

Accelerating anaemia reduction

A comprehensive
framework
for action





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Accelerating anaemia reduction: a comprehensive framework for action

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Foreword

Accelerating action on anaemia is foundational for the health and well-being of children, adolescents, and women. Currently, an estimated 571 million women and 269 million young children face serious health problems due to anaemia. These include an increased risk of infections and death, impaired cognitive performance, extreme fatigue, poor pregnancy outcomes, loss of earnings, and poorer growth and development. The health, development and economic consequences of anaemia affect individuals, families, communities, and societies.

The burden is unevenly distributed, with higher prevalence in low- and middle-income countries and communities. The situation has been exacerbated by the impact of the COVID-19 pandemic, and by humanitarian crises caused by war and natural disasters. These in turn cause disruptions to health services, education, and social protection systems, and increase poverty and food insecurity. Conversely, reducing anaemia in women may contribute to reducing gender wage gaps and help some women and their families escape poverty.

The World Health Organization (WHO) is committed to supporting the efforts of its Member States to achieve the World Health Assembly global target to halve anaemia prevalence in women of reproductive age by 2025. Given that the causes and risk factors for anaemia are complex and diverse, and prevalence appears to have changed little in the past 20 years, accelerating anaemia reduction requires renewed dedication and a coordinated, multipronged approach.

At the Nutrition for Growth Summit in 2021, WHO committed to developing a comprehensive framework for action to prevent, diagnose and manage anaemia. We also agreed to work with UNICEF and partners to establish an Anaemia Action Alliance to support the implementation of the framework and drive progress toward national and global goals.

WHO set up an initiative bringing together five different areas of work including nutrition and food safety, maternal, newborn, child, and adolescent health, sexual and reproductive health, malaria and neglected tropical diseases, as well as other technical areas that contribute to the understanding of anaemia.

A key theme throughout this document is that progress in reducing anaemia depends on the meaningful participation of stakeholders at all levels, including national and local governments, educational institutions, civil society organizations, food producers, and local and international organizations. WHO remains committed to reducing the prevalence and severity of anaemia in women, adolescent girls, and children, as part of our shared efforts to build a healthier and safer future for everyone, everywhere.



Tedros Adhanom Ghebreyesus

**Director-General
World Health Organization**

Preface

This document is an output of a WHO cross-programme initiative aiming to improve the prevention, diagnosis and management of anaemia and thereby accelerate reduction in its prevalence.

It comes at an important time, midway through the era of the Sustainable Development Goals, when progress in reducing anaemia has stagnated. This framework is based on the core principles of primary health care: meeting people's health needs through comprehensive promotive, protective, curative, and rehabilitative care along the life course; systematically addressing the broader determinants of health; and empowering individuals, families, and communities to optimize their health.

Iron deficiency is the most common and commonly recognized cause of anaemia and, to date, most work on addressing anaemia has been focused on the prevention and treatment of iron deficiency. However, anaemia is a complex condition with multiple causes – including other nutritional deficiencies, infections, inflammation, gynaecological and obstetric conditions, and inherited red blood cell disorders – requiring a multisectoral approach, building on existing interventions, to make progress against the global target. This document is relevant to the prevention, diagnosis and management of all forms of anaemia. It covers anaemia due to micronutrient deficiencies, inflammation, infection, obstetric and gynaecological disorders, and inherited blood disorders, acknowledging the important role of social determinants of health and the challenges in accurately measuring haemoglobin concentrations and indicators of the underlying causes of anaemia. It consolidates the evidence and describes how multiple sectors can work together to identify and address key barriers and seize opportunities to reduce the burden of anaemia. While the main focus is on menstruating women and adolescents, pregnant and postpartum women, and children, in low- and middle-income countries, several interventions also benefit populations across the life course and around the world.

This document will be complemented by operational guidance and a monitoring framework that will elaborate on how to strengthen multisectoral responses and implement actions in a coordinated and comprehensive way.

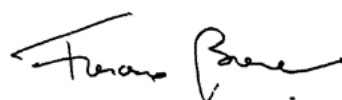
By leveraging the evidence, actions and resources in this document, we can further accelerate anaemia reduction. We must all work together to ensure that women, adolescent girls and children affected by anaemia receive the care and support they need and deserve.



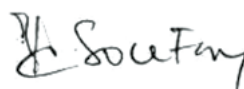
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The development process was coordinated by Lisa Rogers (WHO Department of Nutrition and Food Safety) with the support of Shelby Wilson (WHO consultant). Cathy Wolfheim (WHO contractor) provided technical writing and editorial support.

WHO would also like to thank the members of the Strategic and Technical Advisory Group of Experts on Maternal, Newborn, Child and Adolescent health and nutrition (STAGE). Special appreciation is extended to the members of the STAGE working group on anaemia for their vital contributions to the development of this framework through participation at meetings held virtually and/or at WHO headquarters in November 2021, May 2022, July 2022, October 2022, November 2022, March 2023, and April 2023: Narendra Arora (chair; India), Zulfiqar Bhutta (Canada), Fred Binka (Ghana), Mariam Claeson (Sweden), Helen Cox (South Africa), Theresa Gyorkos (Canada), Dalia Haroun (United Arab Emirates), Caroline Homer (Australia), Ipsita Parida (USA), Daniel Raiten (USA), Laura Reichenbach (USA), Marie Ruel (USA), Harshpal Sachdev (India), Stephanie Topp (Australia), Peter Waiswa (Republic of Uganda), Dilys Walker (USA), Joyce Wamoyi (United Republic of Tanzania), Jennifer Yourkavitch (USA), and Stanley Zlotkin (Canada). All information concerning the STAGE members is available at this [link](#).

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Lastly, WHO thanks the following for their meaningful contributions: Kapil Yadav (All India Institute of Medical Sciences, India); Maria Elena Jefferds (Centers for Disease Control and Prevention, USA); Imelda Angeles-Agdeppa (Food and Nutrition Research Institute, the Philippines); Frank Wieringa (Institut de Recherche pour le Développement, France); Nelly Zavaleta (Instituto de Investigación Nutricional, Peru); Mandana Arabi, Daniel Lopez de Romaña, and Alison Mildon (Nutrition International, Canada); Andreas Hasman and Linda Shaker (UNICEF, USA); Sonja Hess (University of California-Davis, USA); Denish Moorthy (USAID-Advancing Nutrition, USA); Sant-Rayn Pasricha (Walter and Eliza Hall Institute of Medical Research, Australia); Hannah Yankson (WHO, Sierra Leone); Valentina Baltag, Prerna Banati, María Barreix, Elaine Borghi, Jane Cunningham, Regina Guthold, Kate Medlicott, Jin Ni, Annie Portela, and Beena Varghese (WHO, Switzerland).

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Introduction

Anaemia is a strong indicator of overall health (Box 1). It persists as a major public health concern, mainly affecting infants and young children, pregnant and postpartum women, and menstruating adolescent girls and women. It is most prevalent in low-and middle-income countries, particularly populations living in conditions of poverty or social exclusion (1).

Globally, it is estimated that in 2019, 40% of all children aged 6–59 months, 37% of pregnant women and 30% of women 15–49 years of age were affected by anaemia (9). The WHO African Region and WHO South-East Asia Region are the regions most affected (Fig. 1). For all population groups combined, it is estimated that nearly one quarter of the world's population, or 1.8 billion people, suffered from some form of anaemia in 2019 (10).

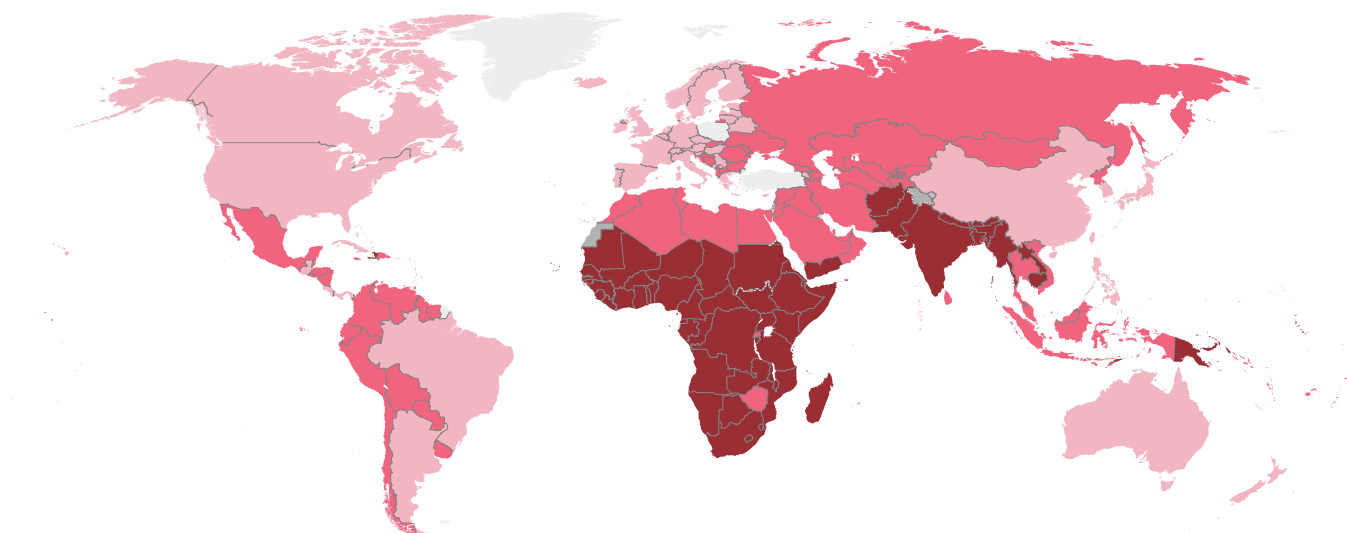
BOX 1

Anaemia



a condition in which the number of red blood cells or the haemoglobin concentration is lower than normal (1). The effects of anaemia include fatigue, decreased productivity, poor cognitive and motor development in children, poor birth outcomes, and increased morbidity and mortality (2–8). Whether moderate or severe, anaemia can also worsen the effects of other illnesses.

Fig. 1. Prevalence of anaemia in children 6–59 months of age, 2019



Category of public health significance (prevalence of anaemia)

- Mild: 5.0–19.9%
- Moderate: 20.0–39.9%
- Severe: $\geq 40.0\%$
- Data not available
- Not applicable

Source: Global Health Observatory, World Health Organization, 2023 (11).

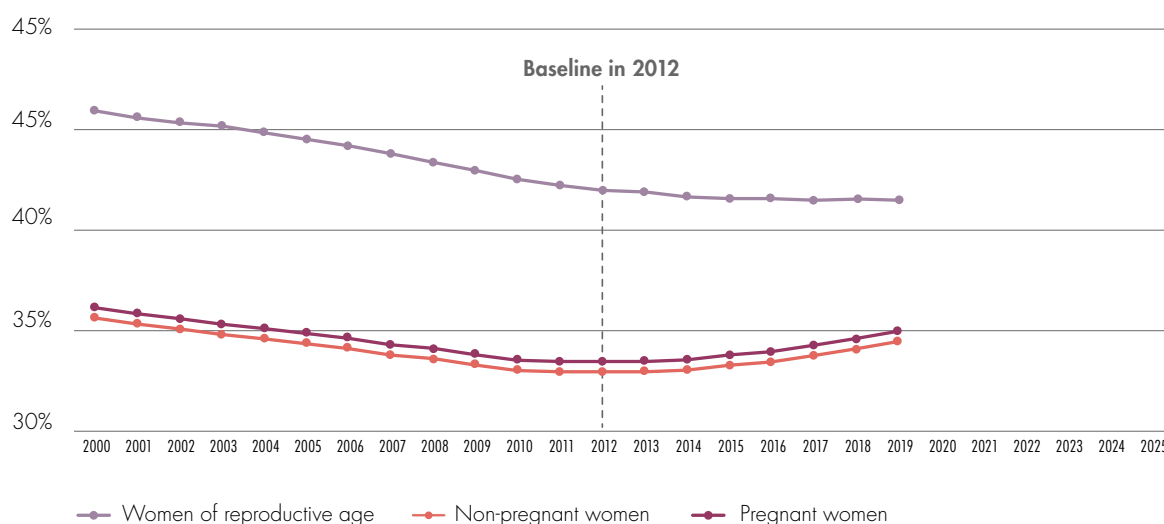
In addition to being a fundamental health issue, **anaemia has important economic consequences** for individuals, families, communities and countries. Anaemia can cause fatigue and lead to lower productivity (7, 12). It is estimated that for every US\$ 1 invested in interventions aimed at reducing anaemia in women, such as iron and folic acid supplementation for non-pregnant and pregnant women, intermittent preventive treatment of malaria in pregnancy and fortification of cereals with iron, \$12 in economic returns could be produced (13).

Advancement towards global targets is slow. The 65th World Health Assembly committed to, by 2025, cutting by half the prevalence of anaemia in women of reproductive age (14). This target aligns with the 2030 Sustainable Development Goals (SDGs), which include an indicator on anaemia in the same population group (15).

Sadly, the prevalence of anaemia has stagnated and the world is not on track for reaching these targets (9) (Fig. 2). Moreover, progress in reducing anaemia has been much slower, less than half the pace compared to other indicators for nutrition, child and maternal health (9, 16–18).

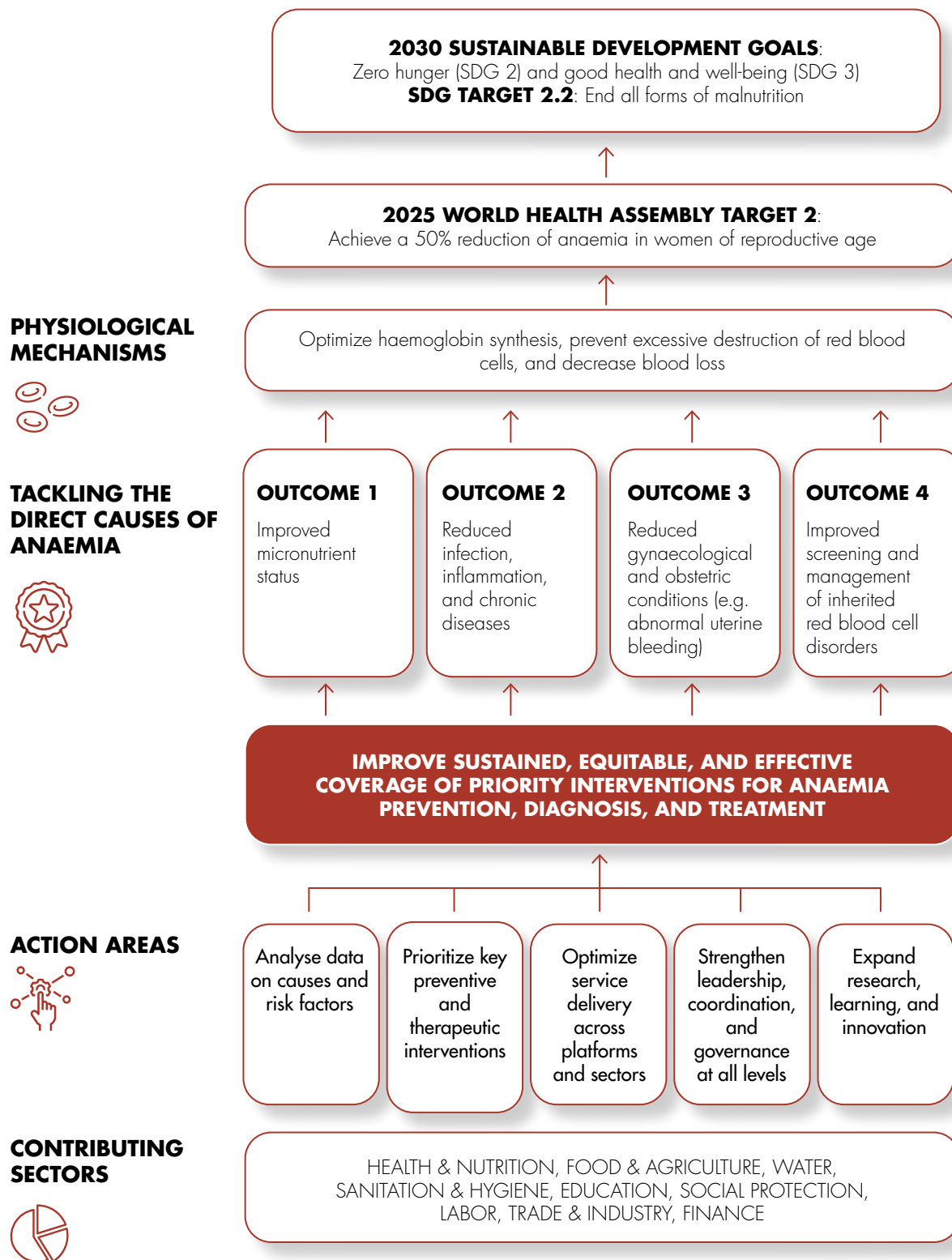
Strategies to reduce anaemia will now require a significantly different approach. This framework on anaemia reduction describes the necessarily comprehensive approach that brings together multiple sectors and actors. It lays out five key action areas to improve the coverage and uptake of interventions that will lead to four main desired outcomes (Fig. 3). These outcomes will in turn lead to improved physiological mechanisms that result in reduced anaemia and improved overall health and well-being.

Fig. 2. Insufficient progress in reducing anaemia prevalence in women 15–49 years of age, 2000–2019



Source: Global Health Observatory, World Health Organization (11).

Fig. 3. Framework for accelerating anaemia reduction



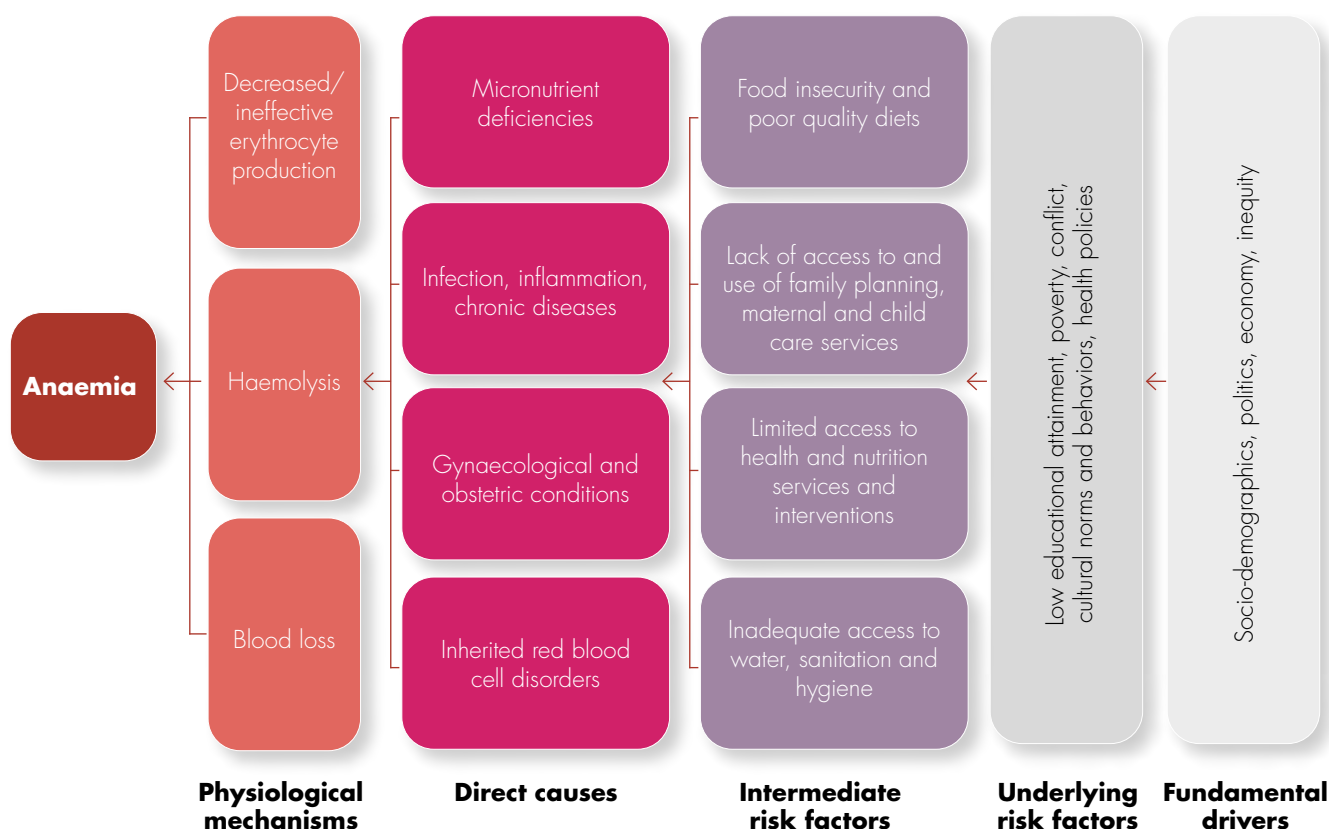
Rationale for a comprehensive framework for accelerating anaemia reduction

Anaemia has a complex etiology, with multiple possible causes and risk factors. The most common and commonly recognized cause is iron deficiency, which is estimated to contribute to anywhere from about 10% to over 60% of anaemia cases, depending on the population group and context (19–21). To date, most work on addressing anaemia has been focused on the prevention and treatment of iron deficiency; however, other nutritional deficiencies, malaria

and other infections including parasitic diseases, chronic diseases, inflammation, gynaecological and obstetric conditions, and inherited red blood cell disorders all play important roles in anaemia prevalence (6,7,10).

These direct causes of anaemia are exacerbated by immediate risk factors, underlying risk factors, and fundamental drivers related to broader social inequities (see Fig. 4). Both the causes and risk factors will need to be considered and addressed simultaneously to effectively control anaemia. The relative role of each will differ from one setting to another, meaning that approaches to controlling anaemia must be tailored to local situations.

Fig. 4. Conceptual framework of anaemia etiology



Sources: adapted from (6,22).

¹ In this document, "causes" refer to the direct causes of anaemia and "risk factors" include the immediate risk factors, underlying risk factors, and fundamental drivers.

Added value

Acknowledging that health remains the predominant sector for delivering many of the recommended interventions, this framework was developed based on the core principles of primary health care, which explicitly comprises multisectoral action (23). It recognizes that accelerating the reduction of anaemia requires coordinated action across sectors such as food and agriculture, environment, education and social protection. It also highlights the importance of taking a comprehensive approach within the broader context of promoting gender equality, empowerment of women and girls, a focus on infants and young children, on greater equity, poverty eradication, inclusive economic growth, and the protection of human rights.

There are widespread challenges to — and opportunities for — using a broader and more inclusive approach to anaemia control. Experts and stakeholders propose various ways forward, including improving education and raising awareness about anaemia, cultivating national and local collaboration among sectors, strengthening food systems and promoting innovation for better service delivery (24,25). Community engagement is fundamental. Stakeholders also stress the need for greater accountability for intervention coverage at population level, stronger intersectoral collaboration, and discernment in the use of resources. Programmes should work on changing misperceptions about anaemia, addressing social norms through social and behaviour change communication and promoting community participation through primary health care. It should be noted that strengthening delivery platforms for anaemia will simultaneously strengthen the delivery of other interventions.

Objectives

This framework proposes strategic, effective and implementable actions which, by leading to the reduction of anaemia, will improve health and accelerate progress toward national and global targets.

The framework brings to light the persistent issue of anaemia and suggests essential action areas and interventions to address it, based on country-specific data and available delivery platforms. It provides information to support discussion among political and health leaders, helping to create a shared understanding and build commitment among local and national leaders for strengthening the multisectoral response to reducing anaemia.

This work leverages global guidelines and consolidates the evidence for decision-makers, providing a menu of strategies that countries can tailor to their specific contexts to advocate for investment in reducing anaemia. Interventions will need to be prioritized according to the most significant local contributors to anaemia, and the associated relative cost-effectiveness or value for money of these interventions. These considerations will link with other criteria such as equity, as prioritized by member states, and affordability.

Intended audience

The framework will support political leaders, health leaders and programme managers who make decisions about planning, prioritization, coordination, human resource allocation, fund distribution, and communication. It may also be helpful to government departments and ministries outside of the formal health system, in particular those dealing with education, food and agriculture, environment including water, sanitation and hygiene (WASH), labour, trade and industry, social protection, and finance.

Lastly, it can serve to inform and support decisions made by organizations, foundations and individuals who support countries and/or fund implementation research to reduce malnutrition, malaria, other parasitic infections, and chronic diseases.

Development process

The development of this framework was led by the WHO interdepartmental working group on anaemia, bringing together different areas of work such as nutrition and food safety, maternal, newborn, child, and adolescent health, sexual and reproductive health, malaria, neglected tropical diseases, and others. Existing WHO guidance provided the basis of the document, bringing together recommendations from the different programme areas that influence anaemia. WHO commissioned four background papers on priority topics for anaemia (determinants, diagnostics, preventive and therapeutic interventions, and programmes for their implementation) to inform on the major challenges and potential ways forward in each respective area.

The framework was developed through a consultative process that involved regional webinars and meetings with WHO regional and country staff, stakeholders and experts in related areas including, but not limited to, those listed

above. The process also involved consideration of input from global experts through three online consultations with the WHO Strategic and Technical Advisory Group of Experts (STAGE) on Maternal, Newborn, Child and Adolescent Health and Nutrition, and four online consultations with the STAGE working group on anaemia. The framework therefore reflects the perspectives of a wide range of stakeholders.

All members of STAGE and the working group on anaemia provided their declaration of interest, which was reviewed by the WHO Secretariat. Twelve members had declared potential conflicts of interest, mainly related to grants received by their institutions for doing research in their area of expertise. None of the reported interests were perceived to have any impact on the members' ability to provide objective and impartial contribution to this work. Declarations of interest were not collected from other stakeholders and experts and their input was considered with the understanding that there may be conflicts of interest.

Action areas for accelerating anaemia reduction

This framework proposes that the key outcomes related to the direct causes of anaemia (see **Box 2**) be addressed by five action areas. These action areas are: 1) analyse data on causes and risk factors for anaemia; 2) prioritize key preventive and therapeutic interventions; 3) optimize service delivery across platforms and sectors; 4) strengthen leadership, coordination, and governance at all levels; 5) expand research, learning and innovation. Interventions under each action area should be sustainable, and designed to influence impact, equity and coverage. Given

programmatic and financial realities, programme managers and decision makers will be called on to prioritize effective interventions, in terms of scope and timing. All five action areas will need to be addressed for success. The first three are sequential and are supported by the last two. All action areas are supported by continued monitoring and evaluation, which will look at haemoglobin concentrations, causes and risk factors of anaemia, and operational issues.



Key outcomes related to the direct causes of anaemia

Outcome 1: Improved micronutrient status

Iron deficiency is the most common nutritional deficiency leading to anaemia. Inadequate dietary iron intake is the primary pathway leading to iron deficiency anaemia. Deficiencies in folate, vitamin B12, vitamin A and riboflavin can also result in anaemia due to their specific roles in the synthesis of haemoglobin and/or erythrocyte production. Additional mechanisms include nutrient losses (for example, blood loss from parasitic infections, haemorrhage associated with childbirth, or menstrual loss), impaired absorption, low iron stores at birth, and nutrient interactions.

Outcome 2: Reduced infection, inflammation and chronic diseases

Infections are another important cause of anaemia, and this is directly related to the geographical burden of infectious diseases, such as malaria, tuberculosis, HIV and parasitic infections. Infections can impair nutrient absorption and metabolism (for example, malaria, ascariasis) or can cause nutrient loss (for example, schistosomiasis, hookworm infection). These infections, malaria in particular, and some chronic conditions (for example, kidney disease, cancer, diabetes, obesity) cause inflammation that can lead to anaemia that is immune-driven, known as anaemia of inflammation or anaemia of chronic disease. HIV infection causes anaemia through a wide range of mechanisms including ineffective erythrocyte production, haemolysis, blood loss, and side effects of drug treatment, while tuberculosis patients may suffer from anaemia caused by chronic inflammation.

Outcome 3: Reduced gynaecological and obstetric conditions

Regular menstrual losses, maternal blood volume expansion during pregnancy, and blood loss during and after childbirth, particularly in cases of postpartum haemorrhage, commonly lead to anaemia (26, 27). Every year about 14 million women primarily in low- and middle-income countries suffer from postpartum haemorrhage (28). Anaemia increases the risk of mortality: the odds of maternal death are twice that in women with severe anaemia compared with those without severe anaemia (29).

Outcome 4: Improved screening and management of inherited red blood cell disorders

Inherited red blood cell disorders are important causes of anaemia in some parts of the world, especially where malaria is or has previously been endemic. Some of these conditions affect haemoglobin production, either the quantity (for example, α - and β -thalassemia) or quality (for example, sickle cell disorders). Being a carrier of α - and β -thalassemia is fairly common among populations living in Africa, Asia and the Western Pacific, as well as among people with ancestry from these regions. This may cause reduced haemoglobin concentrations. Homozygous or compound heterozygous states may cause disease of variable but often profound severity (transfusion dependent thalassaemia, non-transfusion dependent thalassaemia such as haemoglobin H disease, sickle cell disease); these will require specialist care. Screening for these disorders in populations is important for understanding their contribution to anaemia prevalence, which in turn may influence how other interventions (iron supplementation) may be prioritized. Individuals who carry these mutations may require appropriate genetic counselling. Other disorders may affect red cell enzymes (glucose-6-phosphate dehydrogenase deficiency) or the red cell membrane (South-East Asian ovalocytosis).

Action area 1. Analyse data on causes and risk factors

Anaemia is clearly a consequence of poor nutrition. It is also an effect of physiological, social, and environmental circumstances. Physiologically, anaemia can be caused by micronutrient deficiencies, inadequate diet (or the inadequate absorption of nutrients), infections, inflammation, chronic diseases, gynaecological and obstetric conditions, and inherited red blood cell disorders.

There are powerful social and environmental risk factors that need to be considered when addressing anaemia. The most flagrant are poverty, gender inequality, climate change (see **Box 3**), and inequitable access to health services and education. Minority groups are often at increased risk, while gender inequalities increase the risk of anaemia for women and adolescent girls.

Because of the complexity of issues underlying anaemia prevalence, the collection, analysis and use of data for understanding the causes and risk factors in any specific setting require bringing together information from different sources (22,35). While this can be a challenge, getting the right data is essential to identifying how best to intervene. These data should be complemented by knowledge of local traditions and practices that may influence the uptake of specific interventions. For example, taboos around dietary practices during specific stages of life, such as pregnancy, may prevent the uptake of important nutrition interventions.

As the assessment of multiple indicators to inform the origin of anaemia can be costly and cumbersome, innovation in diagnostic tools is needed for responding to local needs, particularly in lower resource settings. Guidance on the assessment of haemoglobin concentrations, as well as some of the main drivers of anaemia have been provided by WHO (7,36,37). Tools are also available to help understand local causes and risk factors. One example is the Anaemia Landscape Analysis tool, developed by USAID's Strengthening Partnerships, Results, and Innovations for Nutrition Globally (SPRING) Project. This tool aims to help guide countries in designing their anaemia programmes based on

BOX 3



How climate change can affect anaemia

Rising temperatures and extreme weather events can create conditions that facilitate the spread of infectious diseases, some of which also cause anaemia (for example, malaria and schistosomiasis). Climate change leads to changes in vector distribution and ecology. It may cause the disruption of healthcare services (30–32) and it can threaten food security and high-quality diets through reduced water quality, altered food production, decreased crop yield, and rising food prices (33,34).

local data (38,39). Questionnaires are used to gather pertinent information on (i) the prevalence of anaemia and coverage of key anaemia-related interventions; (ii) the status of programmes related to nutrition, disease control, water and sanitation, reproductive health, agriculture and genetic counselling and management; and (iii) the strategies and policies enacted related to anaemia.

Dietary assessment data are also useful for assessing risk, given the importance of nutrient deficiencies in the etiology of anaemia. The Global Diet Quality Score (GDQS), developed by the Intake Project, offers countries a method to understand what people eat and to design policies and programmes to promote healthy and sustainable diets (40). The GDQS measures diet quality by gathering information on both the consumption of food groups that contribute to nutrient adequacy and the dietary risk factors associated with non-communicable diseases across a variety of global dietary patterns. The GDQS telephone application was developed to provide a low-cost, streamlined method for collecting routine population-level data on diets.

Action area 2. Prioritize key preventive and therapeutic interventions

Once there is a clear understanding of the causes and risk factors of anaemia within a country or subnational area, there is a considerable range of effective interventions to choose from to improve haemoglobin concentrations and reduce anaemia prevalence (43). These interventions target both causes and risk factors. They include:

- improving the consumption of specific micronutrients, specifically iron, folate, vitamin B12, vitamin A, and riboflavin, as well as other micronutrients, through dietary diversification, food fortification, and supplementation;
- preventing malaria (insecticide-treated nets, indoor residual spraying, malaria chemoprevention);
- ensuring early diagnosis and effective treatment of malaria;
- preventing and treating infections caused by soil-transmitted helminths and schistosomiasis;
- preventing and managing gastrointestinal or chronic diseases such as obesity;
- promoting birth spacing and voluntary use of modern contraceptives;
- managing certain gynaecological and obstetric conditions such as heavy menstrual bleeding, antepartum or postpartum haemorrhage, unnecessary caesarean section (44), and delaying umbilical cord clamping following childbirth; and,
- managing inherited red blood cell disorders such as sickle-cell disease and thalassemias.

The principal response to addressing the public health problem of anaemia has been to provide iron to populations at risk, primarily women and children. This is often through the use of supplements, food fortification, or multiple micronutrient powders. Where iron and other micronutrient deficiencies are prevalent due to inadequate intake, these strategies can be effective. However, the coverage and quality of these interventions is typically low (45–47) and additional, more sustainable interventions are required to maximize the uptake of the nutrients and address other causes and risk factors. This may be as straightforward as promoting healthy diets based on locally available sources of bioavailable iron and other micronutrients (9).

An increasing number of countries are incorporating interventions beyond those limited to iron deficiency into larger national nutrition plans. Others have been developing national anaemia policies and strategies that cover several sectors (48,49).

A more complete illustration of the range of interventions available is presented in **Fig. 5**; a list of interventions by outcome can be found in the **Annex**.

Fig. 5. Interventions to reduce anaemia by sector

Labor, Trade & Industry

- Promote girls' and women's economic empowerment
- Workplace screening for anaemia, nutrition education and provision of nutritious meals
- Raise public awareness about anaemia

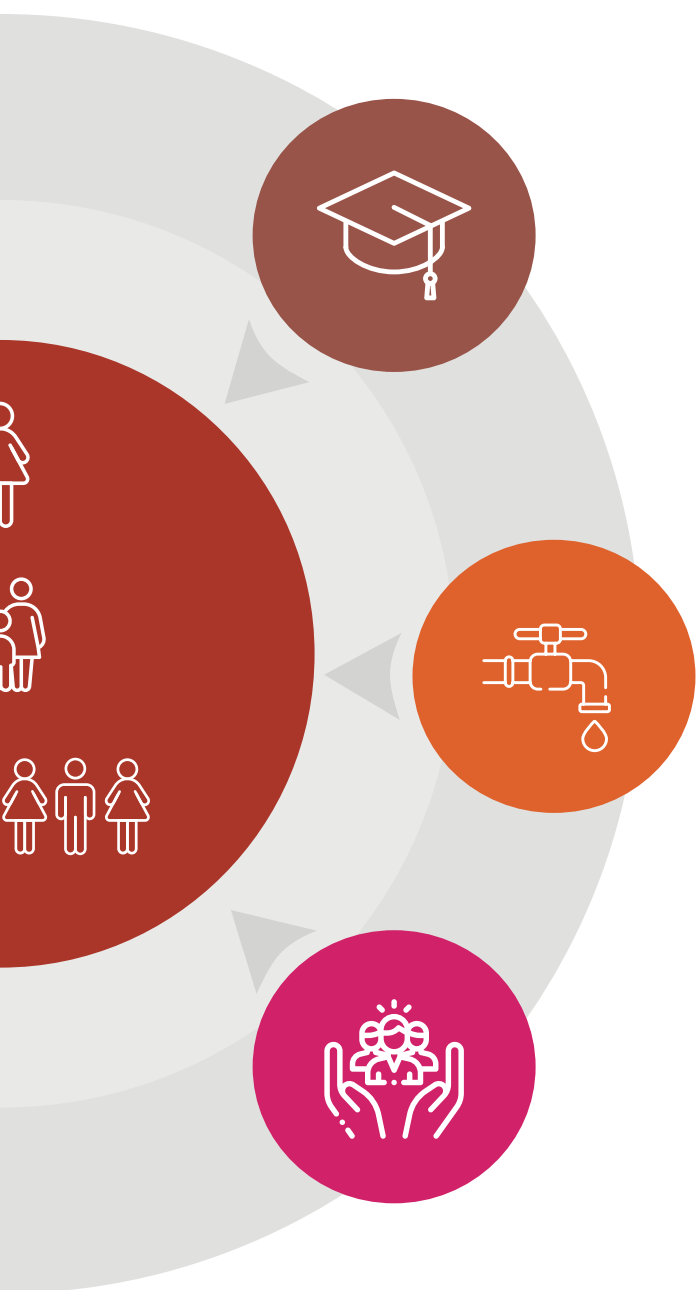
Health & Nutrition

- Promote healthy diets through behaviour change communication
- Improve micronutrient intakes (micronutrient powders and supplements)
- Improve menstrual health
- Screen for and manage haemoglobinopathies
- Prevent, diagnose and treat malaria, HIV, TB, and other infections
- Prevent, diagnose and treat soil-transmitted helminths and schistosomiasis
- Manage heavy menstrual bleeding
- Promote birth spacing, access to and voluntary use of modern contraceptives
- Prevent and treat antenatal and postpartum haemorrhage
- Reduce unnecessary caesarean section
- Delay umbilical cord clamping following childbirth
- Improve access to safe blood and blood products for transfusion in the treatment of severe anaemia
- Prevent, screen and treat for chronic diseases

Food & Agriculture

- Increase production and promotion of nutrient-rich foods
- Create an enabling food environment for healthy dietary practices
- Fortify staple foods with micronutrients
- Promote safe food production and handling





Education

- Promote girls' and women's general education and education on nutrition and reproductive health
- Public health and health care provider messaging about causes and consequences of anaemia
- Public awareness about inherited red blood cell disorders
- Social and behaviour change communication strategies
- Provision of nutritious school meals

Water, sanitation & hygiene (WASH)

- Improve access to safe drinking water
- Promote hand hygiene
- Strengthen safe sanitation systems and practices (access to and use of toilets that safely contain excreta; access to safe systems along the entire sanitation service chain)

Social protection

- Promote gender equality and women's empowerment (including education and income-generating activities, cash or food transfers with behaviour change communication)
- Improve access to quality health care services and interventions
- Promote core components of the right to health (availability, accessibility, acceptability, quality)
- Provide vouchers for nutritious foods

Action area 3. Optimize service delivery across platforms and sectors

After prioritizing the relevant interventions that address the local causes and risk factors of anaemia, coordination must be done with the appropriate implementing sectors. In some cases, interventions can be integrated into existing delivery platforms or programmes. Other situations may require increased coordination with complementary interventions, or simply the co-location of interventions and service delivery.

It is crucial that synergistic efforts are made across health and all other sectors to address the risk factors and improve the quality and coverage of interventions, to reduce fragmentation, to track progress and to optimize the impact of each intervention.

A 2020 review of efforts to reduce anaemia in women reported better results when programmes worked through several sectors at once (8). When coordination of programmes was poor, it was difficult to track progress. Intersectoral approaches will likely require changes in the way the health sector operates.

Building programming across sectors can include incorporating anaemia interventions into antenatal care, community outreach activities, school programmes and child health days (see **Box 4**). Interventions can also be effective in the workplace, particularly in those situations with a high proportion of women. In malaria-endemic areas, it is useful to integrate interventions that address both anaemia and malaria.

Key elements of prior country success include having a high-calibre champion for anaemia (for example the prime minister); synergistic relationships within sectors; and clear knowledge, coordination and accountability of the various ministries and departments involved (8).

Programmes will need a monitoring and evaluation plan to ensure that interventions are being delivered successfully. Existing monitoring and evaluation frameworks such as the Logic model for micronutrient interventions in public health, and reference manual for malaria

BOX 4



Examples of anaemia-related interventions delivered through existing structures and programmes

Community engagement: Prevent early marriage and early onset of childbearing, prevent and treat chronic diseases and common illnesses, promote diet diversity, iron and folic acid supplementation (IFAS), distribute insecticide-treated nets (ITN), water, sanitation and hygiene (WASH).

Basic health care for pregnant and postpartum women: Intermittent preventive treatment of malaria in pregnancy (IPTp), delayed cord clamping, treat heavy menstrual bleeding, prevent postpartum haemorrhage, screen for anaemia.

Hospitals/specialist health care: Blood transfusions, availability of safe blood products, monitor the rates of caesarean sections.

Child health days: Health promotion, vitamin A and iron supplementation, ITN, preventive chemotherapy (deworming) for soil-transmitted helminthiases (STH), raise awareness about anaemia, provide counselling, WASH.

School-based programmes: promote girls' education, healthy meals, fortified foods, IFAS, preventive chemotherapy (deworming) for STH and schistosomiasis, malaria control, WASH.

Workplace: raise awareness and screen female employees for anaemia, provide healthy meals, fortified foods, WASH, IFAS

Malaria programmes: ITN, IPTp, indoor residual spraying.

surveillance, monitoring and evaluation (50–52) focus primarily on the nutrition component. Guidance is needed on the selection of appropriate indicators for comprehensive multisectoral programmes aimed at reducing anaemia. The indicators are not likely to be novel and should be based upon existing frameworks, such as for neglected tropical diseases (53).

Action area 4. Strengthen leadership, communication and coordination, and governance at all levels

Sustainable and sustained work on reducing anaemia, especially across sectors, requires strong commitment, leadership, coordination, and communication. This is easy to recognize, and at the same time often challenging to develop and maintain. One way to hold leaders accountable is to incorporate shared tasks and indicators into workplans across sectors.

Leaders deserve to adequately understand the magnitude and gravity of anaemia, its causes and risk factors, and what can be done about it. Leaders are responsible for the well-being of their populations, and they are accountable to the global community. Reaching the national targets and international goals for anaemia reduction demonstrates their commitment to improving the health of their population (see **Box 5**).

Communication for social and behaviour change has many possible roles. It can serve to raise the awareness of politicians and other leaders and provide an understanding of causes and consequences of anaemia. It can affect social norms such as gender inequality or household distribution of food. It can also promote widespread behaviours to reduce infections and improve nutrient intakes through the consumption of specific foods, as well as the better use of health services.

At the global level, the Anaemia Action Alliance brought together by UNICEF and WHO includes members from intergovernmental agencies, non-governmental agencies, academic institutions and philanthropic foundations. One task of the

Alliance is to support countries to implement multisectoral plans. It also works to raise awareness about the importance and impact of anaemia, and to ensure that the multiple causes and risk factors are recognized. The global Scaling Up Nutrition (SUN) movement plays a strong role in supporting the development of national nutrition plans and in bringing actors together to better coordinate actions.

Encouragingly, there is an increase in the number of countries that are developing national anaemia policies and/or strategies, or incorporating anaemia prevention and control within larger multisectoral nutrition plans. **Box 6** presents the case of India. As another example, building on the foundation laid by the National Anaemia Policy, the Government of Uganda established a National Anaemia Working Group (NAWG) with high-level political support and participation from multiple sectors including health, agriculture, education, and industry. The NAWG leads the coordination of anaemia activities at the national level, including strategy development, data generation and analysis, and development and roll-out of training curricula. Sierra Leone launched a National Anaemia Control Strategy, grounded in data from the National Micronutrient Survey (see **Box 7**). Anaemia is also incorporated into multisectoral nutrition plans in countries such as Nepal and the Philippines.

Action area 5. Expand research, learning and innovation

Research and learning have led to significant improvements in preventing, diagnosing and managing anaemia. Questions remain and others arise, implying a need for further investment to expand the evidence on effective interventions and innovative approaches to delivering them.

There is limited information about the effectiveness of integrated, multisectoral anaemia programmes. Because the reach of current interventions may be inadequate, implementation research will be useful to determine how best to increase this reach, as well as how to best increase the use of health facilities.

Some interventions have unpleasant side effects that discourage people from carrying them through (for example, higher dose iron supplements are not tolerated by all due to adverse gastrointestinal effects). Innovations may help develop effective interventions without side effects. There are also issues with haemoglobin

assessment, which could benefit from new and innovative approaches. Moreover, point-of-use assays to determine iron status can help increase effectiveness by leading to more targeted interventions.

BOX 5



Community engagement to strengthen leadership commitment to addressing social determinants of health in Oman

In recent decades, Oman has undergone rapid economic growth and human development. Oman reduced maternal and child mortality (54,55), increased life expectancy (56), and is the one country in the WHO Eastern Mediterranean Region where the prevalence of anaemia in women, pregnant women and children has declined (57–59). Actions include food fortification (mandatory iron and folic acid fortification of wheat flour and vitamins A and D fortification of vegetable oils); supplementation (iron, folate, vitamin A), and nutrition education (food-based dietary guidelines). Iron deficiency anaemia contributes to less than half of the national burden of anaemia (60). Oman experiences low numbers of malaria cases and genetic disorders. Simultaneously, however, there has been an increase in non-communicable diseases. In 2020, Oman introduced taxes (specifically on alcohol and on sweetened drinks) which aim to promote healthier lifestyles — a goal made more urgent by the alarmingly high rate of overweight and obesity (59%) among Omani women (60,61).

The national commitment to addressing social determinants of health and health inequities is evidenced in Oman's reforms that ensure geographical and financial access to free primary health care for all (62). As a result, over 90% of the population now lives within five kilometres of a primary healthcare facility, and has nearly universal access to health care. Oman's ambitious Birth Spacing Program was initiated in 1994, when Oman had one of the world's highest fertility rates (6.9 children per woman), to improve the survival and well-being of mothers and their children (63). Broader social changes—such as delayed marriage, an increase in the number of educated women, growing participation in the workforce, and birth spacing—led to a decreased fertility rate (64). Oman has near universal school enrolment, and access to improved sanitation facilities and drinking water (65). Local initiatives, such as Community Support Groups and Wilayat Health Teams, strengthen community participation in the planning and implementation of programmes. This has been crucial for ensuring that health and social services meet the needs and expectations of local communities (44). These initiatives have reinforced the active role played by members of each community in developing and improving their health and well-being (58).

BOX 6



Multipronged approach to reduce anaemia in India

In 2018 the Government of India launched the nationwide Anemia Mukta Bharat (AMB) or Anaemia Free India strategy. This strategy aimed to reduce the prevalence of anaemia by three percentage points per year among children, adolescents and women aged 15–49 years up to 2022 (66). It built upon earlier anaemia control programmes in India, leveraged existing health system platforms and focused on multiple causes of anaemia including nutrition, infection, and hemoglobinopathies.

The AMB involved numerous stakeholders at national and state levels through institutional mechanisms. For example, the National Centre of Excellence and Advanced Research on Anemia Control (NCEAR-A) was established under the All India Institute of Medical Sciences. It provided technical support to the Ministry of Health and Family Welfare (MoHFW) in developing a multisectoral approach for policy-making, programme guidelines and programme implementation for anaemia control. The NCEAR-A supported the MoHFW in conducting partners' meetings to help ensure convergence and collaboration. The NCEAR-A also supported the training of over 1000 Master Trainers on anaemia, and the scaling up of digital hemoglobinometers. It advocated for food fortification, and supported research on parenteral iron, multiple micronutrient supplements, and hemoglobinopathies.

The AMB strategy focused on learning from past experience. Although India has implemented iron and folic acid supplementation programmes since the 1970s, bottlenecks in the supply chain adversely affected programme coverage. A nationwide supply chain assessment held in 2019–20 under the AMB informed the development of a review framework for measuring key performance indicators and their determinants, in order to streamline policy efforts (67).

The AMB brought about important innovations, including an e-module for training health workers, and centralized denominator-based reporting. T3 (Test, Treat, and Talk) camps were held to generate demand for anaemia control efforts, promote active community participation and foster partnerships to improve the visibility of anaemia and raise awareness about it among the general public. These camps were later implemented nationally by the Government as a social and behavioural change communication tool.

A more comprehensive understanding of the causes and risk factors for anaemia in a given setting or context is important, particularly in countries, states and districts where the burden is highest. In many cases, limited knowledge and misperceptions of the pathways to anaemia stand in the way of solutions, both in closing the anaemia disparity gap and in preventing and treating anaemia.

The current economic arguments are limited to anaemias due to iron deficiency. More robust and comprehensive estimates are needed, and analyses of the cost and value for money must be improved to strengthen the economic and human capital case for urgent investment.

Existing data from multiple sectors can be brought together for analysis of what is working well and where there are areas for improvement. The research working group of the Anaemia Action Alliance has identified two crucial issues to address as we work towards the 2025 and 2030 global targets on anaemia. These include 1) a better understanding of the anaemia burden through more reliable assessments of haemoglobin concentration, and 2) how we can best prevent, identify and treat the multiple causes of anaemia simultaneously.



An analysis of data changed priorities in Sierra Leone

In Sierra Leone, anaemia was recognized as a severe public health problem, particularly among children (76%), women (45%) and pregnant women (70%). To update the national response, the Government established the National Anemia Working Group, a multisectoral coordination structure with high-level endorsements. The group had access to country-specific anaemia-related data from sources including a national Demographic and Health Survey, a Malaria Indicators Survey, a Micronutrient Survey, and a landscape analysis describing the anaemia situation in the country (41).

Data showed that the prevalence of iron deficiency was low. The main contributors to the anaemia burden in Sierra Leone were found to be infections (malaria, respiratory tract infections and diarrhoea) and inflammation; haemoglobinopathies were not measured. It became clear that there was a mismatch between the contributors to anaemia and the interventions that were in place. This surprised the working group, who moved to correct the response by developing the National Multi-Sectoral Strategy to Prevent and Control Anaemia (2018–2025) (42). Based on the new evidence, the strategy prioritizes the prevention and control of infections, prevention of chronic infections, reproductive health care, micronutrient intake, education of girls and women, and integrated delivery platforms.



Path forward

This framework builds on current global plans, strategies, guidelines and reviews (see **Selected further reading**). It will be complemented by operational guidance to elaborate on how to strengthen coordination within and across sectors and systems, and a monitoring framework for assessing progress.

Anaemia is – and must be addressed as – a public health issue having serious health, development and economic consequences across the life course for individuals, families, communities and countries.

Accelerating anaemia reduction requires leadership and investment in multipronged societal approaches that urgently prioritize the health and well-being of women, adolescent girls and children.

Stakeholders have different roles to play

Member States can be champions for optimizing the health and well-being of every woman, adolescent girl and child. This means prioritizing the prevention and reduction of anaemia; designing rigorous research studies; collecting and using data to inform action; developing, financing and implementing policies, plans and strategies that are equitable; mobilizing investments.

Civil society can advocate, mobilize communities, and monitor commitments. Its role is crucial in contributing to national discourse on topics related to anaemia reduction, including health, education, environment, food and agriculture, labour and trade.

Academia, researchers and funding agencies can work together to generate evidence and to ensure it is produced in a way that makes it easy to use in making decisions. By including policymakers in research design, this group can better seek answers to the questions that governments have prioritized, including offering a more nuanced understanding of how risk factors for anaemia interact dynamically with

each other and with environments. They can also advocate for advancing innovation in diagnostics for anaemia and its underlying causes (for example, inherited red blood cell disorders and micronutrient deficiencies) as well as promoting implementation science.

International organizations can support Member States' leadership in developing national and sub-national strategies to accelerate anaemia reduction. They can foster innovation in people-centred and culturally appropriate tools and services, support implementation research to reduce malnutrition, malaria and other parasitic infections, as well as chronic diseases, and gynaecological and obstetric conditions. They can support the development of the economic argument for investment in accelerating anaemia reduction. Professional associations and societies (obstetrics, midwifery, paediatrics, educators, nutrition, labour, and so on) can educate association and society members, professionals (for example, clinicians and teachers), and the public about the importance of coming together to address anaemia comprehensively.

Media can inform the general population by telling human interest stories and reinforcing a more comprehensive narrative on anaemia. It can influence social norms, promote the use of health services, and strengthen demand for public accountability.

Anaemia is a strong indicator of overall health.

Anaemia has important economic consequences.

Advancement towards global targets is slow.

Strategies to reduce anaemia will now require a significantly different approach.

Key messages

1. Anaemia is a complex condition that must be addressed comprehensively, demanding strong leadership and collective action among multiple sectors.
2. There are multiple causes of anaemia, including micronutrient deficiencies, inflammation, infection, uterine bleeding, and inherited red blood cell disorders.
3. Anaemia has primarily been addressed through the nutrition lens, which is critical but not sufficient alone; rather, all causes must be addressed to effectively prevent and treat anaemia.
4. Effective coverage of a package of interventions to address anaemia at key moments in the life course is foundational for improving health and well-being, and for preventing the irreversible consequences of anaemia.
5. Anaemia remains a major public health problem, mainly affecting infants and children, menstruating adolescent girls and women, and pregnant and postpartum women.
6. The burden of anaemia is unevenly distributed among countries, regions, and population groups, highlighting the role of underlying risk factors, such as poverty, gender, social and environmental inequities.

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Selected further reading

The following existing resources provide data and information that reinforce the rationale for this framework and can support implementation. This compilation aims to include those key documents and resources with direct linkages to the framework.

Strategies

Comprehensive implementation plan on maternal, infant and young child nutrition (2014)

Ending the neglect to attain the Sustainable Development Goals: a global strategy on water, sanitation and hygiene to combat neglected tropical diseases 2021–2030

Ending the neglect to attain the Sustainable Development Goals: A road map for neglected tropical diseases 2021–2030

Global Strategy for Women's, Children's and Adolescents' Health (2016-2030)

World Health Assembly Resolutions and Reports

World Health Assembly Resolution 59.20 Sickle-cell anaemia (2006)

World Health Assembly Resolution 65.6 Comprehensive Implementation Plan on Maternal, Infant and Young Child Nutrition and global nutrition targets (2012)

World Health Assembly Resolution 69.2 Global Strategy for Women's, Children's and Adolescents' Health (2016–2030) (2016)

World Health Assembly Resolution 69.8 United Nations Decade of Action on Nutrition (2016–2025) (2016)

Behavioural sciences for better health initiative. Seventy-fifth World Health Assembly, Geneva, May 2022. Report by the Director-General (WHA75/2022/18.2).

WHO Guidelines

Control of Neglected Tropical Diseases: Intervention strategies

Essential nutrition actions: mainstreaming nutrition through the life-course

Guideline: preventive chemotherapy to control soil-transmitted helminth infections in at-risk population groups

Helminth control in school-age children: a guide for managers of control programmes – Second edition

WHO guideline on control and elimination of human schistosomiasis

WHO guideline on self-care interventions for health and well-being

WHO guideline on use of ferritin concentrations to assess iron status in individuals and populations

WHO Guidelines for malaria

WHO recommendations on antenatal care for a positive pregnancy experience

WHO recommendations on maternal and newborn care for a positive postnatal experience

Reviews, policy briefs and implementation tools

Control of Neglected Tropical Diseases. Data platforms and tools: Collection, management and analysis of data

Deworming adolescent girls and women of reproductive age. Policy brief

Global anaemia reduction efforts among women of reproductive age: impact, achievement of targets and the way forward for optimizing efforts

Global nutrition targets 2025: Anaemia policy brief

Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity

Infant and young child feeding counselling: an integrated course: trainer's guide, 2nd ed.

Management of haemoglobin disorders: report of a joint WHO-TIF meeting

Monitoring flour fortification to maximize health benefits: a manual for millers, regulators, and programme managers

Nutritional anaemias: tools for effective prevention and control

The urgent need to implement patient blood management: policy brief

Weekly iron and folic acid supplementation as an anaemia-prevention strategy in women and adolescent girls

Annex. WHO recommended interventions by outcome (see Web Annex for additional details on individual interventions)

Table A1. Recommended interventions to improve micronutrient status (Outcome 1)

Intervention	Context/setting (All settings vs targeted)	Platform	WHO guidance	Essential Medicine List
SOCIAL PROTECTION				
Promote gender equality and women's empowerment	All		(1,2)	-
Support income-generating activities for women (poverty alleviation)	All	Formal and informal workplaces	(3,4)	-
Support early child development (universal, comprehensive, high-quality early childhood education and care; reduce child poverty)	All		(4)	-
EDUCATION				
Promote educational opportunities for women and girls, particularly those from marginalized and excluded groups	All	Schools, workplaces	(4)	-
Health care provider messaging about causes and consequences of anaemia	All	Community health, primary care, ANC, PNC, hospitals		-
Social and behaviour change communication strategies for anaemia and relevant interventions	All	Community health, primary care, ANC, PNC, hospitals, schools, workplaces		-
ENVIRONMENT & WASH				
Promote safe food production and handling (5 keys to safer foods)	All	Community health, schools, hospitals, workplaces	(5,6)	-
FOOD & AGRICULTURE				
Create a food environment that enables people to adopt and maintain healthy dietary practices	All		(7,8)	-

Increase production and consumption of nutrient-rich foods	All		(9–11)	-
Fortify staple foods with vitamins and minerals	Settings where the food vehicle to be fortified is commonly consumed		(12–15)	-

HEALTH & NUTRITION

Promote optimal timing of umbilical cord clamping	All	Hospitals, primary care community health	(16, 17) Rec 44	-
Counselling on nutrition, food safety and healthy diet (dietary modification and diversification)	All	Hospitals, community health, primary care, ANC, PNC, schools, workplaces	(18, 19) Rec A1.1	-
Complementary feeding of infants and young children 6–23 months of age	All	Community health, primary care	(20–22)	-

Preventive micronutrient supplementation

Iron supplementation for children

Daily iron supplementation for infants and young children aged 6–23 months and children 2–12 years	Populations where the prevalence of anaemia in children is 40% or higher		(23)	(24)
Intermittent iron supplementation for children aged 2–12 years	Populations where the prevalence of anaemia in children is 20% or higher	Community health, primary care, schools	(25)	Ferrous salt

Iron supplementation for menstruating adolescent girls and non-pregnant women

Daily iron supplementation for menstruating non-pregnant adolescent girls	Populations where the prevalence of anaemia in women is 40% or higher		(26)	(27)
Intermittent iron and folic acid supplementation for menstruating non-pregnant adolescent girls and women	Populations where the prevalence of anaemia among women is 20% or higher	Community health, primary care, schools, workplaces	(28)	Ferrous salt

Iron and folic acid supplementation for pregnant women

Daily iron and folic acid supplementation	All		(29) Rec 10b	
Intermittent iron and folic acid supplementation	In situations where daily iron is not acceptable due to side effects, and in populations with an anaemia prevalence less than 20%	Hospitals, community health, primary care, ANC, schools, workplaces	(18) Rec A2.1 and A2.2	(27) Ferrous salt + folic acid
<i>Iron supplementation for postpartum women</i>	Populations with a 20% or higher prevalence of gestational anaemia	Hospitals, community health, primary care, PNC, workplaces	(29) Rec 10c (30) Rec 20	(27) Ferrous salt
<i>Folic acid supplementation</i>	Non-pregnant women	Community health, primary care, schools, workplaces	(29) Rec 10a (31,32)	(27) Folic acid
Preventive multiple micronutrient supplementation	Individuals with tuberculosis disease and populations affected by an emergency in situations where fortified foods are unavailable	Hospitals, community health, primary care, ANC, PNC	(33,34)	(27) Multiple micronutrient supplements
Therapeutic micronutrient supplementation (folic acid, iron, vitamin B12, vitamin C)	All affected	Hospitals, community health, primary care, ANC, PNC	(35,36)	(24,27) Ferrous salt, folic acid, hydroxycobalamin, ascorbic acid, retinol, riboflavin
Point-of-use fortification with iron-containing multiple micronutrient powders for infants and young children aged 6–23 months and children aged 2–12 years	Populations where the prevalence of anaemia is 20% or higher in children	Community health, primary care, schools	(37)	(24) Multiple micronutrient powder
Screening to detect nutrient deficiencies, with provision of appropriate follow-up	Targeted	Hospitals, primary care, community health	(35,38)	(39)
Assessment and management of anaemia	Targeted	Hospitals, primary care, community health	(18,35,36)	(39)

ANC, antenatal care; PNC, postnatal care.

Table A2. Recommended interventions to reduce infection, inflammation, and chronic diseases (Outcome 2)

Intervention	Context/setting (All settings vs targeted)	Platform	WHO guidance	Essential Medicine List
SOCIAL PROTECTION				
Improve access to health care services and interventions	All		(40)	-
Promote core components of the right to health (availability, accessibility, acceptability, quality)	All	Community health, primary care ANC, PNC, hospitals	(41)	-
EDUCATION				
Promote general education for women and girls	All	Community health, schools		-
Health care provider messaging about causes and consequences of anaemia	All	Community health, primary care, ANC, PNC, hospitals		-
Social and behaviour change communication strategies for anaemia and relevant interventions	All	Community health, primary care, ANC, PNC, hospitals, schools, workplaces		-
ENVIRONMENT & WASH				
Improve access to safe drinking water	All	Community health, primary care, schools, hospitals, workplaces	(5,42)	-
Promote hand hygiene	All	Community health, primary care, schools, hospitals, workplaces	(43,44)	-
Safe sanitation systems and practices (access to and use of toilets that safely contain excreta; access to safe systems along the entire sanitation service chain, including food production)	All	Community health, primary care, schools, hospitals, workplaces	(45)	-

FOOD & AGRICULTURE

Promote safe food handling (5 keys to safer foods)	All	Community health, primary care, schools, hospitals, workplaces	(5,6)	-
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HEALTH & NUTRITION

Screen for chronic diseases	Targeted	Hospitals, community health, primary care, schools, workplaces	(46,47)	-
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Counselling on nutrition, food safety and healthy diet (dietary modification and diversification)	All	Hospitals, community health, primary care, ANC, PNC, schools, workplaces	(18) Rec A 1.1 (19)	-
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Screen for malaria, tuberculosis and other infectious diseases

Diagnose malaria with a parasitological test (microscopy or RDT)	Malaria-endemic regions	Community health, primary care, hospitals	(48) Sec 5.1 (35,36)	(49)
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Case management of malaria

Treat malaria (uncomplicated, artemisinin-combination)	Targeted	Community health, primary care, hospitals, ANC	(48)	(24,27)
Treat malaria in the first trimester of pregnancy uncomplicated <i>P. falciparum</i> with artemether-lumefantrine)			Sec 5.2 (35,36)	Antimalarial medicines

Prevent malaria
Vector control

Indoor residual spraying to reduce malarial transmission	Populations at risk of malaria	Community health	(48) Sec 4.1	(50) Prequalified vector control products
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Long-lasting insecticide-treated nets		Community health, primary care, ANC, schools, workplaces	(48) Sec 4.1.1	-
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Chemoprevention

Perennial malaria chemoprevention (PMC)	Populations at risk of malaria	Community health, primary care	(48) Sec 4.2.2	(24,27) Antimalarial medicines
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Seasonal malaria chemoprevention (SMC)	Populations at risk of malaria	Community health, primary care	(48) Sec 4.2.3	
Intermittent preventive treatment of malaria in school-aged children	Malaria endemic settings with moderate to high perennial or seasonal transmission	Community health, primary care, schools	(48) Sec 4.2.4	
Intermittent preventive treatment of malaria in pregnancy	Populations at risk of malaria	Hospitals, community health, primary care, ANC, workplaces	(48) Sec 4.2.1	
Post-discharge malaria chemoprevention	Children with severe anaemia living in settings with moderate to high malaria transmission	Community health, primary care, hospitals	(48) Sec 4.2.5	
Chemotherapy (oral anthelmintic medicines — that is, deworming) for prevention and treatment of soil-transmitted helminth infections and schistosomiasis	Preschool children, school aged children, and women aged 15–49 years in endemic areas	Community health, primary care, schools, HPV vaccination sites, hospitals	(35,36, 51–55)	(24,27) Anthelmintics
Assessment and management of anaemia	Targeted	Hospitals, community health, primary care, ANC, PNC	(18) Rec B1.1 (35,36)	(39)
Blood and blood products for transfusion in the treatment of severe anaemia	Targeted	Hospitals	(35,36)	(24,27) Blood and blood components
Vitamin A supplementation for infants and children with measles	Targeted	Hospitals, community health, primary care	(35,56)	(24) retinol
High dose vitamin A supplementation for infants and young children 6–59 months of age	Populations where the prevalence of vitamin A deficiency is 20% or higher in infants and children 6–59 months of age	Community health, primary care	(57)	(24) retinol

ANC, antenatal care; PNC, postnatal care.

Table A3. Recommended interventions to reduce gynaecological and obstetric conditions (for example, abnormal uterine bleeding) (Outcome 3)

Intervention	Context/setting (All settings vs targeted)	Platform	WHO guidance	Essential Medicine List
SOCIAL PROTECTION				
Promote gender equality and women's empowerment	All		(1,2)	-
Support income-generating activities for women (poverty alleviation)	All		(3,4)	-
EDUCATION				
Promote girls' and women's reproductive health education (counselling about birth spacing and family planning)	All	Community health, primary care, schools, workplaces	(58)	-
Social and behaviour change communication for anaemia and relevant interventions	All	Community health, primary care, ANC, PNC, hospitals, schools, workplaces		-
ENVIRONMENT & WASH				
Improve hand hygiene practices	All	Community health, primary care, schools, hospitals, workplaces	(43,44)	-
Safe sanitation systems and practices (access to and use of toilets that safely contain excreta; access to safe systems along the entire sanitation service chain)	All	Community health, primary care, schools, hospitals, workplaces	(45)	-
HEALTH & NUTRITION				
Assess and manage anaemia	Targeted	Hospitals, community health, primary care	(18) Rec B1.1 (36)	(39)
Screen for chronic diseases	Targeted	Hospitals, community health, primary care, schools, workplaces	(46,47)	-
Improve menstrual health	Menstruating girls and women	Community health, primary care, schools, workplaces		-

Prevent early pregnancy and poor reproductive outcomes among adolescents	All older adolescents	Community health, primary care, schools	(59)	-
Use of hormonal contraceptives	Targeted	Community health, primary care	(58,60,61)	(27) Contraceptives
Prevention and treatment of heavy menstrual losses	Targeted	Hospitals, community health, primary care, ANC, PNC	(61)	(27) Contraceptives
Prevent and treat antepartum and postpartum haemorrhage	Targeted	Hospitals, community health, primary care, ANC, PNC	(16,62–65)	(27) Uterotonics
Reduce unnecessary caesarean section	Targeted	Hospitals, community health, primary care, ANC	(66)	

ANC, antenatal care; PNC, postnatal care.

Table A4. Recommended interventions to improve screening and management of inherited red blood cell disorders (Outcome 4)

Intervention	Context/setting (All settings vs targeted)	Platform	WHO guidance	Essential Medicine List
SOCIAL PROTECTION				
Improve access to and financial support for health care services	All			-
Establish patient support groups and supportive activities for vulnerable groups	Targeted			-
Develop and implement policies on employment for patients with sickle cell disease				-
EDUCATION				
Raise public awareness in schools, communities, health institutions, media and associations	All	Community health, primary care, schools, workplaces		-
Social and behaviour change communication strategies	All	Community health, primary care, schools, workplaces		-

HEALTH & NUTRITION

Assess and manage anaemia	Targeted	Hospitals, community health, primary care	(18) Rec B1.1 (35,36)	(39)
Genetic testing and counselling for inherited red blood cell disorder	Targeted	Hospitals, community health, primary care	(36)	(39)
Newborn screening for haemoglobinopathies	Targeted	Hospitals, community health, primary care, PNC		
Management of sickle-cell disease	Targeted	Hospitals, community health, primary care	(36)	(39)
Manage thalassaemia (major)	Targeted	Community health, primary care, schools	(36)	(39)
Comprehensive health care management	Targeted	Community health, primary care		

PNC, postnatal care.

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