



Introduction to Childhood Nutrition

Siobhán Nestor

Practicing Dietitian, Bsc (Hons) MINDI

Email: siobhan_nestor@Hotmail.com

Linkedin:

Twitter: [@foodtalking](https://twitter.com/foodtalking)

Contents and Objectives

- ▶ Introduction to childhood nutrition (0-5 year age group)
- ▶ The current evidence base on childhood malnutrition and prevalence
- ▶ Defining malnutrition
- ▶ Macro and micronutrient deficiencies
- ▶ Etiology of malnutrition
- ▶ Measuring malnutrition - anthropometric indicators
- ▶ Group task ("WHO Anthro")
- ▶ International Commitments to tackling childhood malnutrition
- ▶ Future directions within childhood malnutrition
- ▶ Resources



Advocates

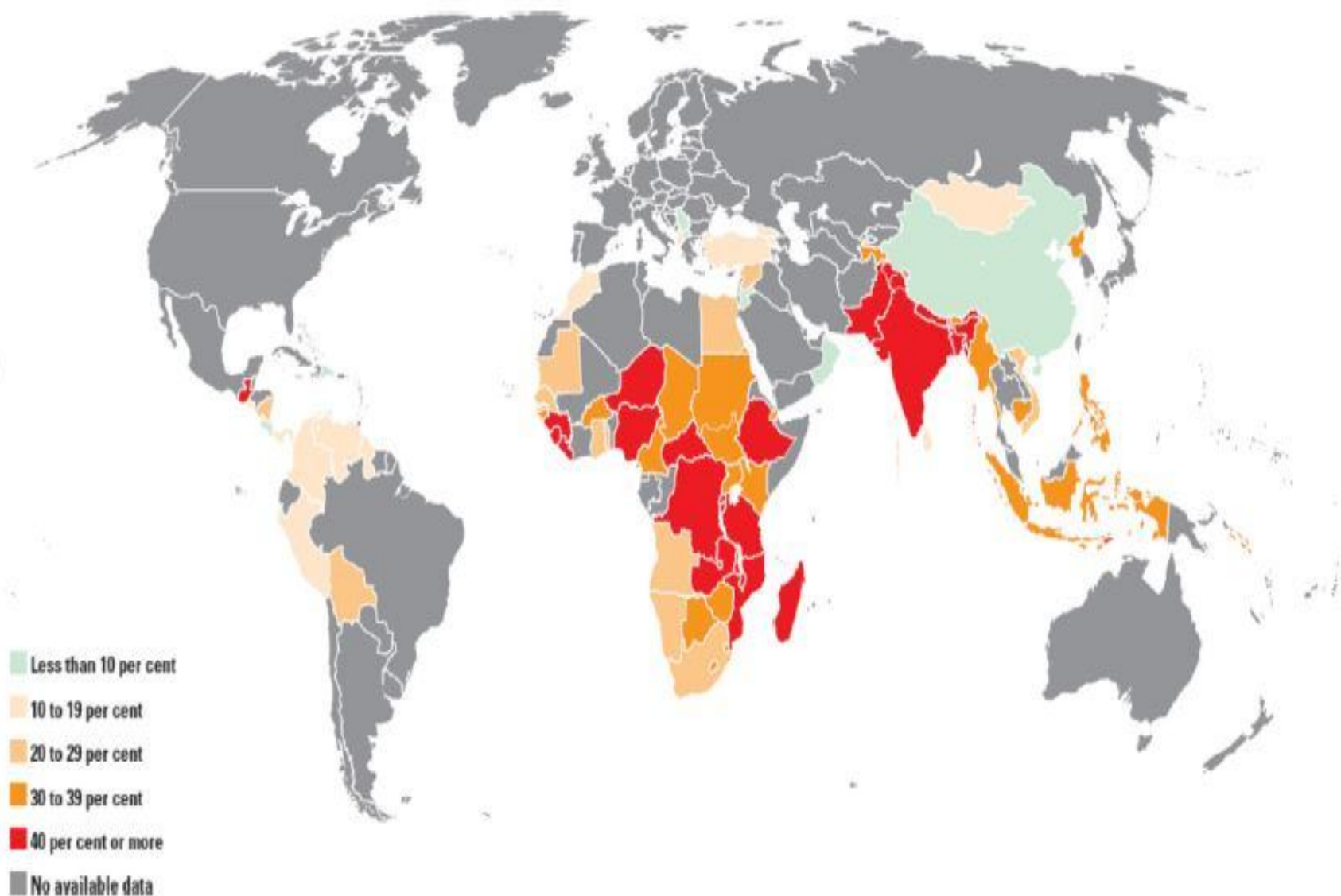


Evidence for focusing on CM

- ▶ “Undernutrition in the first 1000 days post conception represents a fundamental squandering of human potential” (Haddad and Smith, 2014)
- ▶ Undernutrition was implicated in 35% of global disease burden in children under five years (Black et. al. 2013).
- ▶ **Neurological** Chronically malnourished children, score poorly on attention and memory test and poor motor skills.
- ▶ **Educational** Chronically malnourished children are less likely to be in the appropriate grade for their age at school.
- ▶ **Economic** Every \$1 invested in nutrition generates as much as \$48 in better health and increased productivity. (Hoddinott et al, 2013)
- ▶ Countries can lose between 2-3% of potential GDP each year.

1000 Day window

- ▶ Stunting within 1000 day window of opportunity found to result in reduced attained stature in adulthood by 6.6cm for women and 9 cm for men.
- ▶ A 1% loss in attained height reduces adult earnings by 2.4%
- ▶ **Health** Increased risk of non communicable, chronic diseases (obesity, diabetes mellitus , cancer, mental health issues) (Hoddinott et. al. 2013)
- ▶ Well nourished children are 10 x more likely to overcome most life threatening childhood diseases (SOWM, 2012)
- ▶ 1m deaths could be prevented every year if child is exclusively breastfed for six months (SOWM , 2012).
- ▶ The likelihood of a child being severely undernourished is reduced if his/her mother owns land (World Development , 2007).



1. *Global stunting prevalence – percentage of children under age 5 who are moderately or severely stunted. Reproduced with permission: (UNICEF, UNICEF Global Nutrition Database 2012, based on Multiple Indicator Cluster Surveys (MICS), Demographic and Health Surveys (DHS) and other national surveys.*

Estimated prevalence and number of children under-five years of age affected by stunting (moderate or severe) by United Nations region: 1990, 2010, 2011

Region	prevalence estimate (%)			number (million)		
	1990	2010	2011	1990	2010	2011
Africa	38.5 41.6 44.6	33.6 35.9 38.2	33.3 35.6 38.0	42.3 45.7 49.0	52.2 55.8 59.4	52.5 56.3 60.0
Eastern	44.2 50.6 57.0	39.3 42.5 45.9	38.9 42.1 45.4	15.7 18.0 20.3	20.8 22.6 24.3	21.0 22.8 24.6
Middle	36.4 47.2 58.2	30.1 35.6 41.4	29.1 35.0 41.4	5.0 6.4 7.9	6.6 7.8 9.1	6.5 7.8 9.2
Northern	22.3 28.6 35.8	14.9 21.3 29.6	14.6 21.0 29.4	4.9 6.3 7.9	3.5 5.0 6.9	3.5 5.0 7.0
Southern	32.9 36.2 39.7	25.6 31.1 37.1	25.2 30.8 37.0	2.0 2.2 2.4	1.5 1.9 2.2	1.5 1.8 2.2
Western	35.4 39.1 42.9	32.1 36.5 41.1	31.7 36.4 41.2	11.5 12.8 14.0	16.3 18.6 20.9	16.5 18.9 21.5
Asia ¹	45.6 48.4 51.1	24.2 27.7 31.3	23.2 26.8 30.5	178.1 188.7 199.3	85.8 98.4 111.1	82.8 95.8 108.8
Eastern ¹	34.9 36.8 38.6	8.6 9.2 10.0	7.9 8.5 9.2	45.5 47.9 50.3	7.5 8.1 8.7	7.0 7.5 8.1
South-Central	54.4 59.3 64.0	31.3 37.5 44.1	30.1 36.4 43.2	98.6 107.5 116.1	58.7 70.3 82.7	57.0 68.8 81.7
South-Eastern	38.1 47.3 56.6	22.7 28.2 34.5	21.8 27.4 33.7	21.7 27.0 32.3	12.2 15.2 18.5	11.6 14.6 18.0
Western	22.7 29.2 36.6	10.8 18.5 29.7	10.4 18.0 29.5	4.9 6.3 7.9	2.8 4.9 7.8	2.8 4.8 7.9
Latin America & Caribbean	19.3 24.6 29.9	9.4 13.8 18.2	9.0 13.4 17.7	10.8 13.7 16.7	5.0 7.4 9.8	4.8 7.1 9.4
Caribbean	9.4 16.5 27.2	3.3 7.0 14.2	3.1 6.7 13.7	0.4 0.7 1.1	0.1 0.3 0.5	0.1 0.2 0.5
Central America	23.9 34.0 45.8	12.1 19.2 29.2	11.6 18.6 28.5	3.8 5.4 7.2	2.0 3.1 4.8	1.9 3.0 4.6
South America	15.5 21.4 28.8	7.2 11.9 19.0	6.9 11.5 18.6	5.6 7.7 10.4	2.5 4.0 6.4	2.3 3.9 6.2
Oceania ²	26.8 40.4 55.7	16.8 35.8 60.6	16.0 35.5 61.4	0.3 0.4 0.5	0.2 0.5 0.8	0.2 0.5 0.8
All developing countries	42.6 44.6 46.7	26.3 28.7 31.0	25.6 28.0 30.4	237.0 248.4 259.9	148.7 162.1 175.4	145.9 159.7 173.4
Developed countries	3.3 6.1 11.0	4.0 7.2 12.5	4.1 7.2 12.6	2.5 4.7 8.5	2.8 5.1 8.8	2.9 5.1 8.9
Global	38.1 39.9 41.8	24.1 26.3 28.4	23.5 25.7 27.9	241.4 253.1 264.9	153.5 167.1 180.7	150.6 164.8 179.8

¹ Excluding Japan

² Excluding Australia and New Zealand

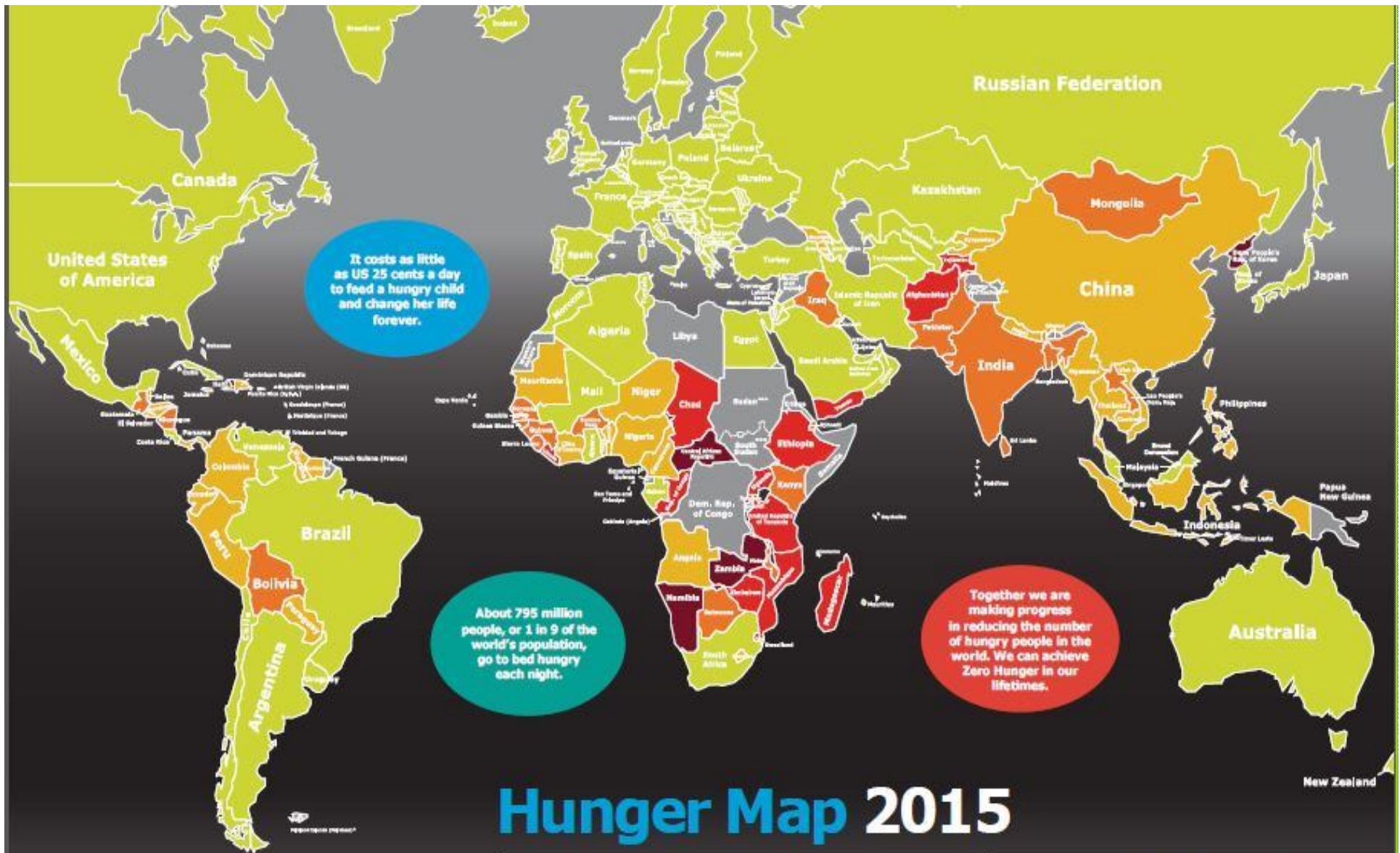
Prevalence and 95% confidence limits (lower P upper)

Estimated prevalence and number of children under-five years of age affected by overweight (including obesity) by United Nations region: 1990, 2010, 2011

Region	prevalence estimate (%)			number (million)		
	1990	2010	2011	1990	2010	2011
Africa	3.4 4.2 5.0	6.0 7.1 8.1	6.2 7.3 8.4	3.8 4.6 5.5	9.3 11.0 12.6	9.8 11.5 13.2
Eastern	3.3 4.4 6.0	3.8 5.0 6.4	3.8 5.0 6.5	1.2 1.6 2.1	2.0 2.6 3.4	2.1 2.7 3.5
Middle	2.1 3.5 5.8	4.0 5.6 7.8	4.1 5.8 8.0	0.3 0.5 0.8	0.9 1.2 1.7	0.9 1.3 1.8
Northern	4.8 7.3 10.9	9.0 12.8 17.8	9.3 13.1 18.2	1.1 1.6 2.4	2.1 3.0 4.2	2.2 3.1 4.3
Southern	4.7 6.1 7.8	8.0 15.6 28.2	8.1 16.3 30.0	0.3 0.4 0.5	0.5 0.9 1.7	0.5 1.0 1.8
Western	1.5 1.9 2.3	4.8 6.2 8.2	5.0 6.6 8.7	0.5 0.6 0.8	2.4 3.2 4.2	2.6 3.4 4.5
Asia ¹	2.8 3.7 4.5	3.7 4.6 5.5	3.7 4.7 5.8	11.1 14.4 17.7	13.2 16.5 19.7	13.3 16.9 20.6
Eastern ¹	6.1 6.8 7.5	4.7 5.6 6.6	4.7 5.5 6.6	8.0 8.8 9.8	4.1 4.9 5.8	4.1 4.9 5.8
South-Central	0.8 2.0 4.7	2.0 3.0 4.5	1.9 3.1 4.8	1.5 3.6 8.5	3.7 5.6 8.4	3.7 5.8 9.1
South-Eastern	1.3 1.8 2.4	3.1 5.8 10.6	3.1 6.1 11.6	0.7 1.0 1.4	1.7 3.1 5.7	1.7 3.3 6.2
Western	2.5 4.4 7.6	7.7 10.8 15.1	7.8 11.3 16.0	0.5 1.0 1.7	2.0 2.8 4.0	2.1 3.0 4.3
Latin America & Caribbean	5.2 6.5 7.7	6.2 7.1 8.0	6.2 7.1 8.0	2.9 3.6 4.3	3.3 3.8 4.3	3.3 3.8 4.3
Caribbean	3.3 4.0 4.9	4.6 7.3 11.4	4.6 7.5 11.9	0.1 0.2 0.2	0.2 0.3 0.4	0.2 0.3 0.4
Central America	3.6 5.1 7.3	5.5 6.4 7.3	5.6 6.4 7.4	0.6 0.8 1.2	0.9 1.0 1.2	0.9 1.0 1.2
South America	5.7 7.3 9.3	6.2 7.4 8.9	6.2 7.4 8.9	2.1 2.6 3.4	2.1 2.5 3.0	2.1 2.5 3.0
Oceania ²	2.3 2.6 3.0	2.9 3.6 4.6	2.9 3.7 4.7	0.0 0.0 0.0	0.0 0.0 0.1	0.0 0.0 0.1
All developing countries	3.4 4.1 4.7	4.9 5.5 6.2	5.0 5.7 6.4	19.2 22.7 26.1	27.7 31.3 34.9	28.2 32.3 36.3
Developed countries	4.9 7.4 11.0	9.4 14.1 20.4	9.7 14.5 21.1	3.8 5.7 8.5	6.6 9.9 14.4	6.9 10.3 15.0
Global	3.8 4.5 5.1	5.7 6.5 7.3	5.8 6.6 7.5	24.3 28.4 32.4	34.2 41.2 46.2	37.1 42.6 48.0

¹ Excluding Japan

² Excluding Australia and New Zealand



Hunger Map 2015



Prevalence of undernourishment in the population (percent) in 2014-16



The map shows the prevalence of undernourishment in the population of developing countries as of 2014-16. The indicator measures the probability that a randomly selected individual in the population is consuming an amount of dietary energy, which is insufficient to cover basic requirements for an active and healthy life.

Source: FAO, UNICEF and WFP, 2015. The State of Food Security in the World 2015. Meeting the 2015 International Hunger Targets: Making Sense of the Numbers. Rome, FAO. Further information is available at www.fao.org/hunger.

Undernourishment data: FAO Statistics Division (2015) - www.fao.org/statistics/en

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The information presented and the composition of maps in this map are only the expression of any opinion expressed on the part of WFP concerning the state of food security in the world and do not constitute a commitment on the part of WFP.

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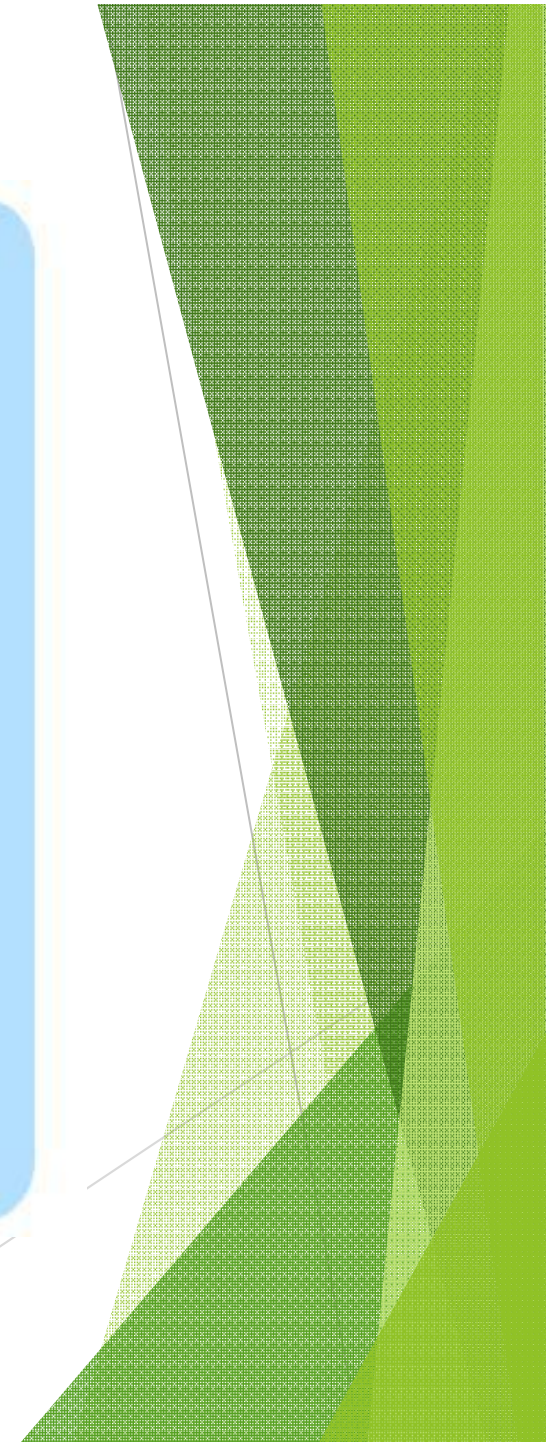
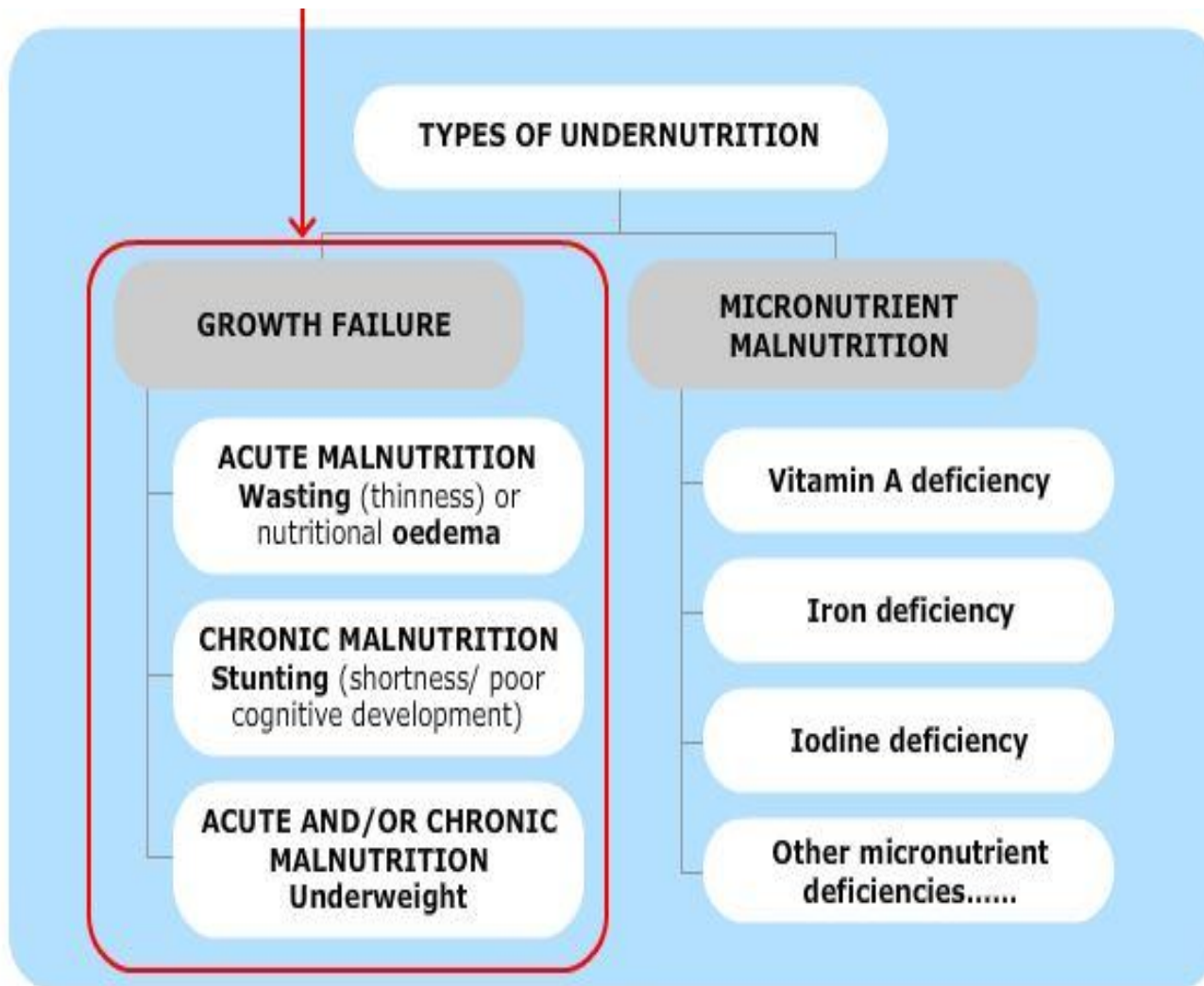
Defining Malnutrition

- ▶ **Malnutrition** A condition resulting when a person's diet does not provide adequate nutrients for growth and maintenance or when a person is not able to adequately utilize the food consumed due to illness. Malnutrition encompasses both undernutrition (too thin, too short, micronutrient deficiencies) and 'overnutrition' (overweight and obesity), which should actually be considered 'unbalanced nutrition' as it often co-occurs with micronutrient deficiencies, (WFP)
- ▶ The most visible forms of childhood malnutrition are stunting and wasting.
- ▶ **Protein Energy Malnutrition:** Imbalance between the supply of protein and energy and the body's demand for them to ensure optimal growth and function. This imbalance can be either inadequate or excessive energy intake.

Protein Energy Malnutrition

Types of protein energy malnutrition

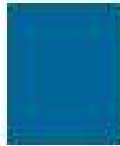
- ▶ Acute malnutrition also known as wasting is classified as having a low weight for height.
- ▶ Encompasses marasmus (severe weight loss), kwashiorkor (bilateral edema/ fluid buildup), marasmus kwashiorkor (combination of both) (UNICEF)
- ▶ Chronic malnutrition also known as stunting is classified as having a low height for age.
- ▶ Underweight is classified as having a low weight for age according to WHO international growth references and reflects both stunting and wasting (WFP)
- ▶ Overweight/obesity: abnormal or excessive fat accumulation that may impair health (WHO)
- ▶ Hidden Hunger ie “chronic micronutrient deficiencies” as they exist in children who may consume enough calories and are not classified as malnourished according to growth measurements.



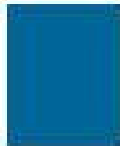
Stunted and Wasted ?



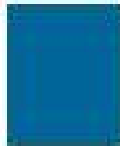
Stunted ?



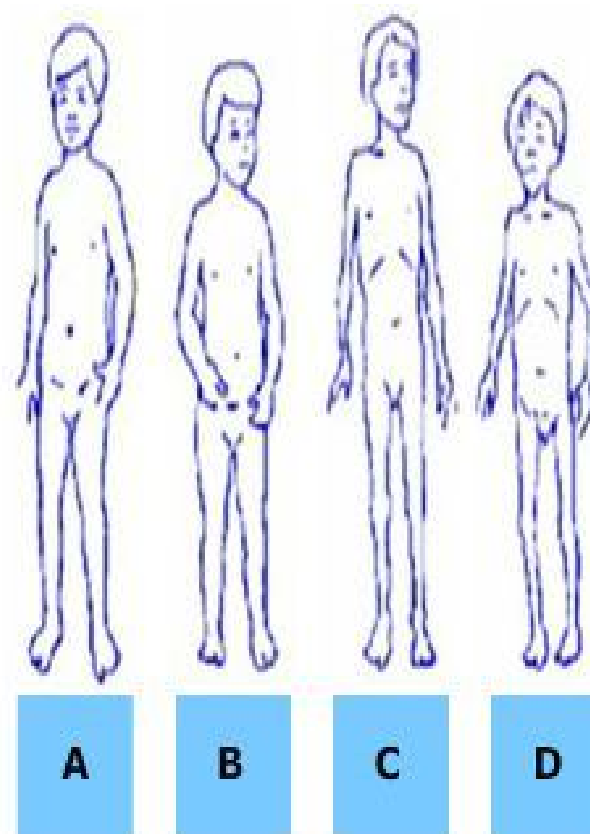
Healthy ?



Wasted ?

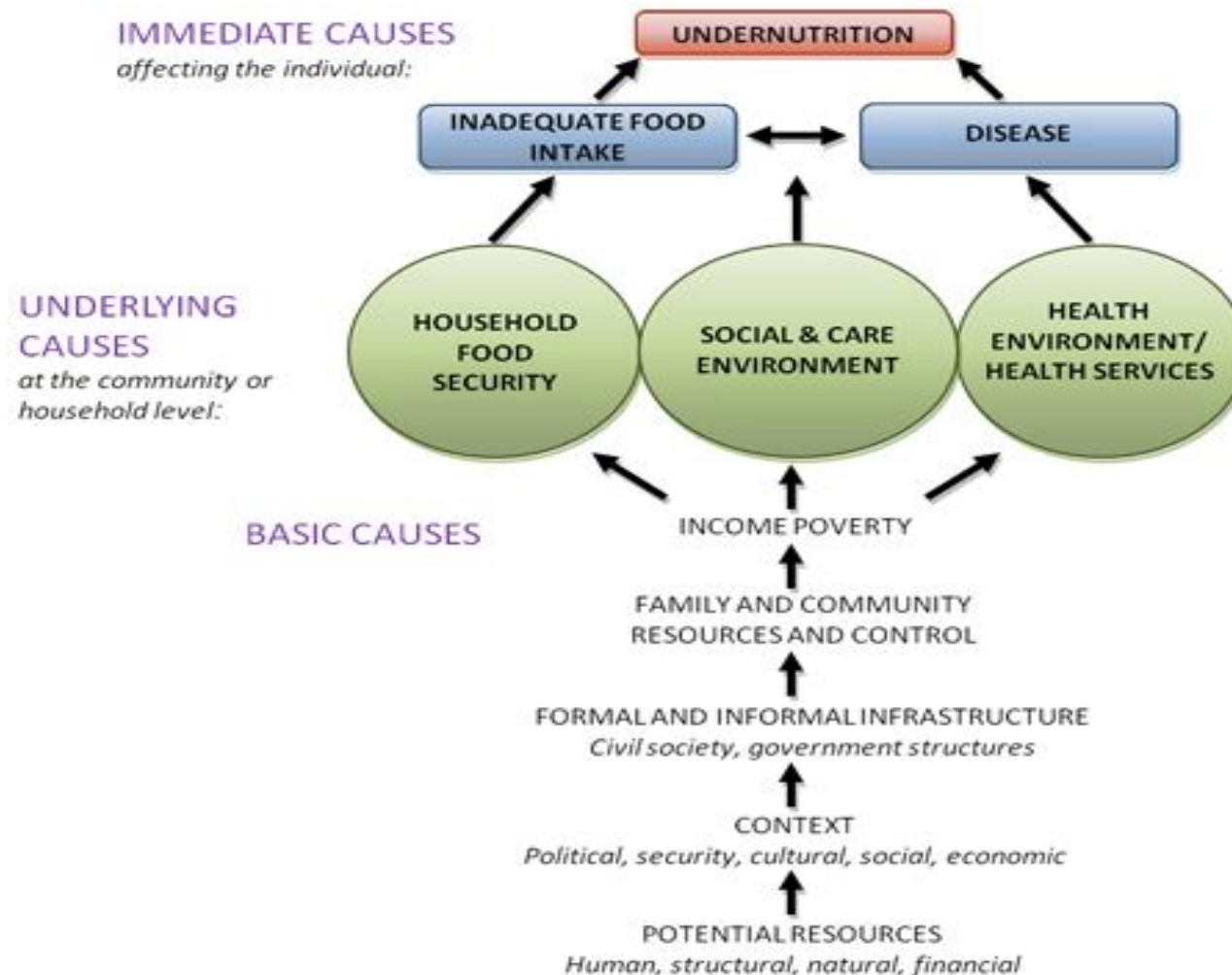


Drag and drop A - D pieces
onto the column above



Etiology of Childhood Malnutrition

Causes of child malnutrition and death" (UNICEF 1990) and adapted in the *Lancet* 2013 Framework for Action (Black et. al. 2013).



WHO Child Growth Standards: international reference for analysis of nutritional surveys.

Growth Indicators

Weight for age

Length for age/ Height for age

Weight for height

Mid upper arm circumference: less than 115mm

Indicator	Severity of malnutrition by prevalence ranges (%)			
	Low	Medium	High	Very high
Stunting	<20	20-29	30-39	>=40
Underweight	<10	10-19	20-29	>=30
Wasting	< 5	5-9	10-14	>=15

- ▶ The Z score classification system is the most widely recognised system for analysing anthropometric data in population based assessment.
- ▶ The Z score expresses the anthropometric value as a number of standard deviations or Z scores below or above reference mean or median value.

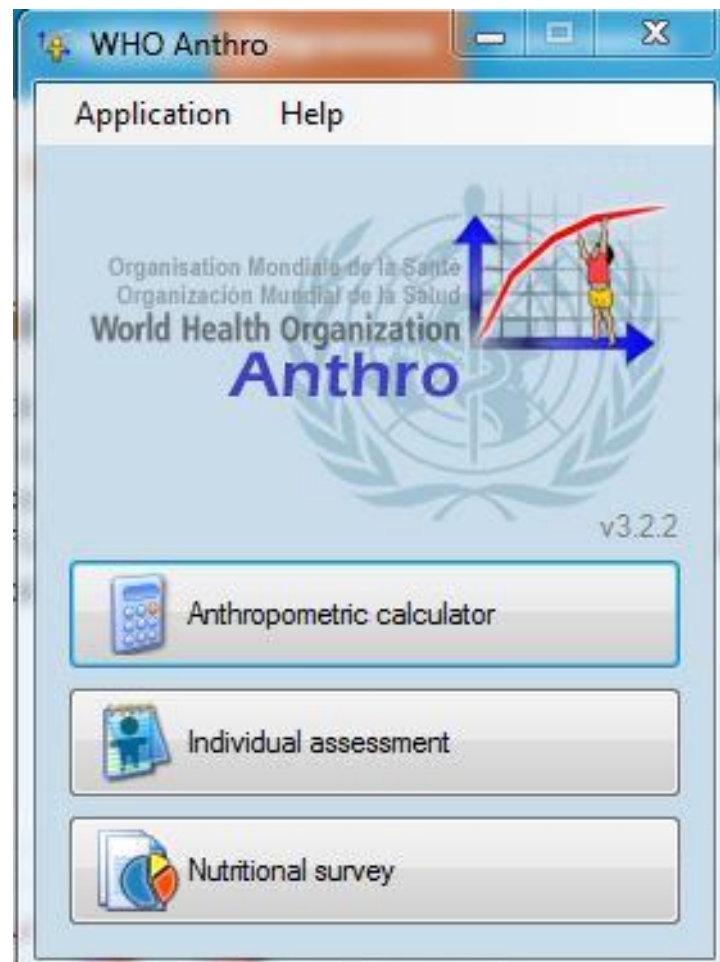
A Z-score between -1 to +1 SD is defined as "normal" in comparison to reference population.

A Z score <-2 SD classifies low weight-for-age, low height-for-age and low weight-for-height as moderate undernutrition,

A Z score less than <-3 SD defines severe undernutrition.

The cut-off point of >+2 SD classifies high weight-for-age or high weight for height as overweight in children.

WHO "Anthro" workshop



Individual assessment Selected child Help

Children

- Kwanza, Kofi (1)
- Lopez, Flora (2)
- Smith, Jane (3)
- 1 (4)
- 2 (5)
- 3 (6)
- 4 (7)
- 5 (8)
- 6 (9)
- 7 (10)
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- 24 (27)
- 25 (28)
- 26 (29)
- 27 (30)
- 28 (31)
- 29 (32)
- 30 (33)

Select all Deselect All

Child: 1

First name: Date of birth: Approximate date Unknown date

Last name: Mother:

Sex: Female Male Age: 2yr 6mo (30mo) Father:

Child ID: Address:

Notes:

Visits

1 visit(s)

	Date	Observer ID	Weight (kg)	Oedema	Recumbent	Ln/ht (cm)	HC (cm)	MUAC (cm)	TSF (mm)	SSF (mm)	Motor milestones
▶	11/03/20...	Siobhán...	10.50	No	No	87.00					

Visit: 11/03/2014

Weight-for-height	Percentile	3.1	z-score	-1.87	HC-for-age	Percentile	NA	z-score	NA
Weight-for-age	Percentile	1.7	z-score	-2.12	MUAC-for-age	Percentile	NA	z-score	NA
Height-for-age	Percentile	5.1	z-score	-1.63	TSF-for-age	Percentile	NA	z-score	NA
BMI-for-age	Percentile	4.8	z-score	-1.67	SSF-for-age	Percentile	NA	z-score	NA

0 25 50 75 100

- 1 Kwanza, Kofi (1)
- 2 Lopez, Flora (2)
- 3 Smith, Jane (3)
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- 33

Child: Kwanza, Kofi

First name: Date of birth:

Last name: Approximate date Unknown date

Sex: Female Male Age: 5mo

Child ID:

Notes:

Mother: (No data) (4)
Created by WHO-HQ-1\siyama, last updated by NA (11/09/2007)

Father: (No data) (4)
Created by WHO-HQ-1\siyama, last updated by NA (11/09/2007)

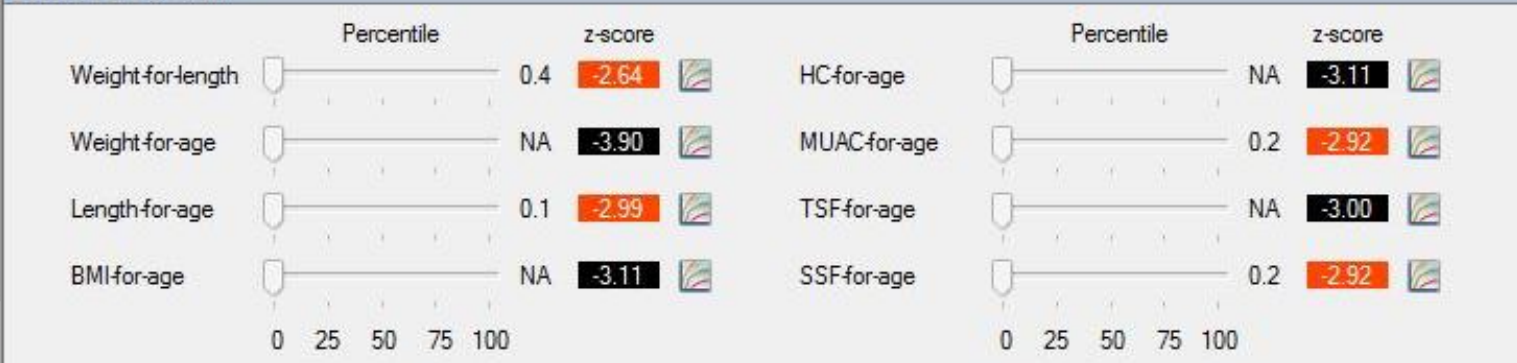
Address:

Visits

8 visit(s)

	Date	Observer ID	Weight (kg)	Oedema	Recumbent	Ln/Ht (cm)	HC (cm)	MUAC (cm)	TSF (mm)	SSF (mm)	Motor milestones
	30/12/2...	Dr. Sesay	11.20	No	No	89.90	44.80	12.30	4.30	3.70	<input type="checkbox"/>
	26/10/2...	Dr. Belga...	13.90	No	No	95.20	45.50	12.60	4.20	3.60	<input type="checkbox"/>

Visit: 12/10/2000

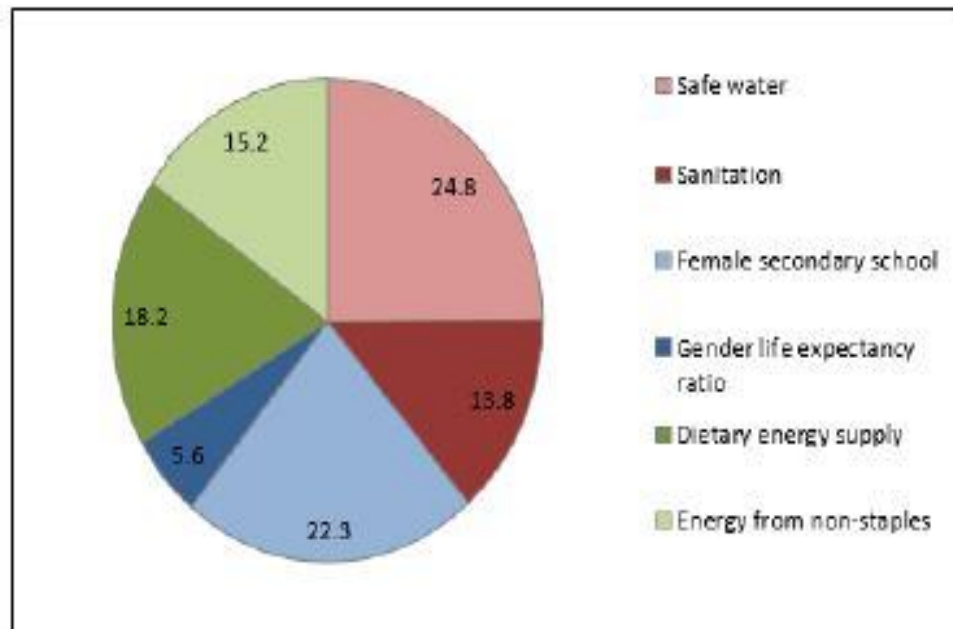


International Commitments to Nutrition

- ▶ Sustainable Development Goals (Goal 2) : End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- ▶ Nutrition for Growth Compact,
- ▶ Scaling up Nutrition
- ▶ Generation Nutrition
- ▶ Power of Nutrition
- ▶ Zero Hunger Challenge

Nutrition Sensitive versus Nutrition Specific Programmes

Figure 3b. Contributions of underlying determinants to total estimated reductions in stunting, 1970-2010 (percent)



**Malnutrition is the New
'Normal'**



Where to access more information

- ▶ <http://www.who.int/elena/en/>
- ▶ <http://www.thousanddays.org/resource/>
- ▶ <http://www.thousanddays.org/resources/technical-materials/>
- ▶ <http://apps.who.int/iris/bitstream/10665/42590/1/9241562218.pdf?ua=1&ua=1>
- ▶ http://www.who.int/childgrowth/training/jobaid_weighing_measuring.pdf
- ▶ http://www.who.int/nutgrowthdb/jme_unicef_who_wb.pdf
- ▶ <http://data.fao.org/map?entryId=0dc30f20-851b-11db-b9b2-000d939bc5d8>
- ▶ http://www.unicef.org/publications/files/SOWC_2015_Summary_and_Tables.pdf
- ▶ <http://www.who.int/nutrition/publications/infantfeeding/9241562544/en/>
- ▶ <https://www.wfp.org/hunger/faqs>
- ▶ http://www.who.int/quantifying_ehimpacts/publications/MalnutritionEBD12.pdf
- ▶ <http://apps.who.int/nutrition/landscape/report.aspx>
- ▶ http://www.savethechildren.org/atf/cf/%7B9def2ebe-10ae-432c-9bd0-df91d2eba74a%7D/FOOD_FOR_THOUGHT.PDF
- ▶ State of the World's Children Report Executive Summary, 2015.
- ▶ World Development, 2007. Do womens land rights promote empowerment and child health in Nepal?
- ▶ Global Strategy Infant feeding for the Young Child, 2003