the baby. Keep the newborn dry and wrap the newborn, including the head.

Seizure management:

- First choice: Phenobarbital intravenous (30mg)
- Second choice: Phenobarbital intramuscular (30mg)
- Third choice: Diazepam per rectal
 - <2500 g: 1.25mg
 - ≥2500 g: 2.5mg

Prevent hypoglycemia:

- If they still can breastfeed, then ask the mother to keep breastfeeding
- If they cannot breastfeed but can still swallow, give pumped breastmilk using a small cup, spoon, or pipette. Give 20-50 ml (10ml/kg) or formula milk
- If they cannot swallow, give 20-50ml (10ml/kg) pumped milk or formula milk through a nasogastric tube.

Antibiotics for very ill or severe bacterial infection:

- Give the first dosage of Ampicillin and Gentamicin before referring the newborn to the hospital
- Ampicillin 50mg/kg body weight intramuscular (newborn <1 week - twice a day; newborn ≥ 1-week 3x/day) for 5 days
- Gentamicin IM: once a day for five days
 - newborn <1 week: 5mg/kg body weight
 - newborn ≥1 week: 7.5mg/kg body weight

In the MOH 2019 Guidelines for Prevention and Management of SAM in Under-five Children,¹⁹ a detailed protocol for in-patient treatment of malnourished infants under six months has been given. The guidelines recommend first treating any medical conditions as per the standard treatment protocol. For nutritional rehabilitation, the guidelines recommend feeding with either Formula 75 (F-75) or diluted Formula 100 (F-100) therapeutic milk in the first few hours after admission before transitioning to breastmilk (breastfeeding or expressed breastmilk). The guideline categorizes infants into two primary groups: breastfed and non-breastfed infants. Breastfed infants are further categorized into three groups; infants with the ability to suck, infants without the ability to suck, and infants whose mothers have no breastmilk or

those who have stopped breastfeeding. For this group, the aim is to re-initiate breastfeeding as effectively as possible during the in-patient stay and discharge when an infant weight gain of 20g/day is maintained for 5 consecutive days with breastmilk only.

Guidance on the management of at-risk breastfeeding mothers has also been given. They are to be provided with emotional and mental support and dietary supplementation to meet the dietary requirements of a lactating mother. Box 3 below summarizes these recommendations.

Box 3: Summary of recommendations for in-patient management of breastfed malnourished infants under six months

For breastfed infant

Stabilization Phase

- Treat the medical complications per standard protocol. Infants under six months have a higher risk of hypoglycemia and hypothermia.
- Start refeeding using F-75 or F-100 dilute or commercial infant formula. Give a fixed amount (130ml/kg body weight/day). If both F-75 and F-100 are unavailable, give commercial infant formula only. Give every 2-3 hours.
- Give the milk using a cup or supplemental (if the baby can suck) or using the drip-drop technique or nasogastric tube.

If there is still breastmilk and the infant can suck:

- In the first hour before feeding F-75/F-100, diluted/formula, Give breast milk for around 20 minutes. Do it day and night.
- At this stage, F-75/F-100 diluted/formula is the main source of nutrition, while breastmilk is the supplementation
- Record breastfeeding time on a table or graph to show the mother the importance of breastmilk and observe that breastfeeding is done correctly

If there is still breastmilk, but the infant is not able to suck or does not want:

- Help the mother to express breastmilk; do it at least 8x/day for 20-30 minutes; keep doing this even if you only get a small amount of breastmilk
- Give the expressed milk to the infant using a pipette, cup, or a nasogastric tube.
- If the infant is already strong enough or able to suck, help the mother to express more milk

If there is no breastmilk or the mother has stopped breastfeeding:

- Help the mother to re-lactate.
- Give F-100 dilute formula

Transition Phase

During this phase, the formula given is the same. The purpose is to help infants get more breastmilk; gradually, infants should be exclusively breastfed when discharged.

Rehabilitation Phase

In this phase, the aim is to:

- Reduce the amount of formula
- Achieve weight gain
- Continue giving breastmilk.

Clinical progress is assessed by daily weight gain:

- If there is weight loss or no weight gain for 3 consecutive days, but the infant looks hungry and has finished all formula, then give an additional 5ml of formula in every feed (assuming per kg, but this precision is not given in the Indonesia guideline).

- Generally, when the amount of formula given is not increased, but the infant still gains weight, it means that breastmilk intake is increased, and the infant gets sufficient intake to meet their needs.
- The infant is weighed daily with a weighing scale that has an accuracy of up to 10g.

When an infant shows absolute weight gain of 20g/day, then:

- The amount of F-100 diluted given should be reduced. Initially, the amount of F-100 diluted is reduced by $\frac{1}{4}$ of what it should be. Then, gradually, it is reduced to $\frac{1}{2}$ of the amount it should be.
- When the weight gain is maintained, the formula can be stopped totally.
- If there is no weight gain, then the amount of formula is increased to 75 percent (or $\frac{3}{4}$) of the amount it should be for 2-3 days. The formula can be reduced or stopped if the weight gain is maintained.
- Observe the infant for a few days with breastmilk only to ensure that weight gain is maintained. Infants can be discharged without referring to current weight or WLZ.

Discharge criteria

- Success on re-lactation with effective suckling; minimum weight gain 20g/day for 5 consecutive days with breastmilk only
- No bilateral oedema for 2 weeks
- Clinical condition is good and alert, with no other medical problems.
- The mother has received adequate counseling and multiple micronutrient supplements.

Care for Mother

A breastfeeding mother needs support, especially if they are stressed. The care should focus on:

- The environmental conditions that support breastfeeding practice, for example, individual counseling, breastfeeding mother support group, and a lactation room that is safe and comfortable.
- A mother who is traumatized/depressed needs emotional and mental support to boost her spirit and make her confident enough to breastfeed.
- Mother's nutritional status assessment
- Counselling on risks of new pregnancy

Adequate nutrition and supplementation for lactating women

- Lactating women need extra calories, as much as 450 Kcal/day.
- Essential micronutrients in breast milk are from the mother's diet and micronutrient supplementation. Therefore, it is necessary to meet the calorie and nutrient requirement for lactating women by consuming at least 2500 Kcal/day; according to the maternal health program, post-partum women receive two high-dose vitamin A capsules; Vitamin A supplementation for post-natal women: 1 capsule right after delivery and 1 capsule 24 hours after the first capsule.
- Lactating mothers are recommended to drink at least 2 liters per day because dehydration can reduce breastmilk production.

A separate protocol applies for the management of malnourished infants under 6 months who have no prospects of breastfeeding.¹⁹ The guideline recommends formula-feeding infants with no prospect of breastfeeding with either F-75 or F-100 diluted to meet a minimum weight gain of 20g/day or weight velocity of 5g/kg/day for 5 consecutive days. The details have been summarized in Box 4 below.

Box 4: Summary of recommendations for in-patient management of non-breastfed malnourished infants under six months

No prospect of breastfeeding

Stabilization Phase

- The formula given is F-75 or F-100 diluted
- The amount given can be referred to in a look-up table
- Give the formula using a cup or by nasogastric tube (drip) when the infant is not taking sufficient formula by mouth)
- Implement proper feeding practices to have adequate intake

Criteria to move from the Stabilization Phase to the Transition Phase

- Appetite returns.
- Oedema resolves (if present). An infant with bilateral oedema grade 3 has to be in the Stabilization Phase until oedema has reduced to grade 2.

Transition Phase

- Only give F-100 diluted.
- The amount of F-100 diluted is increased by 1/3 of the amount given during the Stabilization Phase.
- Use the look-up table to determine the amount of F100 diluted.

Criteria to move from the transition to the Rehabilitation Phase

- Good appetite: infant can finish at least 90 percent of the formula given
- Oedema resolves
- At least two days at the transition phase
- No medical problems

Rehabilitation Phase

- Only give F-100 Dilute.
- During the rehabilitation phase, the amount of F- 100 Dilute is twice the amount given during Stabilization Phase
- Use a look-up table for non-breastfed infant

The general discharge criteria for infants within any of the two categories include the following key points:

1. Clinical conditions have been resolved
2. No oedema
3. Infants can breastfeed effectively or get a sufficient intake of formula milk
4. Sufficient weight gain of >5g/kg/day for 3-5 consecutive days

The general community management of ill infants under six months in Indonesia follows the IMCI protocol that has prescribed an intervention package for young infants 0-2 months and for children 2-59 months by trained CHWs.²⁰

Nutritional care for preterm infants has also been clearly defined in the consensus document agreed by the Indonesia Pediatric Society.²² The document details what a preterm infant should receive in the first week of life, the type of feed, and the amount and support to breastfeed.



Key findings

Detailed information on in-patient management of malnourished infants under six months has been provided.

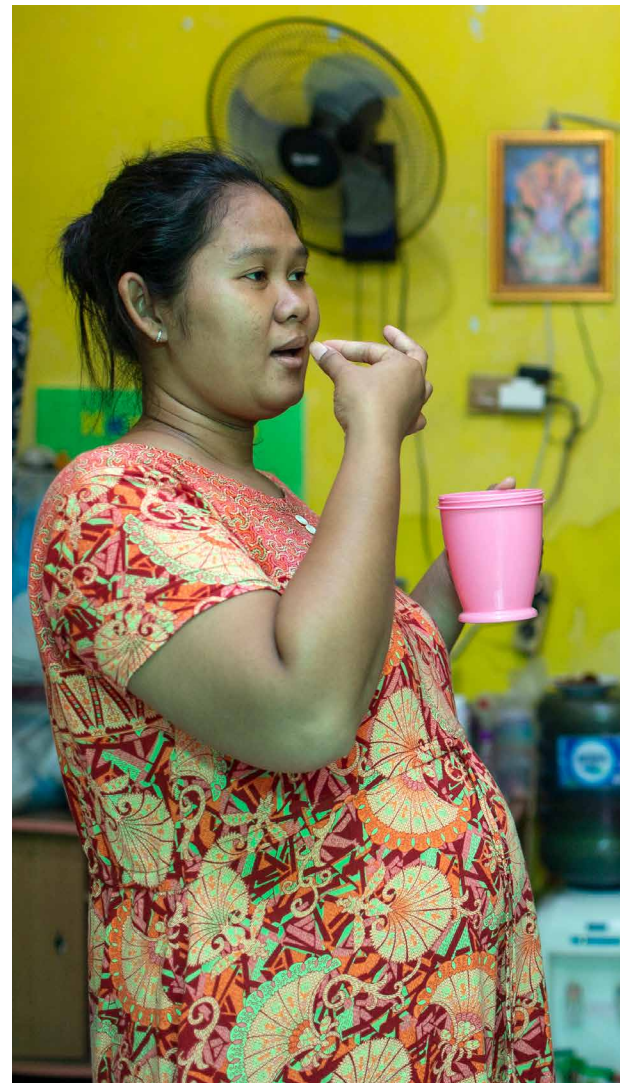
Management of malnutrition focuses on in-patient hospital care and largely follows the 2013 WHO guidelines but excludes specific guidance on post-discharge follow-up care and community/outpatient management of infants.

Care for mothers of admitted infants is included in the guidance. However, guidance on post-discharge care and linkages to referral and community support services is missing.

Within the health system, there is an intervention pathway for CHWs, and they may be used for community follow-up and management, including infants and their mothers.

Follow-up of at-risk mothers and infants

In the MOH policy regulation on organizing C-IMCI²⁰ and the policy regulation of Indonesia for neonatal essential health care,²¹ the community management and follow-up of neonates and infants are described. In summary, the CHWs are expected to determine the child's age, assess for danger signs, and apply age-appropriate management and treatment to common childhood illnesses such as pneumonia, diarrhea, cough, breastfeeding problems, fever, malaria, and dehydration. CHWs are also trained to apply the care pathway, including follow-up and referral to the nearest health facilities for further investigation. See a detailed summary in Box 5 below of the heavy scope of work of the CHWs.



Box 5: Summary of the standard competence for the trained CHW in Indonesia**Standard competence for the trained CHW cadre:**

- Understand the concept of time to determine a child's age. For young infants (0-2 months), age is stated using 'weeks,' while for children 2-59 months, age is stated in 'months.
- Able to identify:
 - Four danger signs in sick infants: cannot drink/breastfeed, vomit, seizure, lethargy, and can do the referral.
 - Signs and symptoms of pneumonia, diarrhea, and fever in children under five by assessing.
- Can conduct under five sickness classifications:
 - Cough due to pneumonia and non-pneumonia.
 - Diarrhea with and without dehydration
- Can do the correct treatment based on classification.
 - Counsel mothers on how to prepare safe throat lozenges and cough medication for children with non-pneumonia coughing.
 - Give co-trimoxazole to children under 5 with pneumonia before referring them to health centers in hard-to-reach areas.
 - Give ORS and zinc to children under 5 with diarrhoea without dehydration and only ORS for a young infant.
 - Give co-trimoxazole to children under 5 with bloody diarrhea before referring them to a health center in hard-to-reach areas.
 - Counsel caretakers on how to take care of young infants at home, such as how to keep the baby warm, care for the umbilical cord, and effective breastfeeding.
 - Conduct Kangaroo Method care for an infant with birth weight <2500g without danger signs.
 - Motivate caretakers to conduct follow-up visits and immediate referrals when the condition worsens.
- Can do a referral when:
 - A young infant with signs and symptoms does not want to drink/breastfeed or vomits everything, history of seizure, lethargy, respiratory rate >60x/minutes, temperature $\geq 38,5^{\circ}\text{C}$ or $< 35,5^{\circ}\text{C}$, wheezing, chest retraction, eye discharge, skin pustules, redness or discharge on baby's navel, diarrhea with dehydration, jaundice or bluish, wound in the mouth, cleft palate or baby's condition worsens.
 - Has one or more general danger signs, identified with pneumonia, diarrhea with dehydration, diarrhea ≥ 14 days, bloody diarrhea, rapid diagnostic test positive for malaria, fever $\geq 38.5^{\circ}\text{C}$, or the condition gets worse during a follow-up visit.
 - All under 5 children with signs/symptoms of sickness beyond the signs/symptoms discussed in IMCI.
- Can conduct first treatment before referring young infant:
 - Counsel the mother to keep the infant warm during transfer to hospital.
 - If the infant still can drink or alert, the mother is asked to keep breastfeeding or feed the infant with expressed breastmilk to prevent blood sugar drop.
 - Write a referral letter.
 - Can fill out management forms for young infants' and children's sickness.
 - Can do recording and logistic planning



Key message

CHWs are well integrated within the health system and are trained in community management of different ailments, assessing for danger signs, and referring cases to health facilities.

Breastfeeding counselling is included, but the assessment of breastfeeding difficulties is not specified.

The scope of follow-up care CHWs provide for nutritionally at-risk infants and their mothers are not specified in the guidelines.

Summary of key findings for Indonesia

The following table summarizes the above key findings, listing each within a specific result domain.

Table 2: Summary of key findings within specific result domain

Domain	Indonesia (document review only)
Definition of at-risk infants and their mothers	<p>The document review identified five groups of nutritionally at-risk infants under 6 months and their mothers. These can be expanded to include infants under 6 months with disability and twins.</p> <p>Categories of at-risk mothers of infants under 6 months need to be identified and included in the appropriate guidelines and policies, such as the national guidelines on antenatal care.</p>
Prevalence and risk factors	<p>The review found a high prevalence of LBW and prematurity and a low prevalence of exclusive breastfeeding.</p> <p>The reviewed documents and peer-reviewed publications identified key risk factors for LBW and premature births (groups of at-risk mothers, including adolescent mothers and sick/ill pregnant women) in Indonesia.</p>
Screening and identification	<p>Anthropometric criteria are commonly used for screening infants and their mothers.</p> <p>No additional criteria for in-patient admission, such as breastfeeding difficulties, have been included. Preterm infants are identified using gestational age.</p> <p>No information on screening and identification of nutritionally at-risk mothers of infants under 6 months has been identified.</p>
Management and treatment	<p>Guidelines provide detailed information on in-patient management of malnourished infants under 6 months and their mothers and care for preterm infants.</p> <p>Little guidance was available on post-discharge care and community management of at-risk infants under 6 months.</p> <p>The health system has an intervention pathway for CHWs, which may be used post-discharge.</p>
Follow-up	<p>CHWs currently assess simple ailments in the community and refer complicated cases to a health facility.</p> <p>Breastfeeding counselling is included, but an assessment of breastfeeding difficulties is not specified.</p>



4

RECOMMENDATIONS



Below are recommendations drawn from the desktop review:

- **Develop a comprehensive maternal nutrition and health program to reduce undernutrition in infants under 6 months**, targeting populations with high rates of low birth weight and prematurity in Indonesia. The program should focus on ensuring access to affordable, nutritious diets, essential nutrition services, and high-quality antenatal care during pregnancy, breastfeeding, and humanitarian crises.

The proposed minimum package of maternal nutrition services should aim to:

- Enhance access to affordable, nutritious foods such as fruits, vegetables, eggs, fish, meat, and fortified foods
- Improve access to essential nutrition services before and during pregnancy and breastfeeding, including in humanitarian crises
- Implement policies and mandatory legal measures to protect the population from nutrient-poor and unhealthy ultra-processed foods and beverages
- Expand access to social transfer programs, particularly in fragile settings and humanitarian scenarios targeted to nutritionally vulnerable women that link recipients to services to improve maternal nutrition interventions
- Provide targeted health education campaigns using multiple communication channels (print, broadcast, social, and digital media) to raise awareness of maternal nutrition's impact on birth outcomes and advise on nutrition and care practices, especially in rural and underserved areas
- Strengthen counseling services to help adolescent girls, women, and their families make informed decisions for better nutrition

The overarching policy for maternal nutrition should also include strengthening antenatal care services with regular weight monitoring protocols for pregnant women, implementing gender-transformative policies and legal measures that reinforce social and economic empowerment of women, and accelerating the elimination of discriminatory gender and social norms to enable girls and women to realize their rights to food, nutrition, and education.

Lastly, it is recommended that the government allocate research resources to further identify the specific causative factors of low birth weight and prematurity within the country to inform and optimize policy interventions.

- **Systematically include data collection** on infants under six months in Demographic Health Surveys (DHS) and national nutrition surveys. Advocate for disaggregated data analyses specifically for this age group to gain insight into their nutritional challenges.
- **Update the existing guidelines:** Review and update current guidelines to incorporate evidence-based recommendations for assessing, managing, and post-discharge care of infants under six months and their mothers. This update should align with the 2023 WHO guidance on the Prevention and Management of Wasting and Nutritional Oedema, which includes specific directives for managing infants under six months of age at risk of poor growth and development. Key areas for guideline enhancement include:
 - i. *Broadening screening and identification criteria:* Expand the screening and identification process for at-risk infants to encompass twins, feeding difficulties, maternal health and nutrition assessments, and mental health. This necessitates updating guidelines for newborn care and the prevention and management of Severe

- Acute Malnutrition (SAM) to incorporate comprehensive breastfeeding assessments and articulate explicit recommendations for post-discharge management of at-risk mothers and infants. It is essential to ensure that these guidelines are interlinked to facilitate a continuum of care. Furthermore, developing and disseminating clear protocols and training materials for healthcare providers to implement these expanded screening criteria is imperative.
- ii. *Comprehensive nutritional assessment and support of infant-mother pair:* Expand the screening and identification process for at-risk infants to encompass feeding difficulties and maternal health assessments, including mental health. Also, ensure that every infant under six months and mother pair receives a thorough nutritional assessment and appropriate support during all community and health-service contact points to promote their survival and optimal development.
 - iii. *Feeding difficulty screening:* Update newborn care guidelines and severe acute malnutrition (SAM) management to include comprehensive breastfeeding assessments and provide clear recommendations for the post-discharge management of at-risk mothers and infants. These guidelines should be interconnected to ensure a continuum of care.
 - iv. *Maternal mental health and breastfeeding assessment tools:* Introduce tools for maternal mental health screening and structured breastfeeding support into routine maternal and child health services.
 - v. *Post-discharge care:* Provide specific recommendations for home-based care and post-discharge follow-up for community health workers. This should be accompanied by creating a follow-up system that involves CHWs in monitoring and supporting these infants and their mothers after hospital discharge.
- **Management and treatment:** It is crucial to adopt an integrated management approach that treats nutritionally at-risk infants and their mothers as interdependent units. This strategy should effectively utilize the existing network of trained CHWs, who are pivotal in diagnosing and managing childhood illnesses, to also address the needs of nutritionally at-risk infants and their mothers. To make this feasible, the CHWs' duties need to be expanded to include tasks such as conducting anthropometric assessments, offering breastfeeding support, and screening for physical and mental health issues in mothers. Given the already substantial responsibilities of CHWs, it's critical to conduct a thorough review and rebalance their workload to ensure they can effectively handle these additional duties without compromising the quality of care.
 - **Continuum of care:** It is essential to ensure a seamless continuum of care in both guidelines and health service delivery for at-risk infants and their mothers. This should include creating cross-references among various guidelines catering to different at-risk infants, thereby establishing a comprehensive continuum of care. Key to this is the integration of hospital and community management guidelines, which will facilitate a smooth transition and consistent follow-up care. Additionally, the development of a care pathway algorithm is crucial. This algorithm will map the journey of at-risk infants through the health system, highlighting gaps and identifying opportunities for improvement in their care.

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ANNEX

Annex 1: Summary of key opportunities and challenges

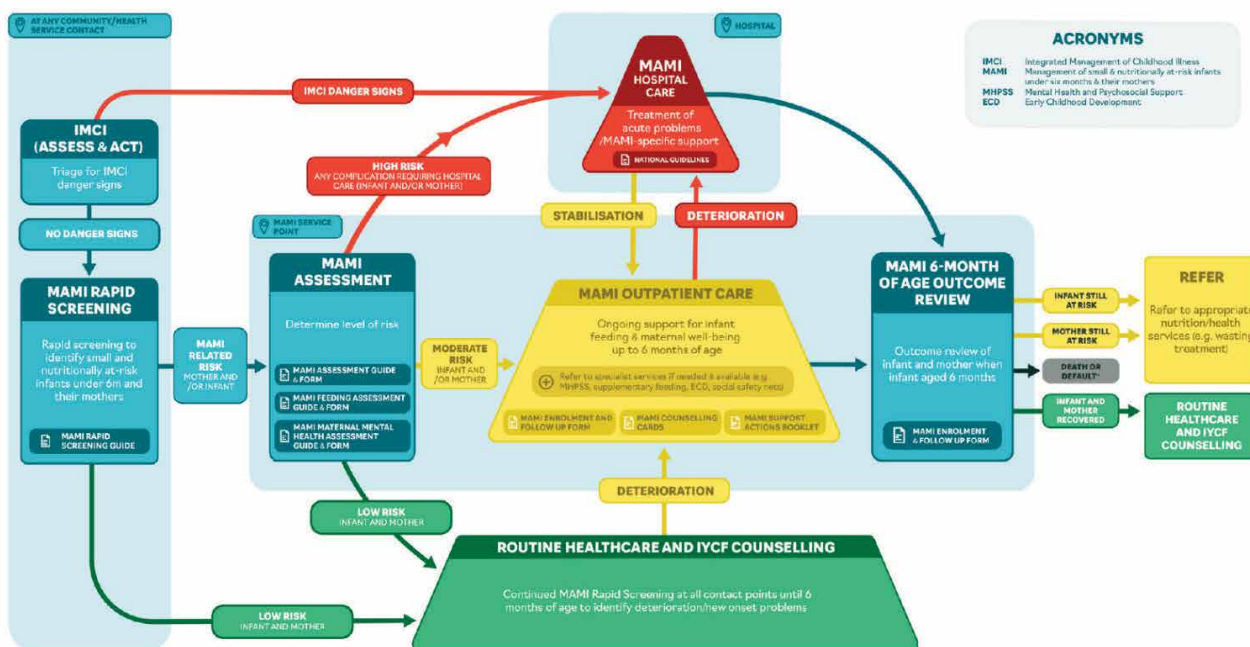
Opportunities	Challenges	Recommendations
There is a comprehensive list of at-risk infants that could be expanded to children with disabilities and twins. Anthropometric criteria are used to screen at-risk infants U6 months	There are no identification criteria for at-risk mothers of infants under 6 months	Categories of at-risk mothers need to be identified following new 2023 WHO guidelines.
DHS reported an LBW prevalence of 7.1 percent but not prevalence of malnutrition. Indonesia Basic Health Research reports 5.1 percent of SAM in under 6 months.	Undernourished under 6 months less reported.	DHS and other surveys to include and report under 6 months of anthropometry and other key indicators separately
Evidence of high rates of prematurity: ranked 5th in the world; low prevalence of exclusive breastfeeding: 42 percent	We could not establish from this desk review why there is a high prevalence of prematurity and what the key challenges in addressing it would be. A further phase of interviewing health workers would shed more light on these aspects.	Investigate the high rates of prematurity. Strengthening breastfeeding promotion through workforce innovation strategies and legislature
Comprehensive guidelines to identify and manage nutritionally at-risk infants under 6 months, including malnourished, LBW, premature, and lactating mothers within institutions. Opportunity to cross-reference and promote a continuum of care	Clear guidance to community systems on post-discharge follow-up and community management of non-ill nutritionally vulnerable infants is missing.	Update guidelines to provide more explicit recommendations for home-based care and post-discharge follow-up Include breastfeeding screening in the Prevention and Management of SAM and Newborn care guidelines. Development of guidelines implementation tools such as screening for mental health and tools for structured breastfeeding support
The availability of CHWs presents an advantage for continued care for at-risk groups of infants within the community.	Extensive scope of work (text box 4), which might mean ineffective implementation of roles and tasks	Review CHWs scope of work; advocate for increased number of CHWs; advocate for inclusion of breastfeeding peer supporters to focus on breastfeeding interventions.

Annex 2: Data extraction tool for the document review

Author (year)	Document title (Language)	Document scope (Hosp/Comm/Both)	At-risk infants under 6 months?	At-risk mothers under 6 months?	Prevalence	Screening	Identification	Management	Follow-up	Comments

Annex 3: MAMI Care Pathway: An algorithm to guide the integration of MAMI services into the health system.

*Shared courtesy of ENN



*Death or default may occur at any point in the pathway and requires further investigation.



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October 2023

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