Wasting in the wider context of undernutrition

An ENN position paper

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The problem of wasting

Global levels of wasting remain alarmingly high

An estimated 47 million children under five years of age are currently wasted (Box 1) (UNICEF, WHO and WBG, 2020). This number is likely an underestimate, given that new cases occur throughout the year; when all new cases are accounted for the number of wasted children triples (Isanaka et al, 2016). High levels of wasting can exist in fragile contexts; however, wasting is by no means a problem limited to crises, as evidenced by high burdens of wasting in many development contexts, particularly in South Asian countries where 50% of cases live (UNICEF, 2020).

The consequences of wasting are grave and long-lasting

An estimated 12.6% of under-five child deaths are attributed to wasting alone each year (Black et al, 2013). Risk of mortality increases along a continuum across all forms of undernutrition and rises exponentially in the very severest cases (Olofin et al, 2013). Risk of death is also very

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**Box 1 What is wasting?**

Wasting occurs when nutrient intakes do not meet the body’s demands to support physiological and biochemical functions, growth and capacity to respond to illness. As a result, the body uses fat stores, proteins and other nutrients to maintain essential metabolic processes (Cahill, 2006; Desai et al, 1996). This leads to weight loss or a failure to gain normal weight as the foetus/infant/child grows which, left unchecked, results in wasting and, in some cases, nutritional oedema (Bhutta et al, 2017). A process of wasting can occur at any stage of infant or childhood development, including in utero, which can lead to a child becoming wasted.

Immediate drivers of wasting are inadequate diet and the cyclical relationship between infection and undernutrition, whereby wasting reduces the body’s ability to fight infection, and infection reduces appetite and nutrient absorption, resulting in further wasting (Bhatta et al, 2017). In low-resource settings, this process is often exacerbated by pre-existing gut inflammation (environmental enteric dysfunction) and disturbed gut microbiota. In severe cases, multiple organ systems are impaired and metabolic disturbance occurs (Bhutta et al, 2017).

Reversing the physiological changes that occur as a child experiences wasting is extremely challenging. This may explain why, even after weight is gained, previously wasted children remain at high risk of future episodes of wasting and death (Lelijveld et al, 2016; Bhutta et al, 2017).
Wasting can occur in all age groups in extreme situations of food crises and famine\(^2\) and individuals with underlying infections. This paper focuses on opportunities across the life course to prevent and treat wasting in infants and young children, as this is the group most at risk of wasting and its long-term deleterious effects. We consider individual factors that drive risk during the period of conception and the early months and years of life, and external factors that must be considered to prevent wasting.

Maternal health and nutrition are important to prevent the process of wasting

An estimated 20% to 30% of wasting and stunting originate in the foetal period respectively. This significantly contributes to the number of infants born with LBW (Christian et al, 2013; Mwangome et al, 2019) – a particularly acute problem in South Asian populations (Torlesse et al, 2020). LBW can be driven by nutrition factors, such as maternal stature, diet and micronutrient deficiencies\(^6\) (Black et al, 2013; Ozaltin et al, 2010; Victora et al, 2015); and non-nutrition factors, such as young maternal age and maternal infection (Kramer, 1987). Being wasted or stunted at birth leads to a higher risk of wasting and mortality during infancy and childhood, which persists even if there is ‘catch up’ in weight gain (Mwangombe et al, 2019). Interventions to improve the nutrition and health status of mothers may therefore be useful in preventing the process of wasting in utero and undernutrition at birth. Interventions proven to support foetal growth include maternal multiple micronutrient supplementation (Bourassa et al, 2019; Keats et al, 2020).

\(^2\) Famines in Somalia and Sudan in the 1990s, and recently in Yemen, highlighted the significant role of wasting in adult mortality.

\(^6\) Including iron, vitamin A, zinc, iodine, folate, calcium and vitamin D.
et al, 2019), protein/energy supplementation (Ota et al, 2015) and infection control and management (Grivell, 2009).

Adolescent girls are at particular risk of having LBW infants and related mortality (Bhutta et al, 2017). There are therefore likely benefits of targeting adolescent girls with nutrition support to restore and build their nutrition reserves pre-conception. Interventions include micronutrient supplementation, school feeding, family planning and incentives to improve school attendance and prevent early pregnancy (Lassi et al, 2017; Bhutta et al, 2017). Adolescent boys should not be neglected by these interventions, given the possibility that paternal epigenetic effects also impact offspring development (Wells et al, 2019).

Wasted infants under six months of age are at high risk of death

Around nine million infants under six months of age are wasted globally (Kerac et al, 2011). Infants who experience wasting, particularly those born LBW, have higher risk of mortality and those who survive the first six months of life have higher risk of compromised development and death in later infancy and childhood (Mwangome et al, 2019). Interventions are needed to prevent risk of death and compromised development that accompany growth failure in infants and to prevent the continuation and exacerbation of these risks into childhood. Risk factors associated with wasting in infants under six months of age include being born LBW, sub-optimal feeding practices, poor health (including infectious diseases), maternal and environmental factors (Kerac et al, 2019; Munirul Islam et al, 2018). Existing health and nutrition services should be leveraged to establish and strengthen pathways of care to manage wasted infants and to provide the necessary support to their mothers.

Wasting episodes must be prevented throughout early childhood

Vulnerability to wasting continues into early childhood due to ongoing susceptibility to infectious diseases, high demand for nutrients to support rapid growth and development, and dependence on optimal care and feeding practices (ENN, 2018; Black et al, 2008). Each experience of wasting further depletes the body's capacity to cope with external insults such as illness, leaving the child more vulnerable to the next episode of wasting. This leads to an accumulation of risks associated with wasting as the child grows, with the most severe and prolonged episodes having the most serious effects (Richard et al, 2014; Schoenbuchner et al, 2019). Being wasted also increases a child's risk of stunting and its associated long-term consequences, due to the slowing or halting of a child's linear growth during each wasting period (Schoenbuchner et al, 2019). To avoid this downward spiral, children at risk of wasting must be identified and those risks averted before the child becomes wasted. Those already wasted who are at highest risk of long-term negative outcomes (wherever they are on the spectrum from moderate to severe) must be identified and treated to avoid further deterioration (Box 2). Vulnerability to wasting and concurrent wasting and stunting is higher in boys in all regions and boys also appear more vulnerable to seasonal nutrition insults (Schoenbuchner et al, 2019); therefore, it is important to ensure that interventions also explore and take account of male vulnerability (Khara et al, 2018).

### Box 2 From identification of wasting to identification of risk

Wasting has been historically identified by measuring weight-for-height/length (WHZ/WLZ) at a single point in time. However, anthropometric measures only provide a crude proxy for the physiological changes caused by undernutrition that lead to illness and death (Wells et al, 2019; Briend et al, 2015). Several studies have demonstrated the sensitivity and specificity of mid-upper arm circumference (MUAC) and weight-for-age (WAZ) in identifying risk of mortality, including in children with concurrent wasting and stunting, LBW infants and infants under six months of age (McDonald et al, 2013; Myatt et al, 2017; Lelijveld et al, 2017). Increasingly, the evidence is bringing us back to the utility of tracking and understanding the growth trajectory of a child over time to identify early growth problems as an indicator of risk. Growth-monitoring services (based on regular WAZ measurements), which prevail in many contexts, may provide a critical platform to achieve this at scale. The limited effectiveness of growth-monitoring programmes in many contexts has been widely documented; thus, opportunities to strengthen these existing systems and link them to wasting prevention and treatment programmes should be explored. Critical to this approach will be the identification and communication of clear actions and pathways of care for infants and young children identified with growth failure.

Indicators that capture important risk factors beyond anthropometry should also be considered, including birth weight, feeding practices, clinical status, previous episodes of wasting, disability, mental health of caregivers, poverty and ability to access adequate health services. There are also community and environmental factors that could be appropriately monitored to target risk mitigation, including poor water, sanitation and hygiene; livelihoods and employment; and access to social protection. Indicators should be context-specific, measurable in real-life conditions, and lead to action.
Wastening levels will not fall if underlying causes are not addressed

Wasting, as with all forms of undernutrition, is the result of a complex interplay between ever-changing, context-specific individual, social, political, economic and environmental factors (Bhutta et al, 2017). Inadequate food systems’ vulnerability to external shocks predispose populations to high risk of nutrition insecurity and inadequate health systems increase population vulnerability to illness (and undernutrition) through lack of access to preventative and curative interventions. Another critically important external factor is poor environments, which lead to increased risk of childhood illness and enteric dysfunction (Wells, 2018), key factors that exacerbate the wasting process (Box 1). These contextual factors are disproportionately felt in situations with the greatest levels of inequality, both in terms of gender (Marphatia et al, 2016) and income (FAO et al, 2019). If not addressed, wasting will continue to occur, no matter how well it is treated. Other specific risk factors highlighted in ENN’s workstreams are are now described.

Wasting is strongly affected by seasonal risks
Levels of wasting commonly increase at specific times of the year, often coinciding with pre-harvest depletion of food stocks, rises in food prices and/or increased disease transmission as a result of the rainy season (Young and Marshak, 2018). Seasonal peaks in wasting can also occur more than once during the year (FAO and Tufts, 2019). Infants who are wasted during the first rainy season of their lives have been found to have an elevated risk of wasting during the same season the following year, even if they recover in between, demonstrating the powerful impact of seasonality and the compounding of wasting risk after each episode (Schoenbuchner et al, 2019).

Fragile countries have high levels of wasting but lack long-term responses
Countries that are fragile are disproportionally burdened by high levels of malnutrition (stunting, anaemia and overweight) compared to non-fragile countries and experience high levels of persistent wasting and concurrent wasting and stunting (of over 5% in some countries) (GNR, 2020). Fragile contexts are highly dependent on international assistance and less attention is afforded to the structural, chronic causes of wasting (and stunting) and the strengthening of national service-delivery systems and multi-sector programming to address them (ENN, 2020). Over the past five years, there have been increasing efforts to strengthen the humanitarian-development nexus to build resilience and nutrition security of affected populations; however, such efforts have largely been at policy rather than operational level and have not yet demonstrated clear impact on nutritional outcomes in most contexts (ENN, 2020).

The political will to deliver longer-term financing is needed
The bedrock for effective nutrition programming is a conducive financial and policy environment, driven by strong political will (ENN, 2020). Wasting treatment programmes have been historically dominated by international, short-term humanitarian efforts, although many more governments have included wasting treatment in their national plans over the last decade. Nonetheless, funding for nutrition remains limited and continues to impede efforts to prevent wasting and provide reliable treatment programmes at scale (ENN, 2020).

Food systems can be defined as how we produce, collect, store, transport, transform and ensure access to food (FAO).
4 What interventions and approaches are needed?

Shift the focus to preventing wasting at key points in the life cycle

The process of wasting must be interrupted early in the life course and across generations to mitigate both its immediate and long-term effects. This will require the nutrition community to take a preventative, public-health approach that prioritises the evidence-based interventions outlined above in the pre-pregnancy, pregnancy and infant and young child windows of opportunity. Monitoring the growth of infants and young children may provide a key scalable entry point to identify and mitigate risk through the triggering of early health-based interventions for those whose growth is faltering (Box 2). Broader indicators of risk must also be selected, based on an analysis of the underlying causes of undernutrition in each context, to further prompt preventative action.

Identify and address contextual risk factors through links with other sectors

Given the powerful influence of season on levels of undernutrition, understanding these patterns in any given context is needed to target interventions to the riskiest times of year. We also need to analyse and use information on community-level risks, such as poor environments, infectious-disease outbreaks and harvest failure, and make links with other sectors to address them. These approaches may include community-mobilised health efforts, social protection and livelihoods programmes. Bridging the humanitarian-development divide in wasting prevention and treatment programmes and advocating for longer-term funding cycles in countries with protracted fragility will help enable multi-sector interventions that address chronic risk factors.

Build coverage of treatment for the most at-risk children

A minority of wasted children are currently being treated globally (UNICEF, 2020). Countries that have embedded treatment services into the health system have achieved higher levels of coverage (UNICEF, 2020). However, barriers to this include insufficient government funding, over-reliance on humanitarian financing, supply chain and local production constraints, and lack of health systems capacity (McGrath and Shoham, 2019). In addition, poorly defined and aligned global United Nations agency mandates can give rise to disconnected wasting programming strategies and practice (McGrath and Shoham; 2019). Various innovations are being tested to improve coverage and scalability (Box 3); however, ultimately, treatment must be fully integrated into national health systems to attain universal coverage. Therefore, treatment approaches that support this and that optimise resources by focusing on children at highest risk of near-term mortality must be prioritised.

Create an enabling policy and funding environment

Fundamental to this approach is full capacitating of governments to enable scaling up of context-specific wasting prevention and treatment programmes embedded in existing systems. This will require knowledge and evidence, political commitment at international and national levels, effective governance, leadership, capacity and financing (ENN, 2020). The institutional architecture around nutrition and ways of working must adapt to enable populations most at risk to receive adequate assistance and development support; not just those in acute crises. For this to work, we need a common knowledge and research agenda focused on prevention, with adequate funding to enable capturing of the short- and long-term effects of interventions to fully inform future strategic direction.

Box 3 Innovations in wasting treatment

Various innovations are currently being tested to improve coverage and scalability. These include: the expansion of treatment services to mothers and at-risk infants under six months old in routine maternal and infant health services (ENN et al, 2016); expansion and simplification of treatment protocols to treat moderate and severe forms of wasting together (TSAM, 2020); early detection of wasting at household level (‘family mid-upper arm circumference (MUAC)’) (ALIMA, 2016); embedding of community-based management of acute malnutrition (CMAM) into government-led integrated community case management (iCCM) (Alvarez et al, 2017); and the CMAM-surge approach whereby services can be scaled up and down according to need (Concern Worldwide, 2017).
Conclusions

We must no longer view the problem of wasting in isolation from other manifestations of undernutrition as we now know that all manifestations of undernutrition are interrelated and impact infants and young children. We need to continue to shift from classifying individual severe and moderate anthropometric deficits towards considering levels of risk, both for individuals and communities, focusing on key preventative opportunities throughout the lifecycle and seasonal calendar. Recognising country-level structures and systems is key so that health, social, economic and environmental services are supported and strengthened to deliver prevention efforts at scale and, where this fails, treatment services.

Evidence amassed demonstrates that wasting is a physiological process that can begin in utero; the effects of which are extremely challenging to reverse, even after measurable recovery. It is critical therefore that we view wasting through a public-health lens, aiming to protect populations and prevent the onset of wasting and its further deterioration in individuals over the life course. This requires a focus on improving the nutritional status of adolescent girls and pregnant women for their own nutrition and health benefits and to optimise in utero growth to improve the growth of young infants. Success also hinges on identifying those infants and children most at risk of adverse outcomes and using this to trigger early intervention to avert those risks. Evidence is forcing us to move beyond the limitations of anthropometric absolutes (classifying individuals as ‘small’ or ‘thin’), which are imperfect measures of deeper problems. Broader opportunities and methods for identifying nutritional deterioration in time to avoid death, disease and developmental delay are being explored (including the use of non-anthropometric measures) to better inform the targeting of services. Existing growth-monitoring programmes, with understanding of their current limitations, could provide an entry point for identifying and appropriately responding to growth failure.

A ‘one-size-fits-all approach’ will not be sufficient. We need to invest to better understand in different contexts the complex interaction of individual risk factors throughout the lifecycle and how contextual factors influence such risk, and tailor efforts accordingly. For this, a country or regional focus is needed. In protracted fragile contexts it is vital that we shift the narrative from short-term, humanitarian-focused funding to a long-term development agenda. Critically, global mechanisms must support government-led and government-implemented context-specific prevention and treatment programmes, embedded in development strategies. This must be informed by a coordinated knowledge and research agenda.
ENN’s position on wasting

Wasting must be viewed in the context of all manifestations of undernutrition, as all manifestations of undernutrition are interrelated and impact the growth, development and wellbeing of infants and young children.

The shift must continue away from classifying individual severe and moderate anthropometric deficits towards considering levels of risk both for individuals and communities.

We must view wasting through a public-health lens, focusing efforts on key preventative opportunities throughout the lifecycle and seasonal calendar. This should include improving the health and nutrition of adolescent girls and pregnant women for their individual benefit and to optimise in utero growth and subsequent growth of their infants and young children.

The focus should shift towards identifying risk of adverse outcomes. We must use the evidence base to identify appropriate measures of risk of undernutrition (including growth faltering and non-anthropometric risk measures). These should be used to build more effective approaches to enable the triggering of early action to avert individual risks and interrupt the processes that can lead to wasting and other manifestations of undernutrition.

Country-level structures and systems should be recognised and health, social, economic and environmental services supported and strengthened to deliver context-specific prevention efforts at scale and, where this fails, treatment services.

In fragile contexts it is vital that we shift the narrative from short-term, humanitarian-focused funding to a long-term development agenda if we are to achieve the prevention of wasting.

Global mechanisms must support government-led and government-implemented, context-specific prevention and treatment programmes, embedded in development strategies. This must be informed by a coordinated knowledge and research agenda.

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