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The U.S. Government's Global Hunger & Food Security Initiative

Stunting and Malnutrition in the Developing World

Shibani Ghosh

March 30, 2017



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OVERVIEW

- Global trends
 - Stunting, Underweight, Wasting
 - Micronutrient Deficiencies
 - Co-existence
- Intergenerational cycle of malnutrition
- Factors associated with stunting
- Environmental exposures and stunting



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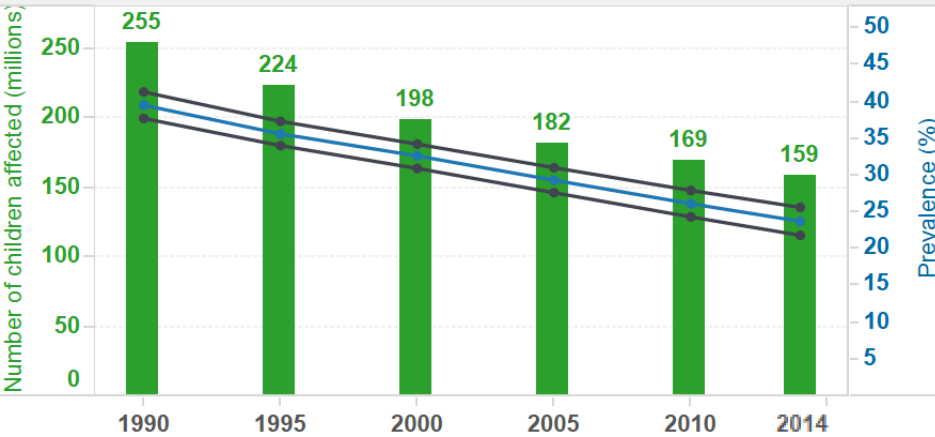
Global Child Malnutrition Trends (1990-2014)

The graphs show trends (1990-2014) in child malnutrition indicators for stunting, underweight and overweight as well as the latest (2014) estimates of wasting and severe wasting. The green bar charts show estimates of numbers of children affected and the blue lines graph prevalence estimates with upper and lower 95% confidence limits in grey. Mouse-over, click or tap on bars or lines to view data details.

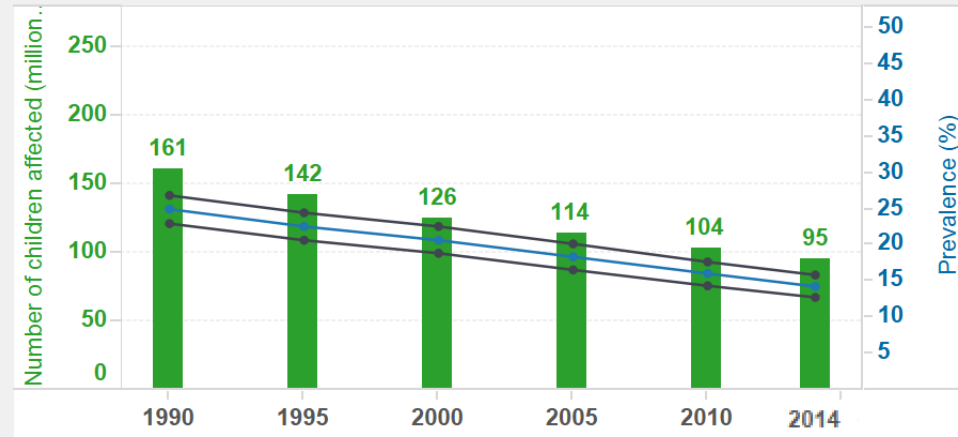
Legend

- Number of affected (millions of Children aged <5)
- Prevalence (% of Children aged <5)
- 95% Confidence Limits

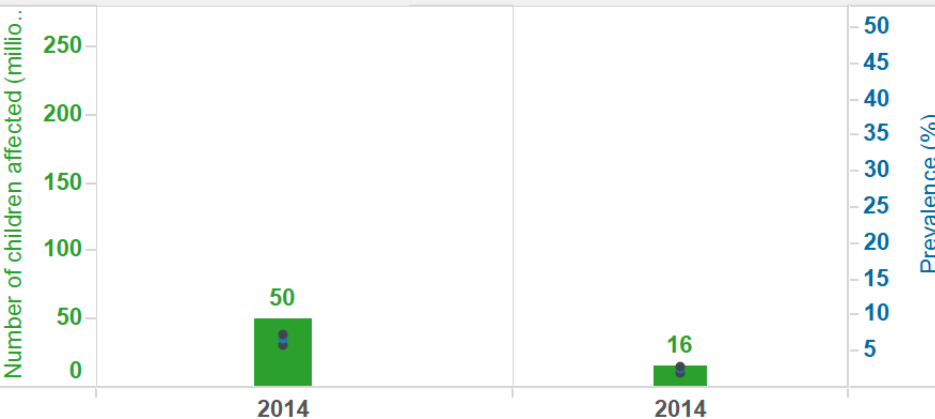
Stunting



Underweight



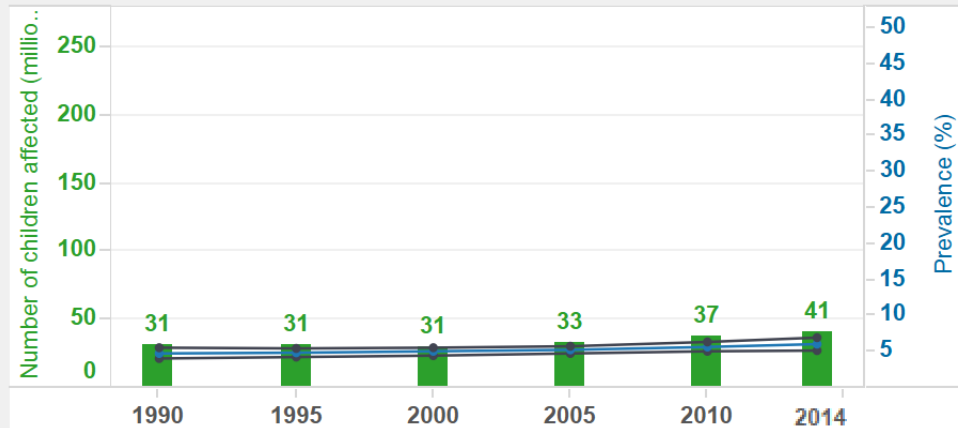
Wasting



Severe Wasting



Overweight



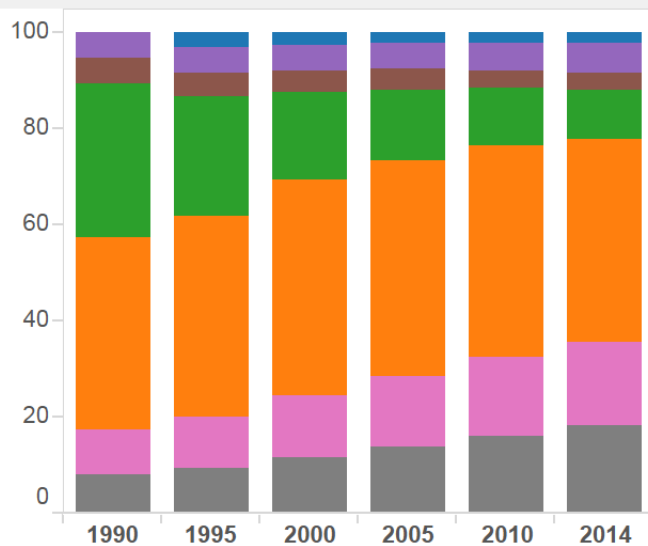
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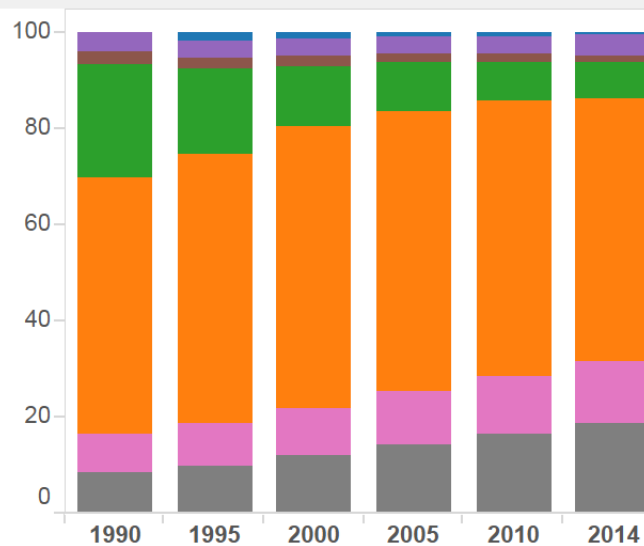
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Regional Trends (1990-2014) in Numbers of Children Affected and Share of Total Number

Stunting



Underweight



Step 1:

Select an Agency Classification
UNICEF Regions

Step 2:

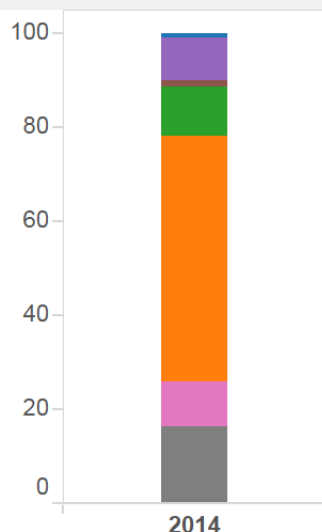
Select a Measure:
Share (% of total number)

Step 3:

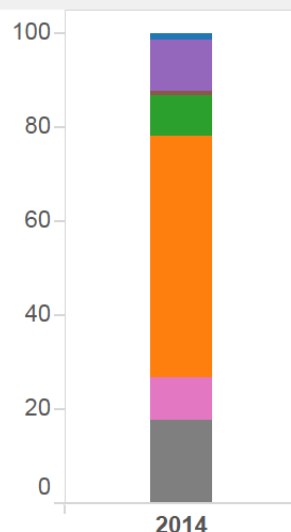
Click on a Region (Subregion) below
to highlight and view the data points

- CEE/CIS
- MIDDLE EAST & NORTH AFRICA
- LATIN AMERICA & CARIBBEAN
- EAST ASIA & PACIFIC
- SOUTH ASIA
- SUB-SAHARAN AFRICA (Eastern & Southern)
- SUB-SAHARAN AFRICA (West & Central)

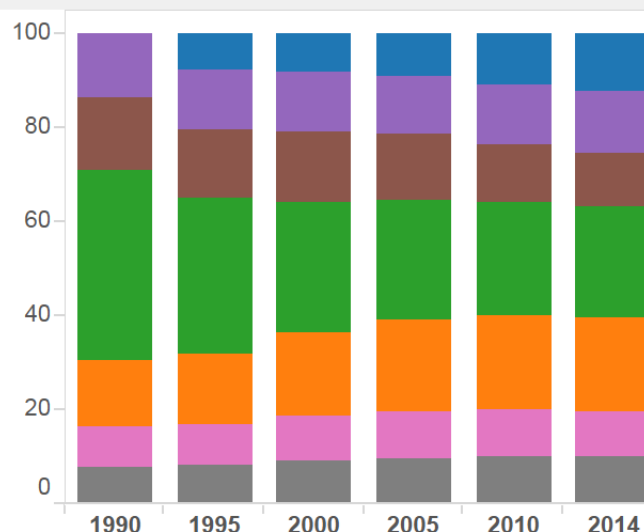
Wasting



Severe Wasting



Overweight



Notes:

1. Vertical axis scales (millions) can vary across the five child malnutrition indicators graphs. 2. Shares are calculated with respect to the sum of regions for each agency's classification. 3. UN and MDG developed countries and the World Bank high-income countries: Due to consecutive lack of any data, results are not displayed. 4. MDG Caucasus & Central Asia and UNICEF CEE/CIS regions: Due to consecutive lack of any data, results are not displayed for year 1990.

Compare Regional Wasting Prevalence (2014) Relative to the WHO Severity Levels

Step 1:

Select an Agency Classification
UNICEF Regions

Legend

- Prevalence (% of Children aged <5)
- 95% Confidence Limits

WHO Severity Level Classification

- Critical: >15%
- Poor: 5% - 10%
- Serious: 10% - 15%
- Acceptable: <5% (Global Nutrition Target)



Notes:

1. For information about the WHO severity levels, see "Physical status: the use and interpretation of anthropometry, TRS 854. Geneva: WHO, 1995 (p.212)". More information about the 2025 global nutrition targets is available from: http://www.who.int/nutrition/topics/nutrition_globaltargets2025/en/ 2. 2004 estimates for UN and MDG developed countries and the World Bank high-income countries had consecutive low population coverage, results are not displayed. 3. UN Regions: South-Central Asia is an aggregation of Southern and Central Asia.



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<http://apps.who.int/gho/data/view.wrapper.nutrition-1-1&showonly=nutrition>



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Prevalence of vitamin A deficiency (1995–2005), iodine deficiency (2013), inadequate zinc intake (2005), and iron deficiency anemia (2011)

	Vitamin A deficiency ⁴⁵				Iodine deficiency ⁴⁶ (UIC <100 µg/L)	Zinc deficiency ⁴⁷ (weighted average of country means)	Iron deficiency anaemia (haemoglobin <110 g/L)	
	Children <5 years		Pregnant women				Children <5 years	Pregnant women
	Night blindness	Serum retinol <0.70 µmol/L	Night blindness	Serum retinol <0.70 µmol/L				
Global	0.9% (0.1–1.8)	33.3% (29.4–37.1)	7.8% (6.5–9.1)	15.3% (6.0–24.6)	28.5% (28.2–28.9)	17.3% (15.9–18.8)	18.1% (15.6–20.8)	19.2% (17.1–21.5)
Africa	2.1% (1.0–3.1)	41.6% (34.4–44.9)	9.4% (8.1–10.7)	14.3% (9.7–19.0)	40.0% (39.4–40.6)	23.9% (21.1–26.8)	20.2% (18.6–21.7)	20.3% (18.3–22.4)
Americas and the Carribean	0.6% (0.0–1.3)	15.6% (6.6–24.5)	4.4% (2.7–6.2)	2.0% (0.4–3.6)	13.7% (12.5–14.8)	9.6% (6.8–12.4)	12.7% (9.8–16.0)	15.2% (11.7–18.6)
Asia	0.5% (0.0–1.3)	33.5% (30.7–36.3)	7.8% (6.6–9.0)	18.4% (5.4–31.4)	31.6% (30.7–32.5)	19.4% (16.9–22.0)	19.0% (14.5–23.4)	19.8% (15.8–23.5)
Europe	0.7% (0.0–1.5)	14.9% (0.1–29.7)	2.9% (1.1–4.6)	2.2% (0.0–4.3)	44.2% (43.5–45.0)	7.6% (6.2–9.1)	12.1% (7.8–16.2)	16.2% (12.6–19.7)
Oceania	0.5% (0.1–1.0)	12.6% (6.0–19.2)	9.2% (0.3–18.2)	1.4% (0.0–4.0)	17.3% (16.6–18.1)	5.7% (1.0–10.3)	15.4% (7.0–25.2)	17.2% (9.7–25.6)

Data are % (95% CI). UIC=urine iodine concentration.



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 Nutrition Science and Policy

Countries with Overlapping Under-five Stunting, Anemia in Women of Reproductive Age, and Adult Overweight

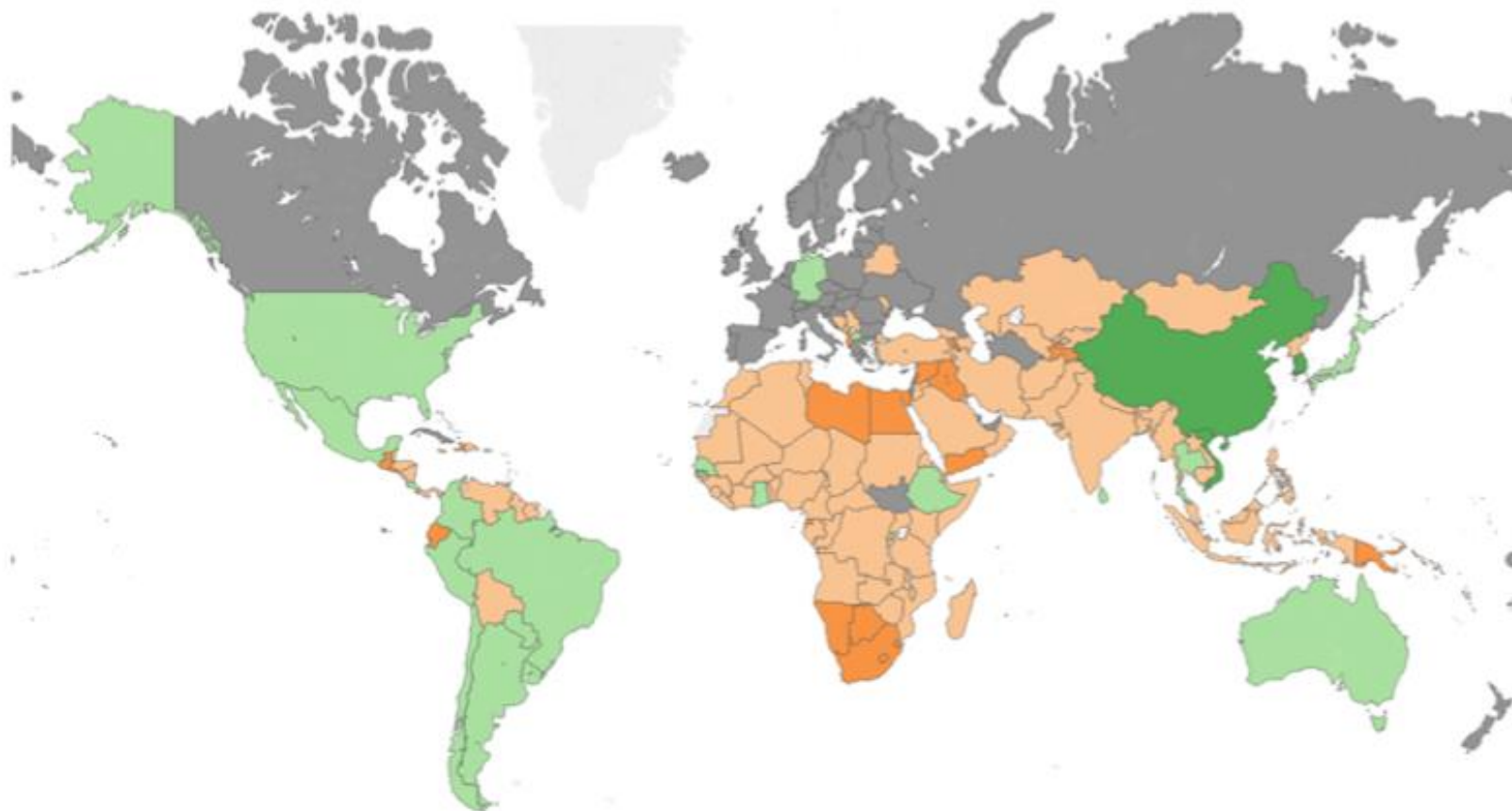


Select region

Select subregion

All

All



■ No "significant" public health nutrition problem

■ All three significant public health nutrition problems

■ One of three significant public health nutrition problems

■ Missing data for at least one indicator

■ Two of three significant public health nutrition problems



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GLOBAL NUTRITION TARGETS FOR 2025



CHILD STUNTING
Cut the number of
stunted children by **40%**



CHILD WASTING
Reduce and maintain
child wasting to less
than **5%**



CHILD OVERWEIGHT
No increase in childhood
overweight



ANEMIA
Cut anemia in women of
reproductive age by **50%**



**EXCLUSIVE
BREASTFEEDING**
Increase to at least
50%



LOW BIRTH WEIGHT
Cut low birth weight
by **30%**

HALT THE RISE IN PREVALENCE OF:



ADULT OVERWEIGHT



ADULT DIABETES
(high blood sugar)



ADULT OBESITY

World Health Assembly Global Nutrition Targets- 2025 and Global Monitoring Framework for Prevention and Control of NCDs

<http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/130354/filename/130565.pdf>



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TABLE 2.2 Global progress against global nutrition targets

Target and indicator	Baseline year	Baseline status	Target for 2025	On or off course?	Basis for assessment
<i>Stunting</i> 40% reduction in the number of children under 5 who are stunted	2012	162 million	~100 million (currently 159 million)	Off	Current rate of reduction not rapid enough to attain 100 million by 2025
<i>Wasting</i> Reduce and maintain childhood wasting at less than 5%	2012	8%	< 5% (currently 7.5%)	Off	Current rate of reduction not rapid enough to reach below 5% by 2025
<i>Under-5 overweight</i> No increase in childhood overweight	2012	7%	No increase (currently 6.1%)	Off	The baseline proportion for 2012 was revised down from 7% to 5.9% in the JCMs for 2015, and the current rate is marginally above this threshold and hence off course
<i>Anemia</i> 50% reduction of anemia in women of reproductive age	2011	29%	15% (no new data over baseline)	Off	Very little progress since 1995, when it was estimated at 33%
<i>Low birth weight</i> 30% reduction in low birth weight	2008–2012	15%	10%	NA	Estimating methods being revised (see Panel 2.1)
<i>Exclusive breastfeeding</i> Increase the rate of exclusive breastfeeding in the first six months to at least 50%	2008–2012	38%	50% (currently 39%)	Off	Not increasing rapidly enough to meet 50% by 2025
<i>Adult overweight</i> Halt the rise in prevalence	2014	38%	Halt the rise in prevalence	Off	Rates are increasing in vast majority of countries, 2010–2014
<i>Adult obesity</i> Halt the rise in prevalence	2014	12%	Halt the rise in prevalence	Off	Rates are increasing in vast majority of countries, 2010–2014
<i>Adult diabetes (raised blood glucose)</i> Halt the rise in prevalence	2014	9%	Halt the rise in prevalence	Off	Rates are increasing in vast majority of countries, 2010–2014

Source: Based on IFPRI (2014, Table 3.1; 2015a, Table 2.1), UNICEF, WHO, and World Bank (2015), WHO (2014b, 2016s, 2016t); 1995 anemia estimate from Stevens et al. (2013).

IT'S HARD TO MEET NUTRITION GOALS IF YOU DON'T HAVE DATA ON NUTRITION

At a 2012 meeting of the World Health Assembly, all 193 UN member nations committed to achieving global nutrition targets by 2025. So far, the number of countries on course to meet the global targets is much too low. This is complicated by the fact that too many countries lack the data necessary to even evaluate their nutrition progress against the global targets.

COUNTRY STATUS: ● No data ● Off course ● On course

REDUCE STUNTING

in children under age five by 40%

Stunting—when children are too short for their age—is associated with a host of negative health, educational, and economic consequences.



PREVENT OVERWEIGHT

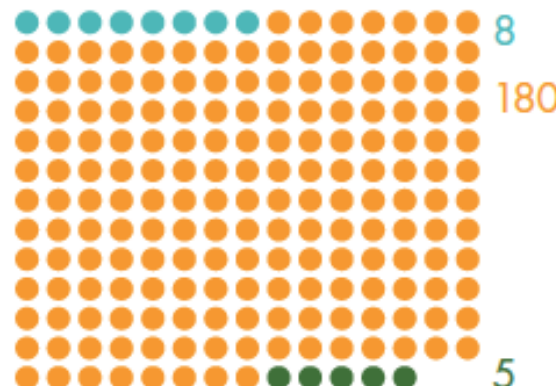
among children under age five from increasing

Overweight and obese children are more likely to develop noncommunicable diseases like diabetes and cardiovascular diseases at a younger age.

CUT WASTING

in children under age five to less than 5%

Wasting—when children are too thin for their height—increases the risk of death from nutrition-related causes.



HALVE ANEMIA

in women of reproductive age

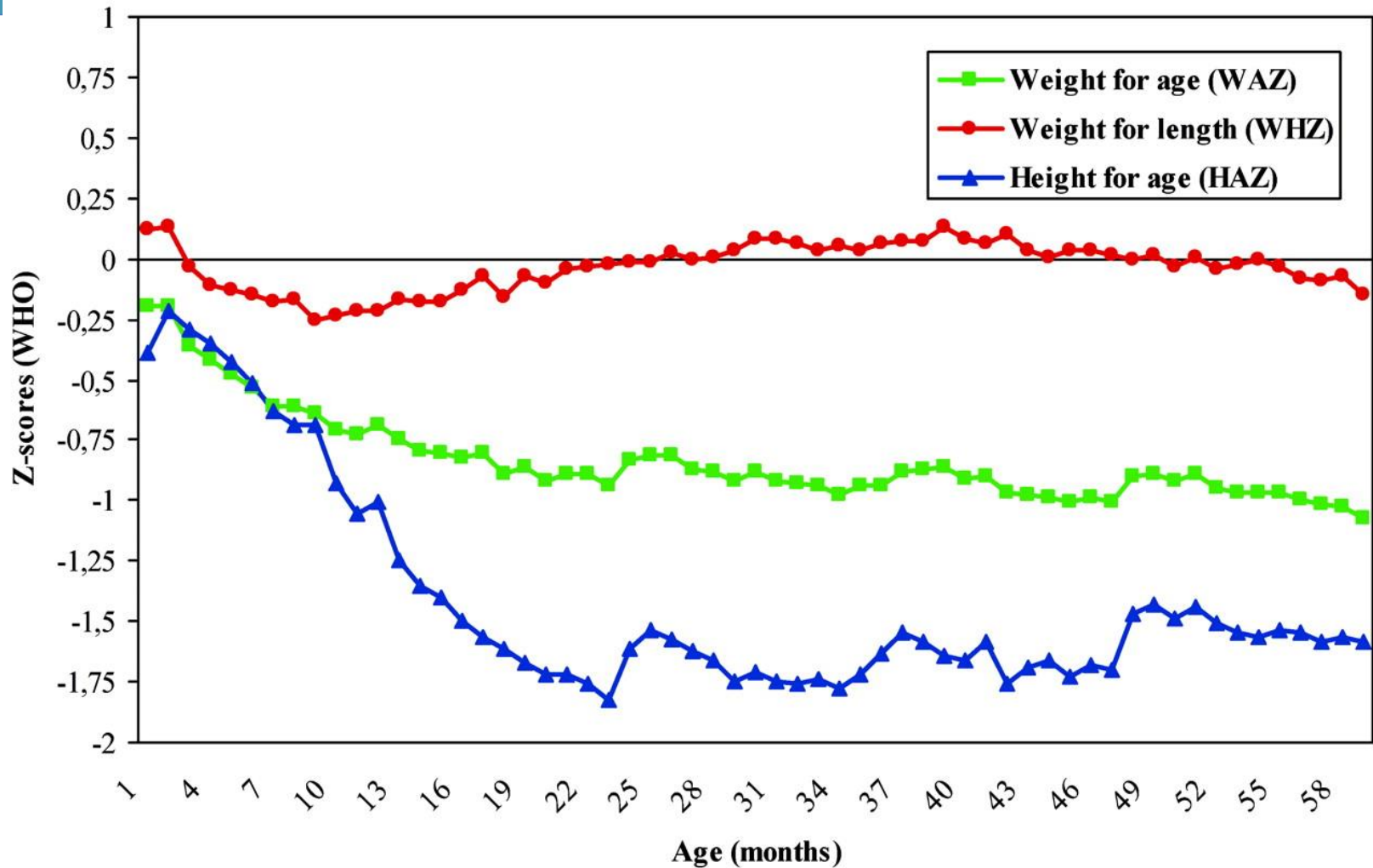
Anemia—a form of iron deficiency and the most widespread nutritional disorder in the world—results in ill health, lost earnings, and premature death.



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Mean anthropometric z scores according to age for all 54 studies, relative to the WHO standard (1 to 59 months).



Cesar Gomes Victora et al. Pediatrics 2010;125:e473-e480



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PEDIATRICS



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Prendregast and
Humphrey, 2014

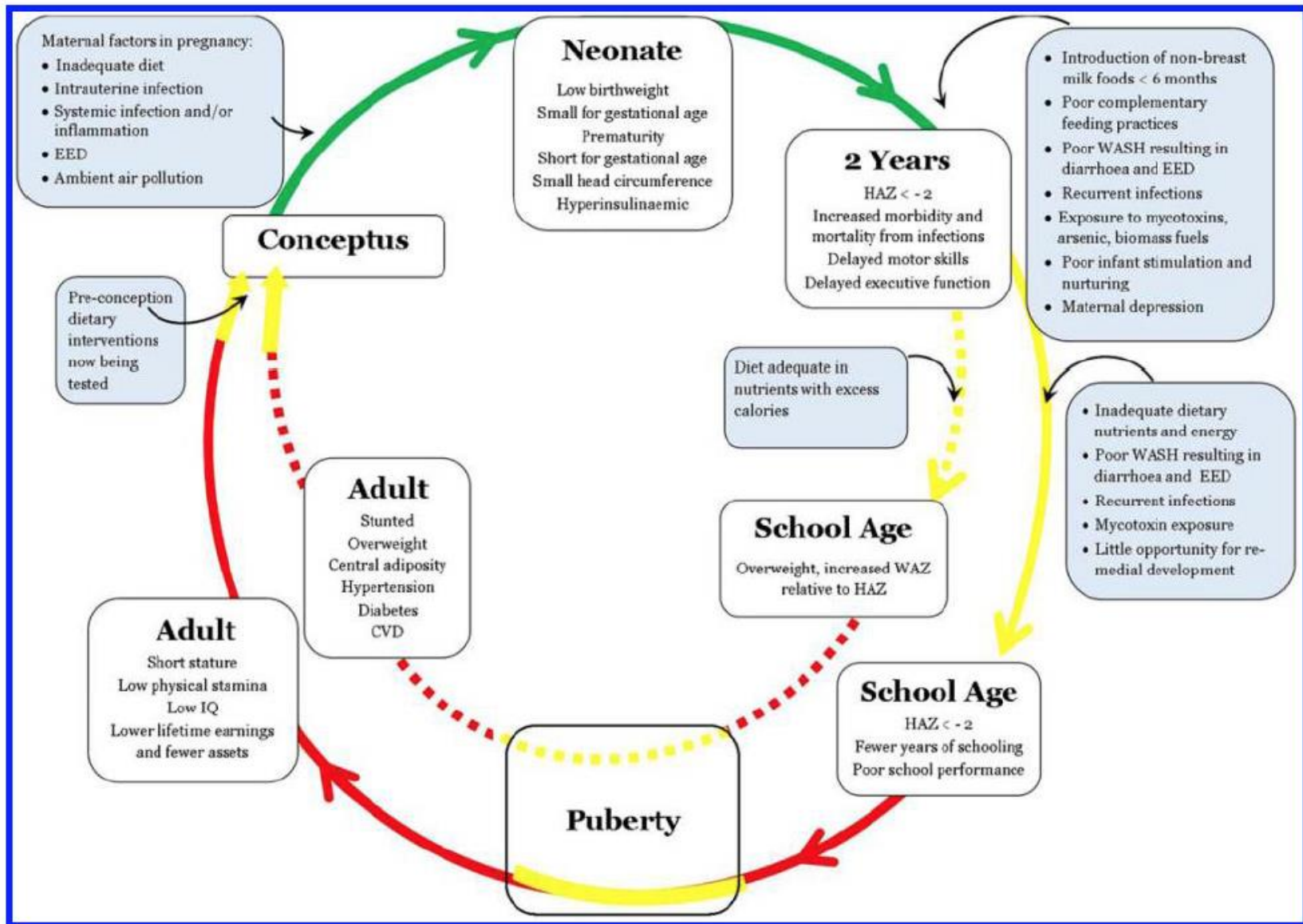


Figure 1 The stunting syndrome. The green pathway denotes the period between conception and 2 years (*'the first 1000 days'*)



FACTORS ASSOCIATED WITH STUNTING

- Maternal factors: age, height, education, nutritional and health status, micronutrient status, diet

Household Level: Care giving, empowerment, income, social capital

of high

Community Level: Access and utilization of services, markets

National Level: Economic growth and development, regulations, guidelines, enabling environment

- Mycotoxin Exposure- Pregnancy and Early life
- Arsenic exposure in pregnancy
- Biomass fuel usage and indoor pollution



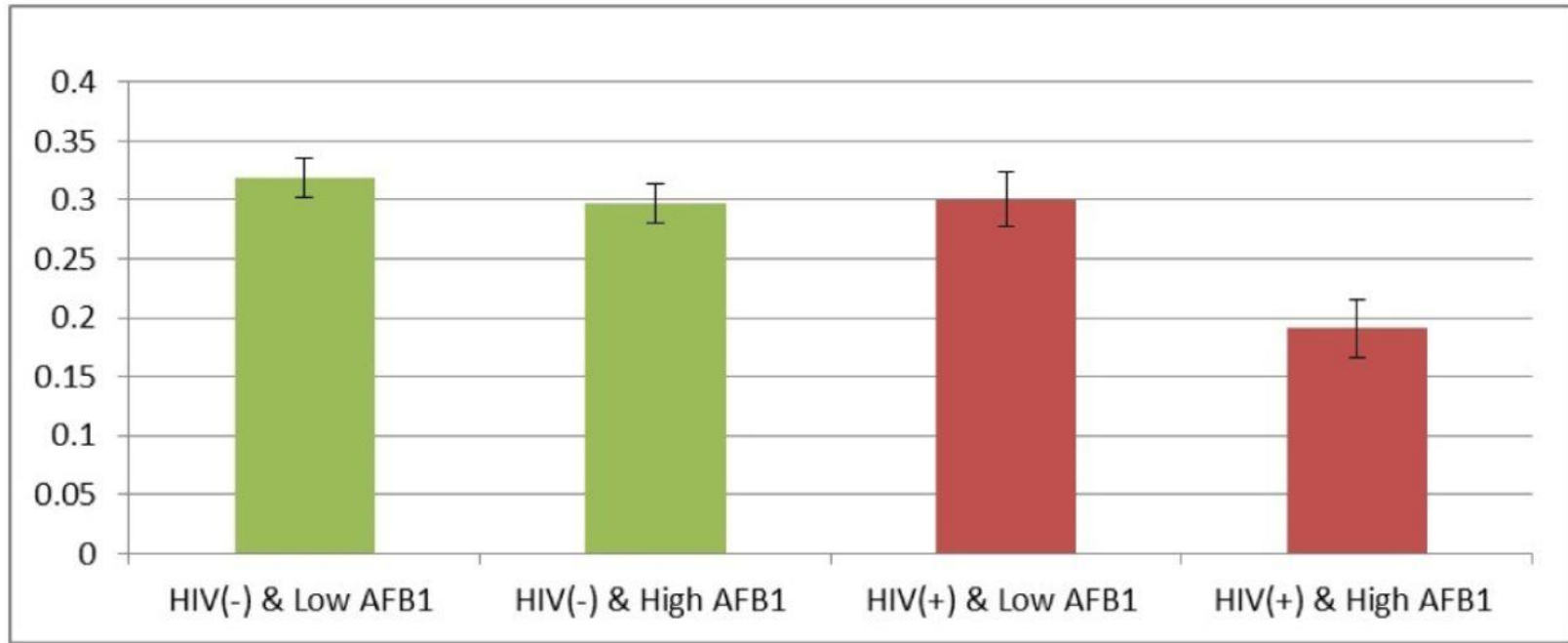


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Rate of weight gain (kg/week) during pregnancy by women's HIV and Aflatoxin Exposure Status (± 1 S.E.).

246 Mother-Infant Dyads (Sub Sample of the Gulu Cohort Study)
Serum Sample in pregnancy enrollment (mean gestational age 19.4 weeks (\pm 3.8 weeks))



Barnabas Kahiira Natamba et al. FASEB J 2016;30:432.6

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The FASEB Journal



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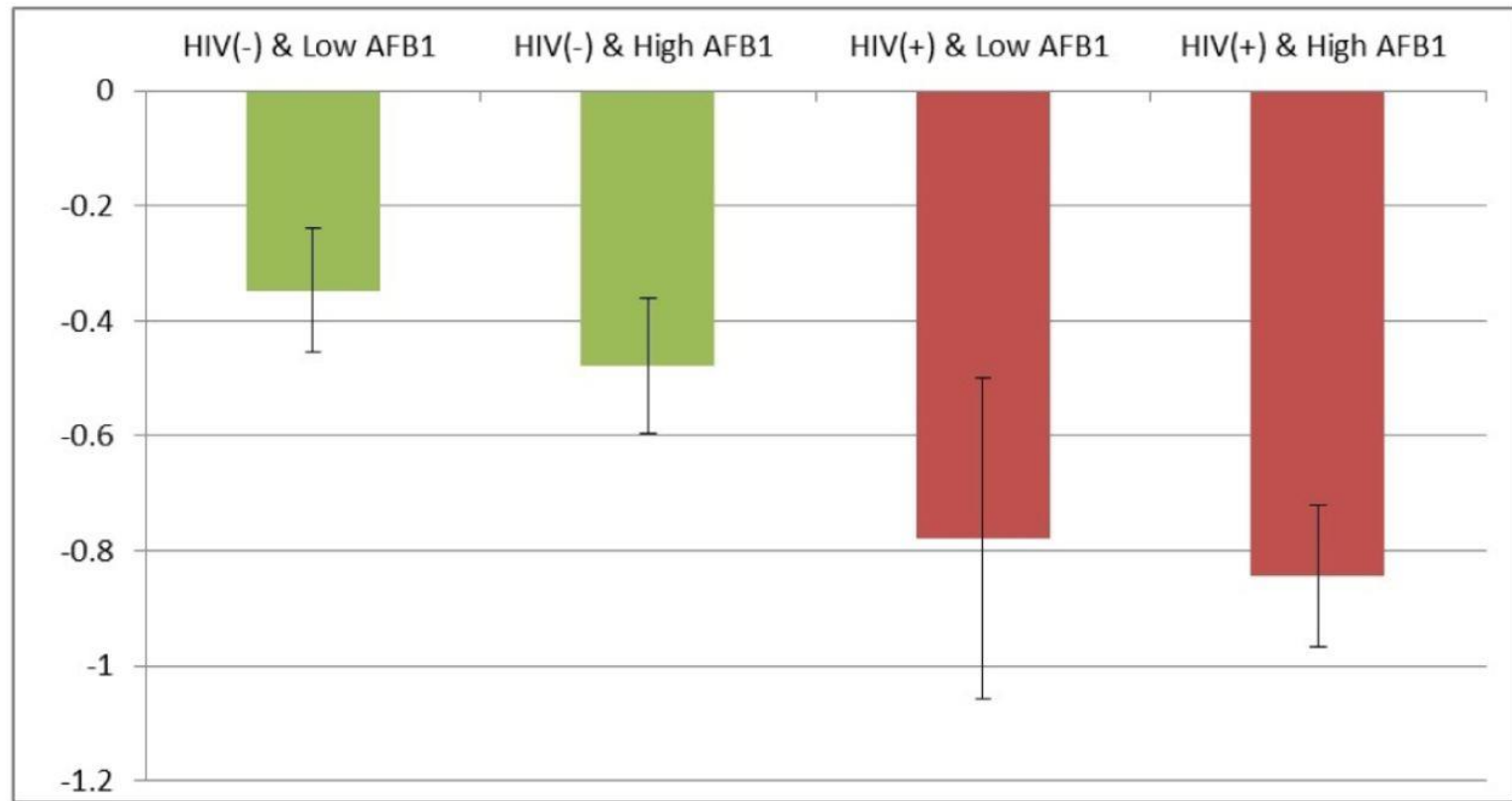
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1- to-12-month-old infant HAZ scores by their mothers HIV and aflatoxin exposure status in pregnancy (± 1 S.E.).



Barnabas Kahiira Natamba et al. FASEB J 2016;30:432.6

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The FASEB Journal

Adjusting for: prenatal food insecurity, dietary diversity, asset index, and infant age and gender,



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AFLACOHORT FOLLOW UPS: FEBRUARY 2018

- Birth follow ups, 3, 6, 9 and 12 months of age
- Linking aflatoxin levels to food consumption, household production and market practices (food purchases)
 - Corn production and consumption is associated with higher levels
 - Ground nut production and consumption is associated with higher levels
- Understanding how exposures through fetal growth, early life link to growth (Linear)
 - Maternal levels are associated with a higher risk of LBW -OR: 1.13 (1.011-1.28 CI, $p=0.032$)- adjusting for maternal education, height, MUAC, dietary diversity, infant gender
 - Breast milk sample analysis ongoing to assess contribution through 0-6 months of age
 - Assessment of introduction and type of complementary foods
- Aflatoxin analysis- Peanut and Mycotoxin Innovation Lab (U Georgia)
- Crop and soil assessment – Post Harvest Innovation Lab (Kansas State)



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CONCLUSIONS

- Different forms of malnutrition co-exist simultaneously- While rates are improving, targets are not on course
- Data is needed to understand to track progress
- Stunting - cyclical and intergenerational, multi-faceted and complex
- Emerging research on the role of environmental contaminants





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