



# **What is the relationship between wasting and stunting?**

*Thursday, February 9, 2023*

Hosted by the Nutrition subgroup





# The relationship between wasting and stunting

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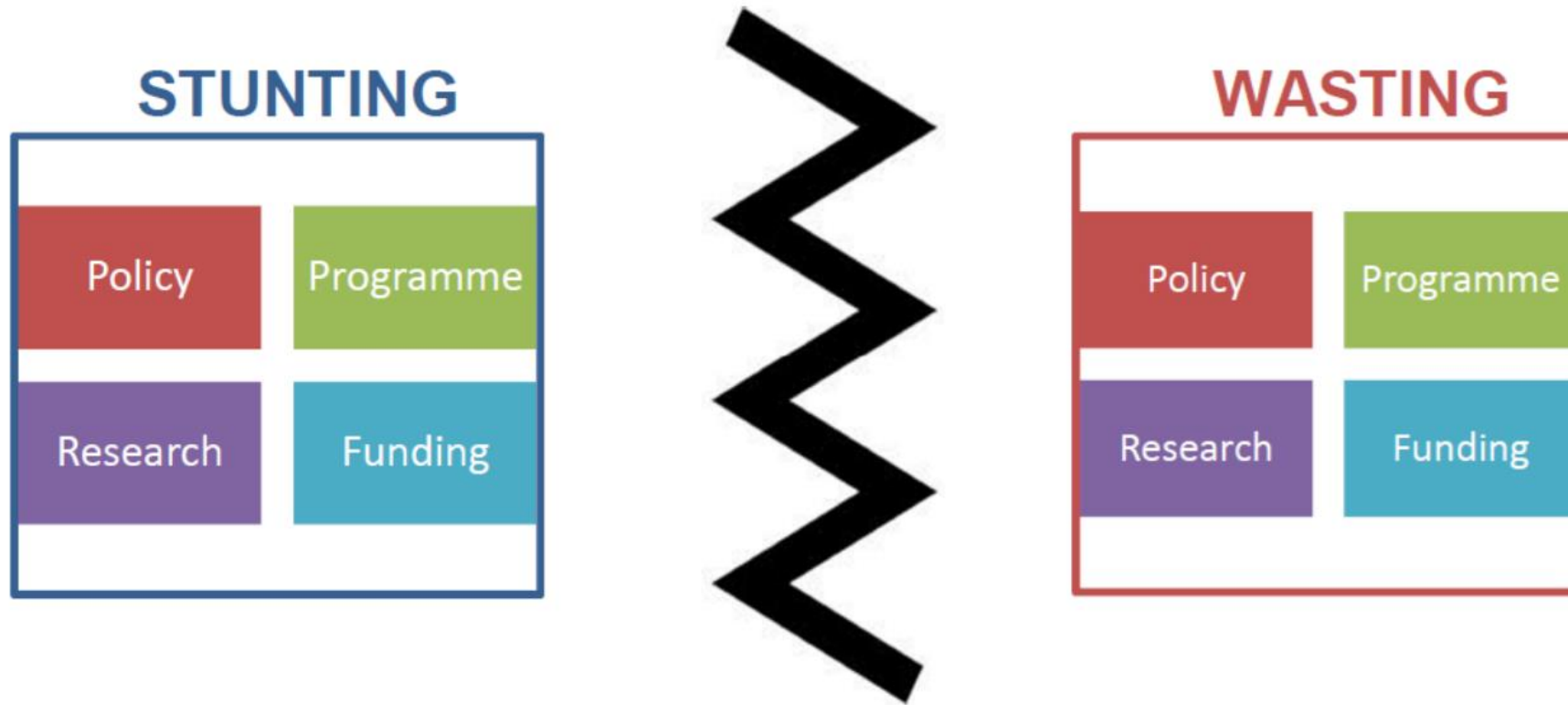
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# The status quo



**Is this justified? Is it effective?**

## Wasting & Stunting Technical Interest Group (WaSt TIG)

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# Systematic Review

Aim: To systematically review current evidence on the relationship between wasting and stunting including:

- Physiological mechanisms behind the interaction
- Evidence on the relationship between wasting and stunting
- Mortality implications
- The burden of wasting and stunting, and concurrent wasting and stunting
- Programme and policy implications
- Research priorities

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REVIEW ARTICLE

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The relationship between wasting and stunting in young children: A systematic review

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## Abstract

In 2014, the Emergency Nutrition Network published a report on the relationship between wasting and stunting. We aim to review evidence generated since that review to better understand the implications for improving child nutrition, health and survival. We conducted a systematic review following PRISMA guidelines, registered with PROSPERO. We identified search terms that describe wasting and stunting and the relationship between the two. We included studies related to children under five from low- and middle-income countries that assessed both ponderal growth/wasting and linear growth/stunting and the association between the two. We included 45 studies. The review found the peak incidence of both wasting and stunting is between birth and 3 months. There is a strong association between the two conditions whereby episodes of wasting contribute to stunting and, to a lesser extent, stunting leads to wasting. Children with multiple anthropometric deficits, including concurrent stunting and wasting, have the highest risk of near-term mortality when compared with children with any one deficit alone. Furthermore, evidence suggests that the use of mid-upper-arm circumference combined with weight-for-age Z score might effectively identify children at most risk of near-term mortality. Wasting and stunting, driven by common factors, frequently occur in the same child, either simultaneously or at different moments through their life course. Evidence of a process of accumulation of nutritional deficits and increased risk of mortality over a child's life demonstrates the pressing need for integrated policy, financing and programmatic approaches to the prevention and treatment of child malnutrition.

## KEYWORDS

child growth, infectious disease, international child health nutrition, malnutrition, stunting, wasting

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wileyonlinelibrary.com/journal/mcn | 1 of 25

# Methods

- Systematic review following PRISMA guidelines
- Registered with PROSPERO

**PROSPERO**  
International prospective register of systematic reviews

  
National Institute for  
Health Research

**UNIVERSITY of York**  
Centre for Reviews and Dissemination

## Systematic review

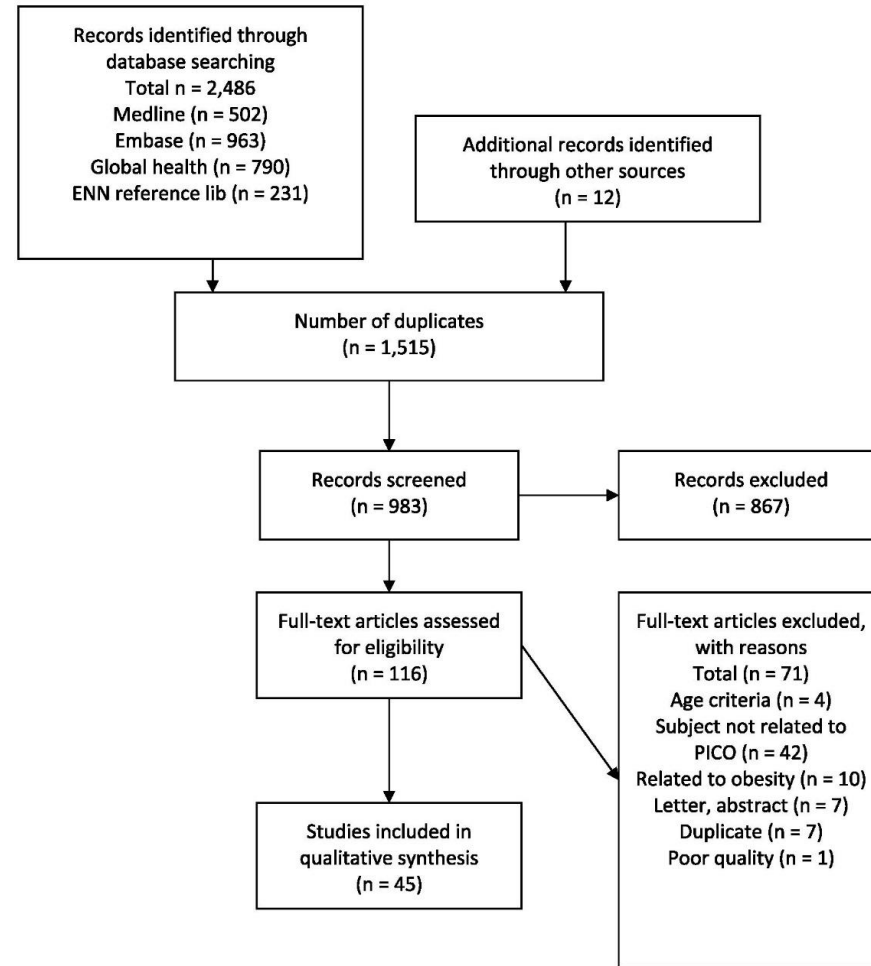
### 1. \* Review title.

Give the working title of the review, for example the one used for obtaining funding. Ideally the title should state succinctly the interventions or exposures being reviewed and the associated health or social problems. Where appropriate, the title should use the PI(E)COS structure to contain information on the Participants, Intervention (or Exposure) and Comparison groups, the Outcomes to be measured and Study designs to be included.

A systematic review of the evidence of the relationship between wasting and stunting, including evidence on causes and effects, direct associations and physiological mechanisms

# Results

45 studies included



# Interconnecting physiological processes

- Loss of fat mass – linked with survival
- Loss of muscle mass
- Reduced stores of leptin
- Environmental factors
- Infectious disease and immune inflammatory response
- concurrence is a transient state



# The burden, aetiology and timing of wasting and stunting

- Cross sectional data fails to measure the onset, recovery and persistence of wasting
- New insight into timing of wasting and stunting through longitudinal data
  - peak incidence of wasting and stunting 0-3 months
- Common causes and determinants
- Inter-play between determinants

# Evidence for the relationship between wasting and stunting

- Previously considered as independent indicators
- Bi-directional relationship
  - Wasting and stunting positively associated in 37/51 countries
  - two-way dose response - Interaction value 1.57
  - Wasting treatment programme data also demonstrates relationship

# Wasting leading to stunting

- Time lagged effect – wasting is followed by stunting
  - Wasting predictive of stunting
  - Persistent wasting from birth to six months strongly associated with incident stunting
- Body slows or halts linear growth until weight is gained and infection is treated
- Where linear growth occurs, characterised by
  - Less severe wasting/stunting, fewer co-morbidities
- population level data from Senegal - linear growth increased with improving health status (Garenne 2020).

# Wasting leading to stunting

- the effect of episodes of wasting on linear growth is modified by age
  - wasting more detrimental to long term linear growth the later it happens
  - recovery of HAZ is more likely if wasting occurs early
- Seasonal evidence - wasting is associated with further wasting

# Stunting leading to wasting

- Evidence also supports a direct relationship whereby stunting leads to wasting
  - physiological mechanisms less clear

# Concurrent wasting and stunting

- 15.9 million children experience concurrent wasting and stunting (GNR 2018)
- FCAS disproportionately affected with higher rates stable contexts (Khara et al. 2018).

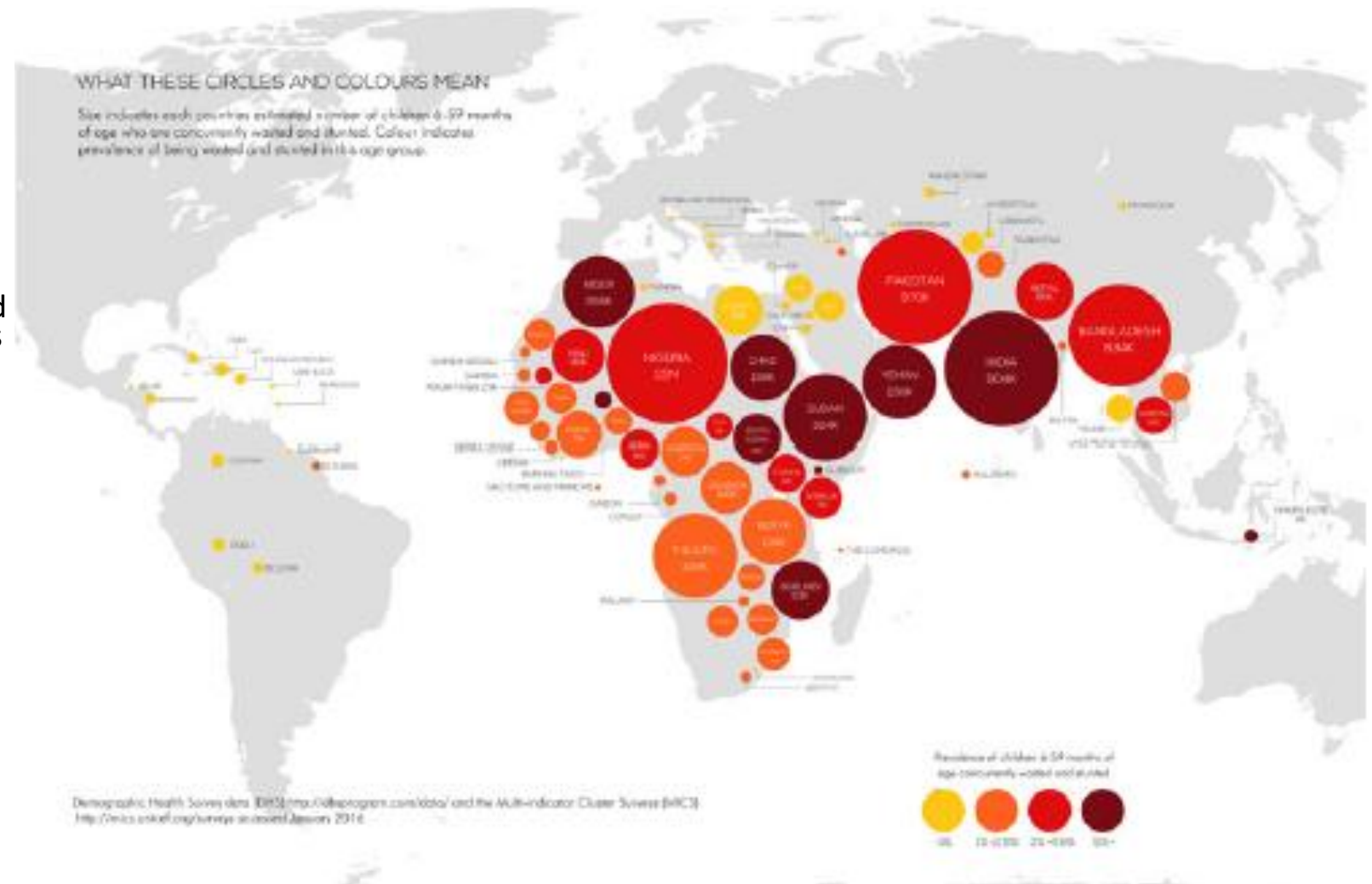


Image from: Khara T, Mwangome M, Ngari M, Dolan C. Children concurrently wasted and stunted: A metaanalysis of prevalence data of children 6–59 months from 84 countries. *Matern Child Nutr.* 2017;e12516



# Concurrent wasting and stunting

- Population-level data
  - wasting, stunting and concurrent wasting and stunting all more prevalent in boys than girls
  - Concurrent wasting and stunting peaks between 12-30 months
- Treatment programme data
  - concurrent wasting and stunting are more prevalent in boys and younger children
  - despite higher overall admission in females, there were more males with concurrent wasting and stunting within the admitted group (Odei Obeng-Amoako, Wamani, et al. 2020).

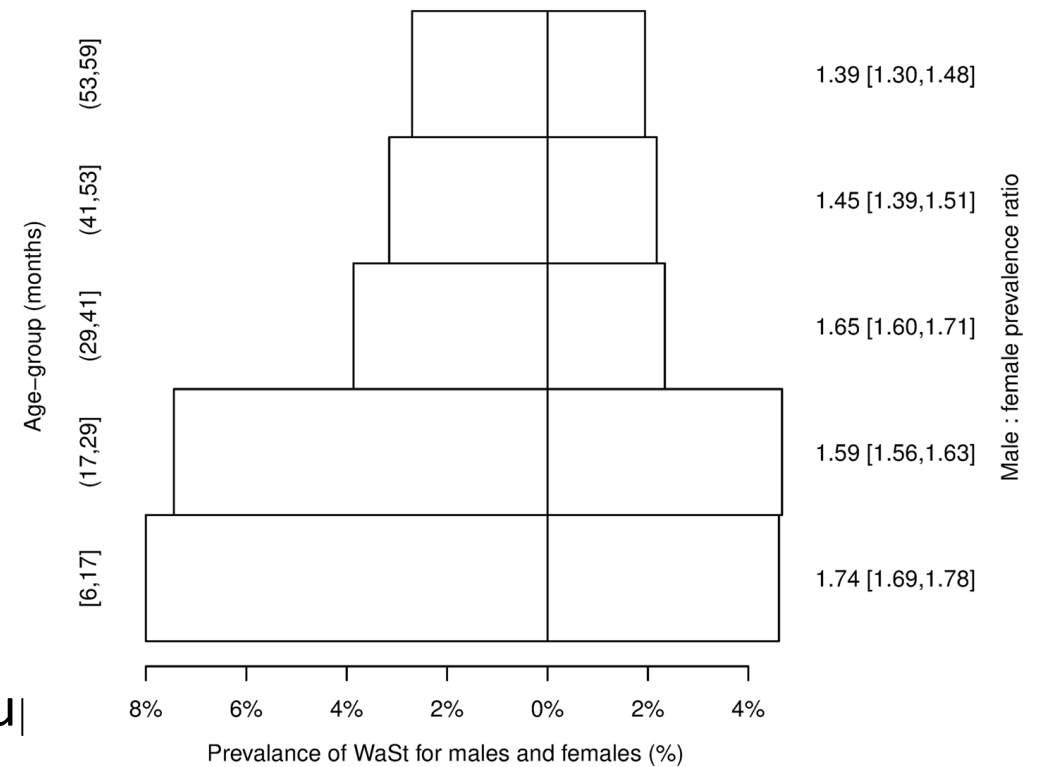


Image from: Myatt, M., Khara, T., Schoenbuchner, S., Pietzsch, S., Dolan, C., Lelijveld, N. & Briend, A. 2018. Children who are both wasted and stunted are also underweight and have a high risk of death: a descriptive epidemiology of multiple anthropometric deficits using data from 51 countries. *Arch Public Health*, 76, 28.

# Mortality implications of concurrent wasting and stunting

- McDonald et al 2012 - First big analysis of mortality and multiple anthropometric deficits
  - meta-analysis of 10 cohort studies in 10 countries
  - Children with multiple anthropometric deficits - 12-fold elevated risk of mortality
- Analysis from 51 countries (Myatt et al 2018) later showed a child cannot be wasted and stunted and not underweight
  - mortality estimates calculated above, will also apply for concurrent wasting and stunting
- Wasting, stunting and concurrent wasting and stunting have a positive effect on mortality (Garenne – Senegal)
  - Combined effect of wasting and stunting explained 51% of the total mortality
  - Sex differences in mortality not significant

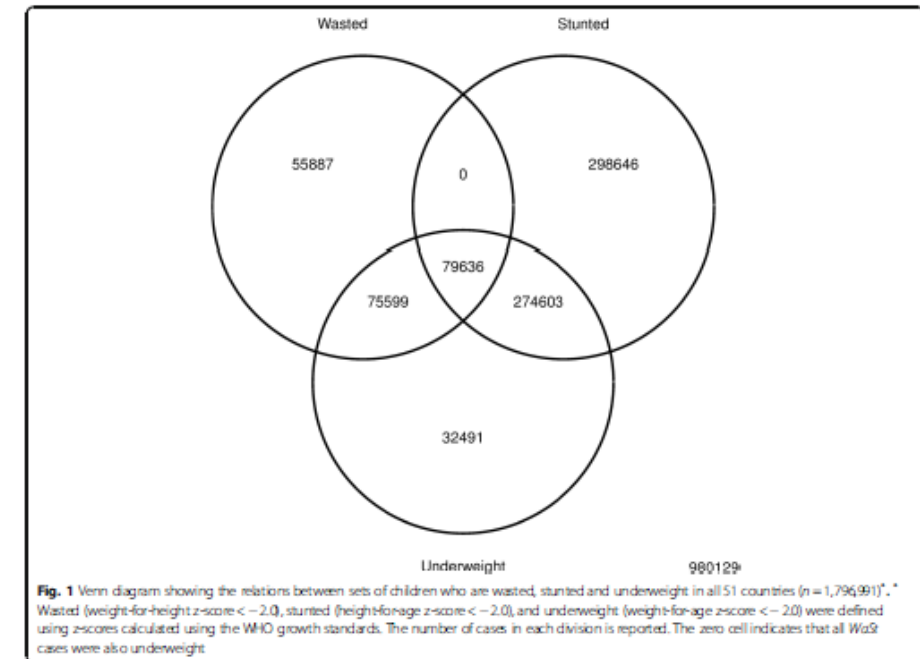


Image from: Myatt, M., Khara, T., Schoenbuchner, S., Pietzsch, S., Dolan, C., Lelijveld, N. & Briend, A. 2018. Children who are both wasted and stunted are also underweight and have a high risk of death: a descriptive epidemiology of multiple anthropometric deficits using data from 51 countries. *Arch Public Health*, 76, 28.

# Wasting treatment outcomes and stunting

- Some evidence of influence on treatment response, though inconsistent
- Niger (Isanaka) – response to SAM treatment independent of stunting
  - No difference in weight gain during or after treatment
  - No difference in mean time to recovery
  - Limited HAZ gain during rehabilitation – stunting increased on average (see graph)
- Uganda (Odei) SAM Rx - Lower recovery rates in stunted children
  - nearly half of admissions had WaSt
    - Lower recovery, higher non-response, longer LOS, BUT higher rate of weight gain
- Malawi (Stobough et al) – relapse following MAM Rx
  - children who experienced a negative change in HAZ were more likely to experience relapse to MAM or SAM

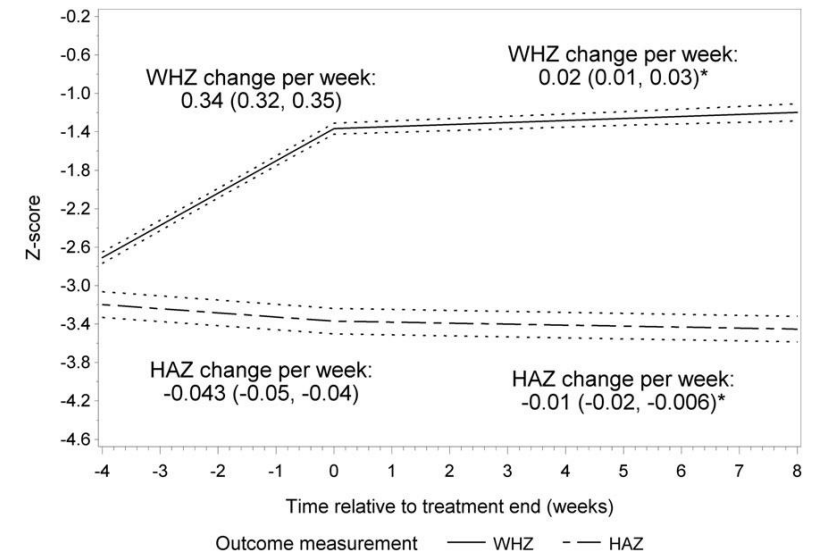


Image from: Isanaka S, Hitchings MDT, Berthé F, Briend A, Grais RF. Linear growth faltering and the role of weight attainment: Prospective analysis of young children recovering from severe wasting in Niger. *Matern Child Nutr.* 2019;e12817.

# Wasting treatment outcomes and stunting

- Long term implications of SAM on stunting
  - Malawi - (Lelijveld et al) - Early weight deficits may have adverse effects on growth and body composition height attainment in the long-term
    - Case control study - 378 children followed up 1-7 years after SAM treatment
    - Some recovery in height, but still more severe stunting than controls
      - shorter leg length, similar sitting height – torso growth preserved, and limb growth compromised

# Anthropometric indices and identification of risk

- Studies recognition of heightened mortality – prompts re-examination of how best to identify risk
- WAZ identifies high risk children (especially those both wasted and stunted) who are not being captured using MUAC or WHZ severe criteria
- MUAC and WAZ also found to identify high risk infants under six months.

# Ongoing research priorities

- The strength of the evidence has come a long way in recent years but there is still a long way to go.
- Priority areas include:
  - Better understanding of the biological processes and causal pathways
  - Research around prevention
  - Operational/Implementation research



# Implications for policies and programmes

- Consider overlapping vulnerabilities
- Develop common prevention strategies
  - Consider seasonality of undernutrition & childhood diseases
- Consider the adaptation of targeting towards the most at risk including concurrently wasted and stunted children
  - Determine the appropriate intensity and duration of treatment for this group

# Implications for policies and programmes

- Ensure younger children are prioritised for prevention
- Understand sex-specific data
- Better contextual casual analysis for both wasting and stunting
- Consider the knock-on effects of the problems of underestimating the actual burden of wasting

# Implications for policies and programmes

- Explore policy cohesion between wasting and stunting policies
- Donors should continue to examine their financing arrangements- so that wasting and stunting can be simultaneously prevented in both humanitarian & development contexts

# Conclusions

- Huge progress in understanding the relationship between wasting and stunting
- Wasting and stunting, driven by common factors, frequently occur in the same child, either at the same time or through their life course, with important interactions between them
- Need for a more integrated approach to prevention and treatment strategies that consider life cycle in order to interrupt this process.

“The notion that wasting and stunting are not separate issues and that they are affecting the same children and that children move in and out of these conditions and we are not doing them justice by just focusing on wasting and neglecting stunting.”

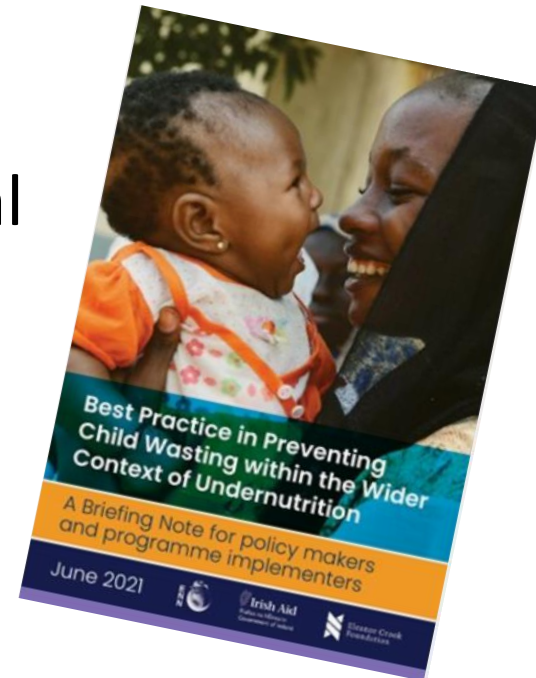


“So what? What do we do differently? How do we manage this problem and what are the priority areas for investment?.”

# Additional work within the WaSt TIG

## Prevention related work


- Preventative actions for wasting and stunting should overlap
- Good health/ healthy environment for women & young children is critical
- That mothers and the initial months after birth matter
- Improving the diets of children over six months is essential



# Additional work within the WaSt TIG

Analysis to understand which anthropometric diagnostic criteria best discriminate higher from lower risk of death in children & the programme implications of this.

- Analysis has pointed to a combined case definition (WAZ <-3 and MUAC <115mm) is the best anthropometric measure for predicting deaths
- Operational questions remain before widespread adoption can be recommended

Public Health Nutrition	
PUBLIC HEALTH NUTRITION	
 CAMBRIDGE UNIVERSITY PRESS	
Anthropometric criteria for best identifying children at high risk of mortality: a pooled analysis of 12 cohorts.	
Journal:	Public Health Nutrition
Manuscript ID:	PHN-SMA-2021-1300.R3
Manuscript Type:	Systematic Review and Meta-Analysis
Subject Category:	6. Nutritional epidemiology
Keywords:	wasting, stunting, underweight, mortality, mid-upper arm circumference
Objective:	To understand which anthropometric diagnostic criteria best discriminate higher from lower risk of death in children and explore programme implications.
Design:	A multiple cohort individual data meta-analysis of mortality risk (within six months of measurement) by anthropometric case definitions. Sensitivity, specificity, informativeness and inclusivity in predicting mortality, face validity and compatibility with current standards and practice were assessed and operational consequences modelled.
Abstract:	Setting Community-based cohort studies in 12 low-income countries between 1977 and 2013 in settings where treatment of wasting was not widespread. Participants Children aged 6 to 59 months Results Of the 12 anthropometric case definitions, four (weight-for-age Z-score

Cambridge University Press



# Additional work within the WaSt TIG



Bringing new evidence on undernutrition and mortality risk into practice

- This study aims to test whether WFA and MUAC can be effectively utilised in existing programmes to capture WaSt children and reach considerably more children at a high risk of death. It addresses the question:
- What intensity, duration of treatment, and discharge criteria are appropriate for children identified using the combinations of the indicators/thresholds identified (WFA < -3 or MUAC < 115mm)?

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# Thank you

For more information, visit: <https://www.ennonline.net/ourwork/reviews/wastingstunting>

Or email: Tanya Khara ([tanya@ennonline.net](mailto:tanya@ennonline.net)) or Natalie Sessions ([natalie@ennonline.net](mailto:natalie@ennonline.net)) for more information on the WaSt TIG

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Subgroup information, recordings and presentations from previous meetings and webinars are available on the subgroup page and events page of the Child Health Task Force website:

[www.childhealthtaskforce.org/subgroups/nutrition](http://www.childhealthtaskforce.org/subgroups/nutrition) & [www.childhealthtaskforce.org/events](http://www.childhealthtaskforce.org/events)

*\*The recording and presentations from this webinar will be available on these pages in a couple days*

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