Southampton NHS
University Hospitals NHS Trust

UNIVERSITY OF Southampton

Undernutrition in the Anthropocene Era Enabling People to Own their Own Health

Alan A Jackson

ACTION AGAINST HUNGER

Research for Nutrition Conference - #R4NUT 2019

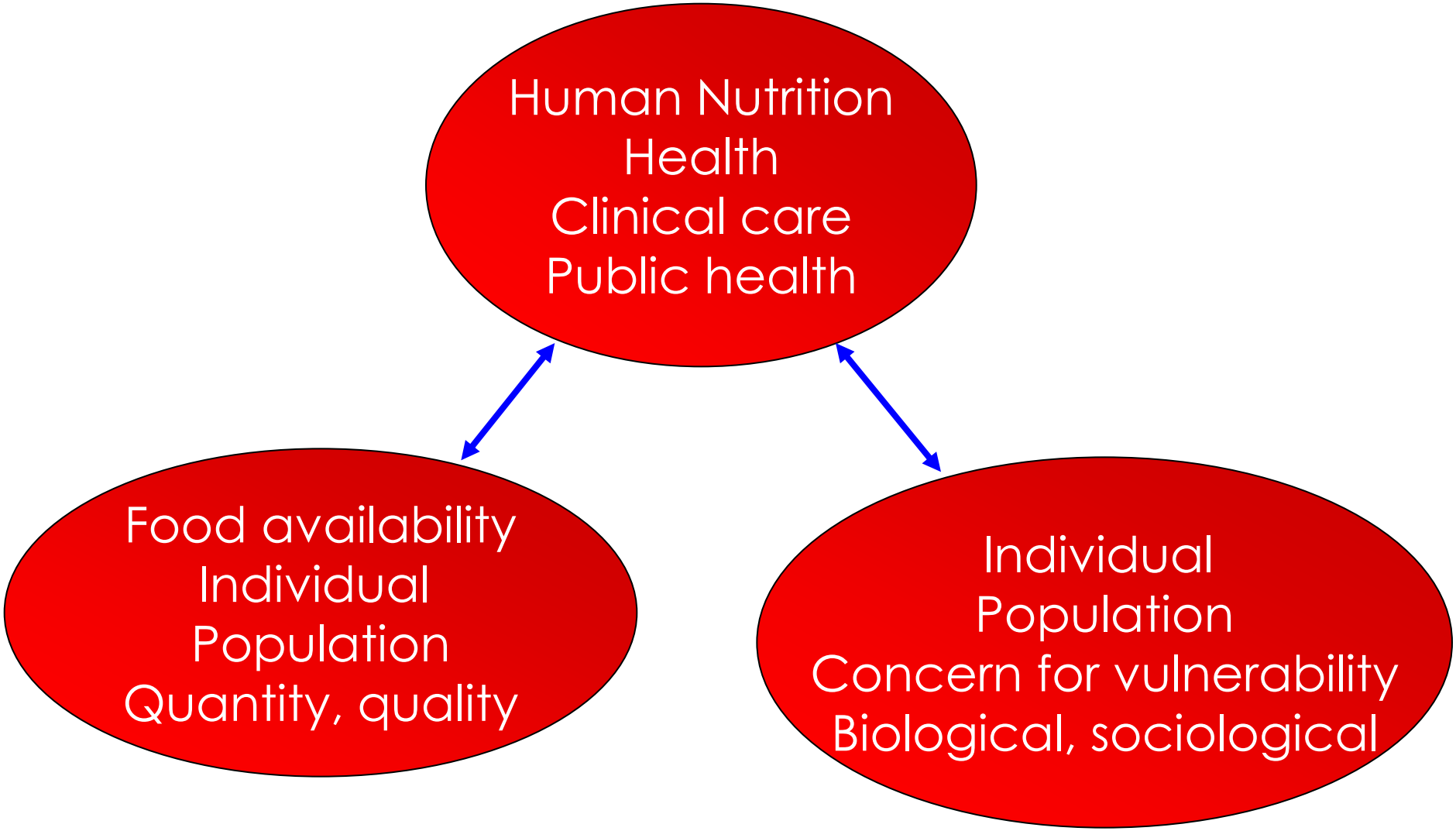
The Continuum of Undernutrition Prevention and Treatment: Sharing Current Scientific Evidence

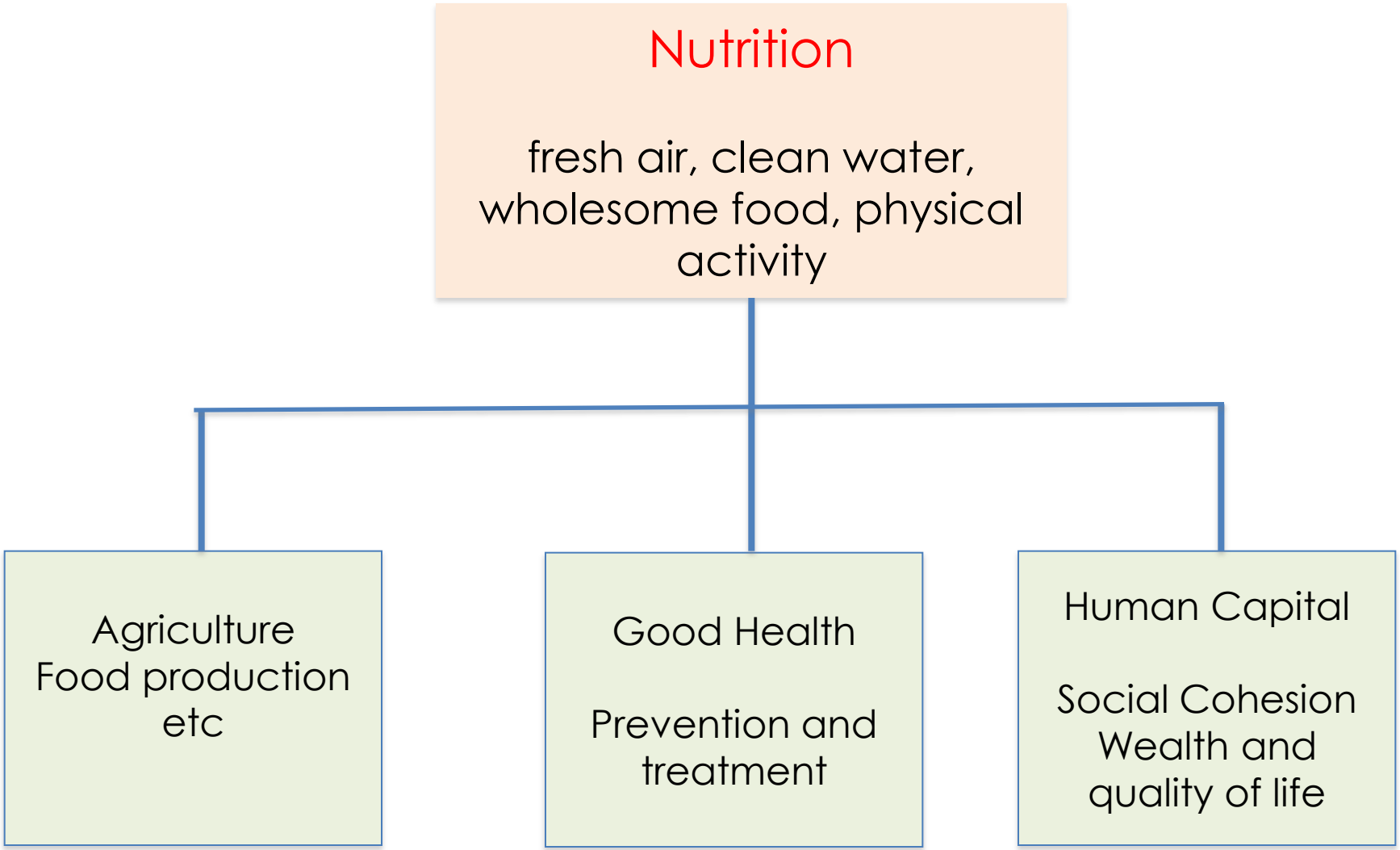
What we know but fail to put into practice

What we need to know

and have to generate relevant understanding

Health is a Social Challenge NOT a Medical Problem




Nutrition
fresh air, clean water, wholesome food, physical activity
Agriculture
Food production
etc
Good Health
Prevention and treatment
Human Capital
Social Cohesion
Wealth and quality of life

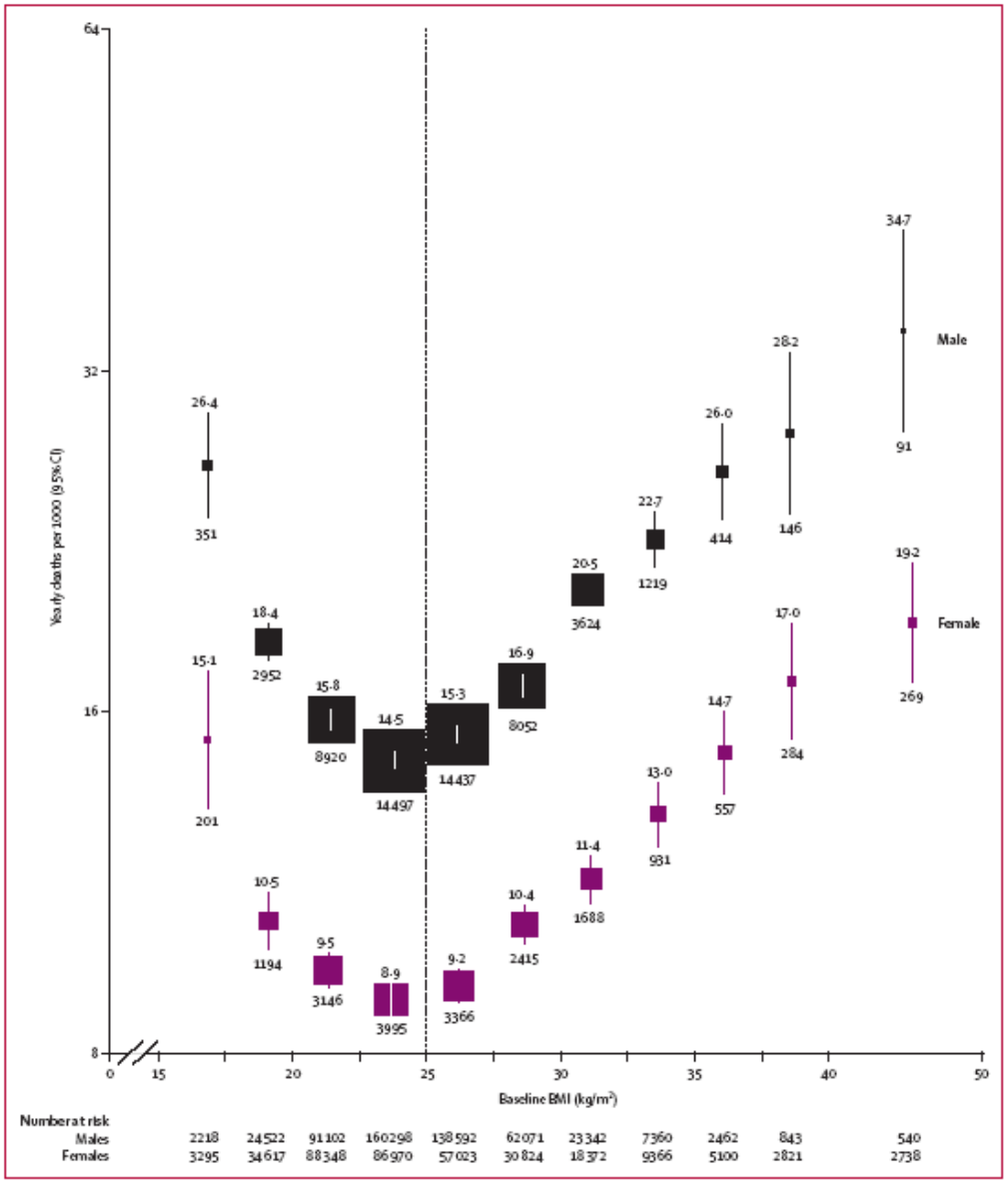


Figure 2: All-cause mortality versus BMI for each sex in the range 15–50 kg/m² (excluding the first 5 years of follow-up)
Relative risks at ages 35–89 years, adjusted for age at risk, smoking, and study, were multiplied by a common factor (ie, floated) to make the weighted average match the PSC mortality rate at ages 35–79 years. Floated mortality rates shown above each square and numbers of deaths below. Area of square is inversely proportional to the variance of the log risk. Boundaries of BMI groups are indicated by tick marks. 95% CIs for floated rates reflect uncertainty in the log risk for each single rate. Dotted vertical line indicates 25 kg/m² (boundary between upper and lower BMI ranges in this report).

Prospective studies collaboration.
Lancet 2009, 373, 1083-1096

57 prospective studies
900,000 adults

Body Mass Index

U-shaped relationship all cause mortality

Preferred range 22-25 kg/m^2

Aims: Meeting all patients nutritional needs

ASSESSMENT- Dietitians & Ward staff +/- NST

PROVISION - Pharmacy enteral feeds +/- catering and sip feeds

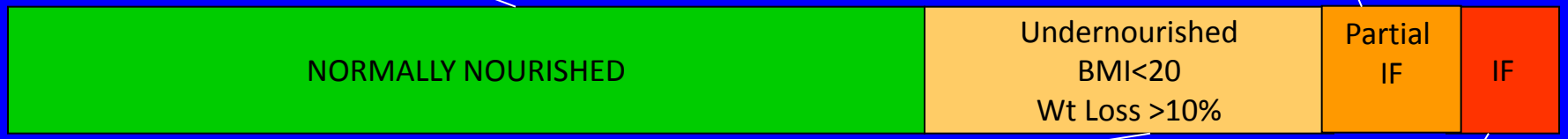
ACCESS - via NG, NJ, PEG

MONITORING - At least 2 x weekly clinical reassessment + weekly wt + intake records + biochemistry

ASSESSMENT - Ward staff

PROVISION - Catering

MONITORING - Admission & weekly wt



ASSESSMENT - Ward Staff & dietitians

PROVISION - Catering +/- oral supplements

MONITORING - Admission & weekly wt + intake records + biochemistry

ASSESSMENT - Nutrition support team

PROVISION - Pharmacy PN via +/- enteral or oral

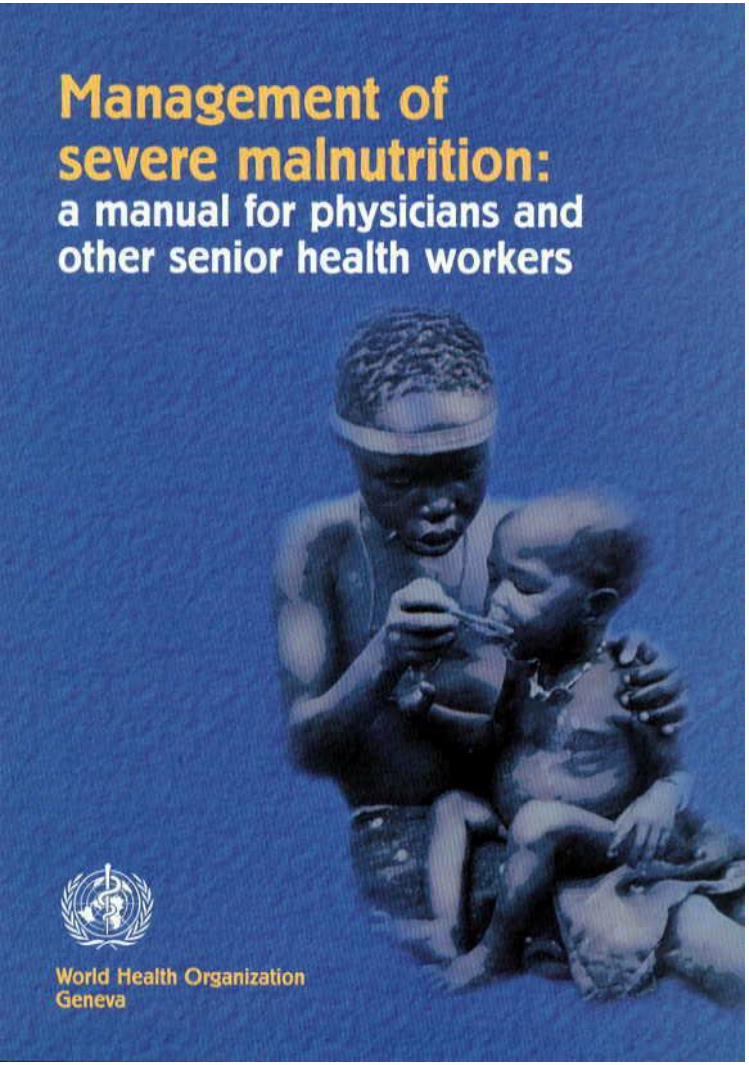
ACCESS - CVP or peripheral line

MONITORING - Daily reassessment including intake, fluid balance and biochemistry + weekly wt

Sheema; aged 2 years, size of 1 month old

Diagnosis “Tb”, case fatality 50%

Nutrition “lens”:
STRUCTURED CARE
diagnosis malnutrition
five weeks, case fatality 5%



Nutritional Lens

Effective care counterintuitive

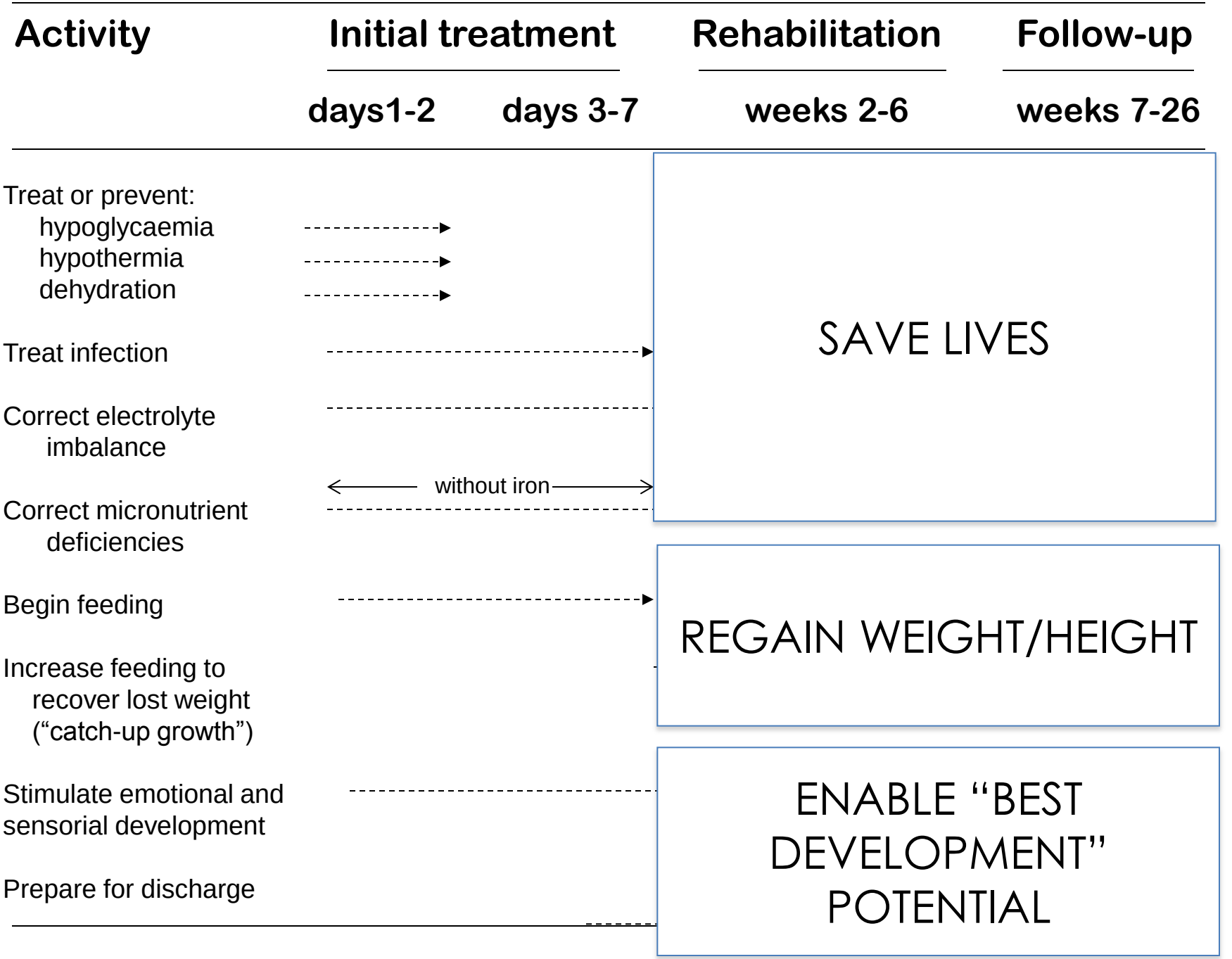
Structure no longer adequately marks function

Reductive adaptation:

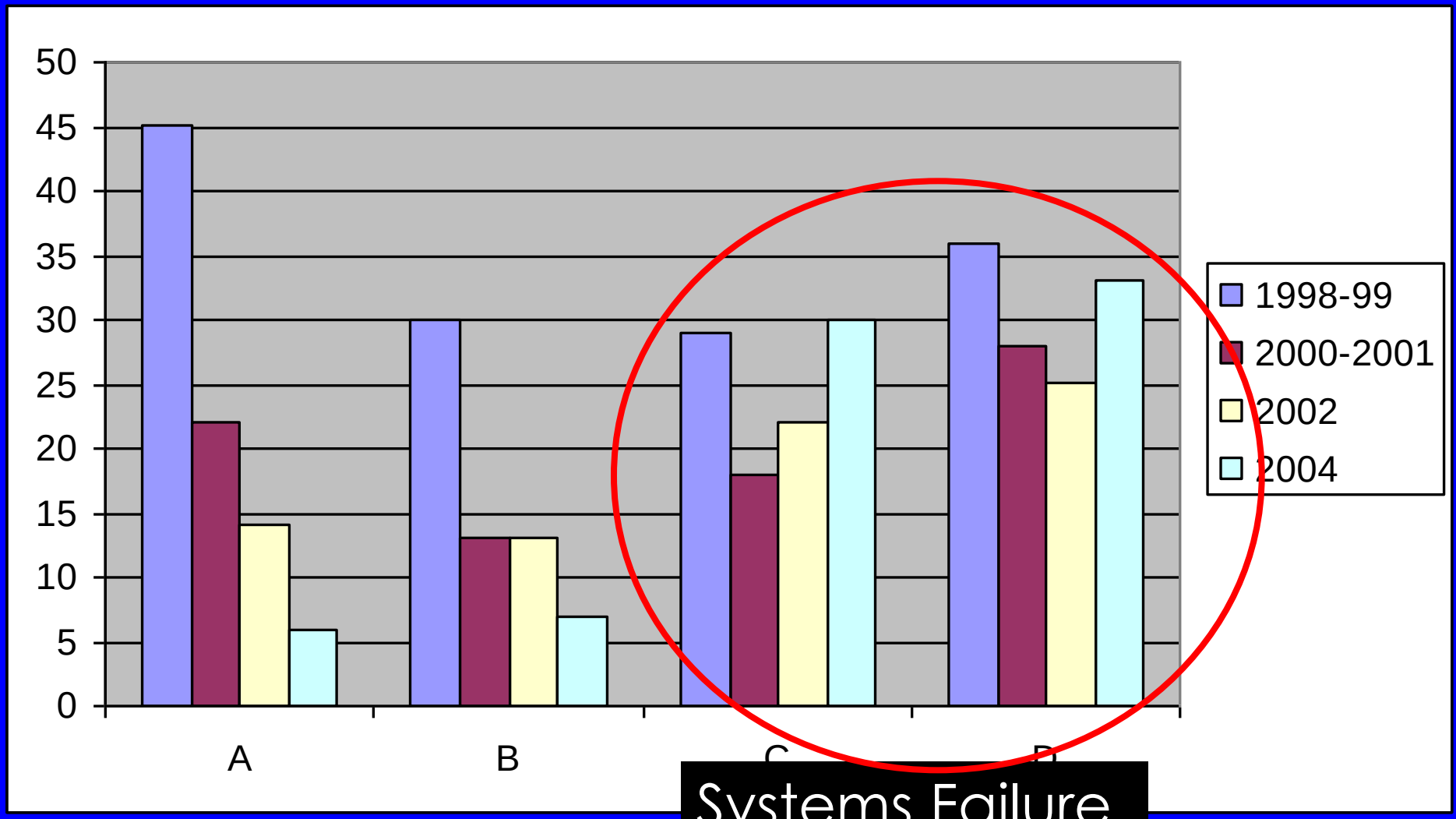
Specific nutrient deficiencies

Silent infection

Ten point structured care


Activity
Initial treatment
Rehabilitation
Follow-up
days1-2
days 3-7
weeks 2-6
weeks 7-26
Treat or prevent:
hypoglycaemia
hypothermia
dehydration
Treat infection
Correct electrolyte imbalance
without iron
Correct micronutrient deficiencies
Begin feeding
Increase feeding to recover lost weight ("catch-up growth")
Stimulate emotional and sensorial development
Prepare for discharge
SAVE LIVES
REGAIN WEIGHT/HEIGHT
ENABLE "BEST DEVELOPMENT" POTENTIAL

Resource Poor Areas South Africa
Structured Care
Mortality pre- and post-training



Differences between hospitals

	Performing well	Performing poorly
In-service training	✓	✗
Induction of new staff	✓	✗
Audit and discussion of critical incidents	✓	✗
Supervision of junior staff and mothers	✓	✗
Leadership and teamwork	✓	✗

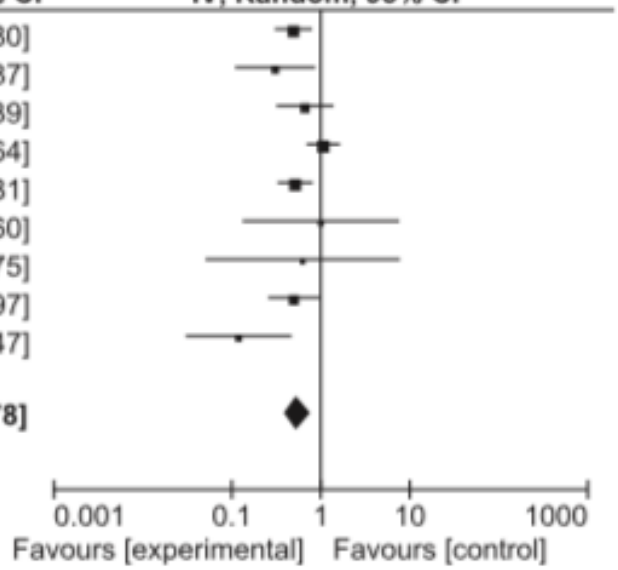
Efficacy of World Health Organization guideline in facility-based reduction of mortality in severely malnourished children from low and middle income countries: A systematic review and meta-analysis

Muttaquina Hossain, Mohammod J Chisti, Mohammod Iqbal Hossain, Mustafa Mahfuz, Mohammad Munirul Islam and Tahmeed Ahmed

	WHO Protocol		Comparison group			Odds Ratio	Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	IV, Random, 95% CI	IV, Random, 95% CI
Ahmed T,1999	30	334	49	293	18.0%	0.49 [0.30, 0.80]	
Ashworth A 2004	10	48	12	26	8.1%	0.31 [0.11, 0.87]	
Ashworth A 2004 a	18	98	18	71	12.4%	0.66 [0.32, 1.39]	
Bachou H 2008	57	230	52	220	19.3%	1.06 [0.69, 1.64]	
Giugliani C 2010	33	379	56	358	18.7%	0.51 [0.33, 0.81]	
Hossain MM 2009	2	30	2	30	2.7%	1.00 [0.13, 7.60]	
Prada, 2011	1	13	2	17	1.8%	0.63 [0.05, 7.75]	
Shwe N 2003	16	186	25	157	13.8%	0.50 [0.25, 0.97]	
Shwe N 2003 a	3	66	10	35	5.3%	0.12 [0.03, 0.47]	
Total (95% CI)		**1384**		**1207**	**100.0%**	**0.55 [0.38, 0.78]**	
Total events	170		226				

Heterogeneity: Tau² = 0.12; Chi² = 15.43, df = 8 (P = 0.05); I² = 48%

Test for overall effect: Z = 3.37 (P = 0.0008)



Going to Scale: Malnutrition eLearning

Malnutrition eLearning

Home

About Course

Take Course

About Us

Help and Support

Welcome to the New Malnutrition eLearning Course!

Please click here to start the new course.

Malnutrition eLearning is an interactive, contextualised and media-rich course.

Based on the WHO guidelines for the management of Severe Acute Malnutrition (SAM), it has been developed to train health professionals in the underlying principles of malnutrition and its management.

The original version was developed by the University of Southampton and the International Malnutrition Task Force in 2010 and launched in 2011 to reduce child deaths by malnutrition. Since its launch to Spring 2018, Malnutrition eLearning had been used by many health professionals and students (>17,000) from over 120 countries.

Going to Scale: Malnutrition eLearning

Module 1: Definition and classification of malnutrition


Introduction to Module 1


Unit 1: Definition


Unit 2: Changes in malnutrition

Module 2: How to identify children with malnutrition


Introduction to Module 2


Unit 1: Assessment and screening options


Unit 2: How to take measurements


Unit 3: How to examine a child

Module 3: How to manage children with malnutrition


Introduction to Module 3


Unit 1: Principles of management


Unit 2: Managing malnutrition


Unit 3: Supporting parents and carers

Going to Scale: Malnutrition eLearning

JOURNAL OF MEDICAL INTERNET RESEARCH Choi et al

Original Paper

Effectiveness of the Malnutrition eLearning Course for Global Capacity Building in the Management of Malnutrition: Cross-Country Interrupted Time-Series Study

Conclusions:
The malnutrition eLearning course improved knowledge, understanding, and skills of health professionals in the diagnosis and management of children with severe acute malnutrition, and changes in clinical practice and confidence were reported following the completion of the course.

J Med Internet Res 2018;20(10):e10396) doi: 10.2196/10396

BMJ Journals

Archives of Disease in Childhood

Improved care and survival in severe malnutrition through eLearning

Sunhea Choi,[1] Ho Ming Yuen,[2] Reginald Annan,[3] Michele Monroy-Valle,[4] Trevor Pickup,[2] Nana Esi Linda Aduku,[3] Andy Pulman,[2] Carmen Elisa Portillo Sermeño,[5] Alan A Jackson,[6] Ann Ashworth[7]

What this study adds?

- Diagnosis and quality of inpatient care were observed to improve with the interactive eLearning course 'Caring for infants and young children with severe malnutrition'.
- Case-fatality rates fell from 5.8% to 1.9% after training.

Growth Following Whooping Cough: INCAP 1978

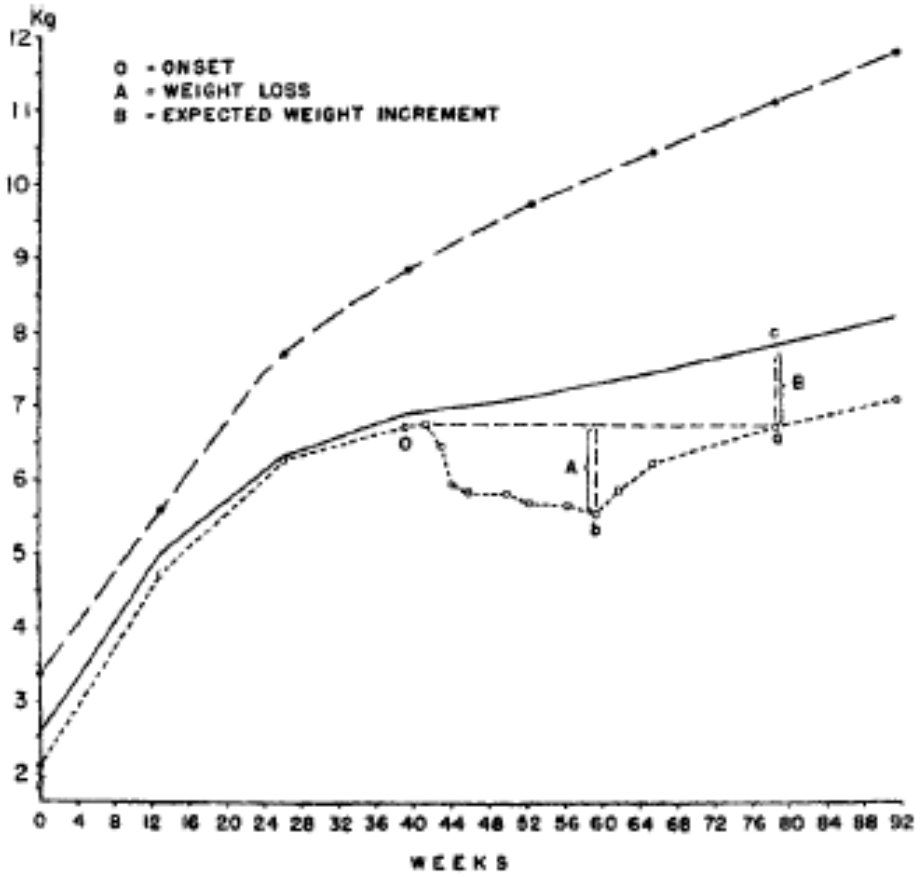
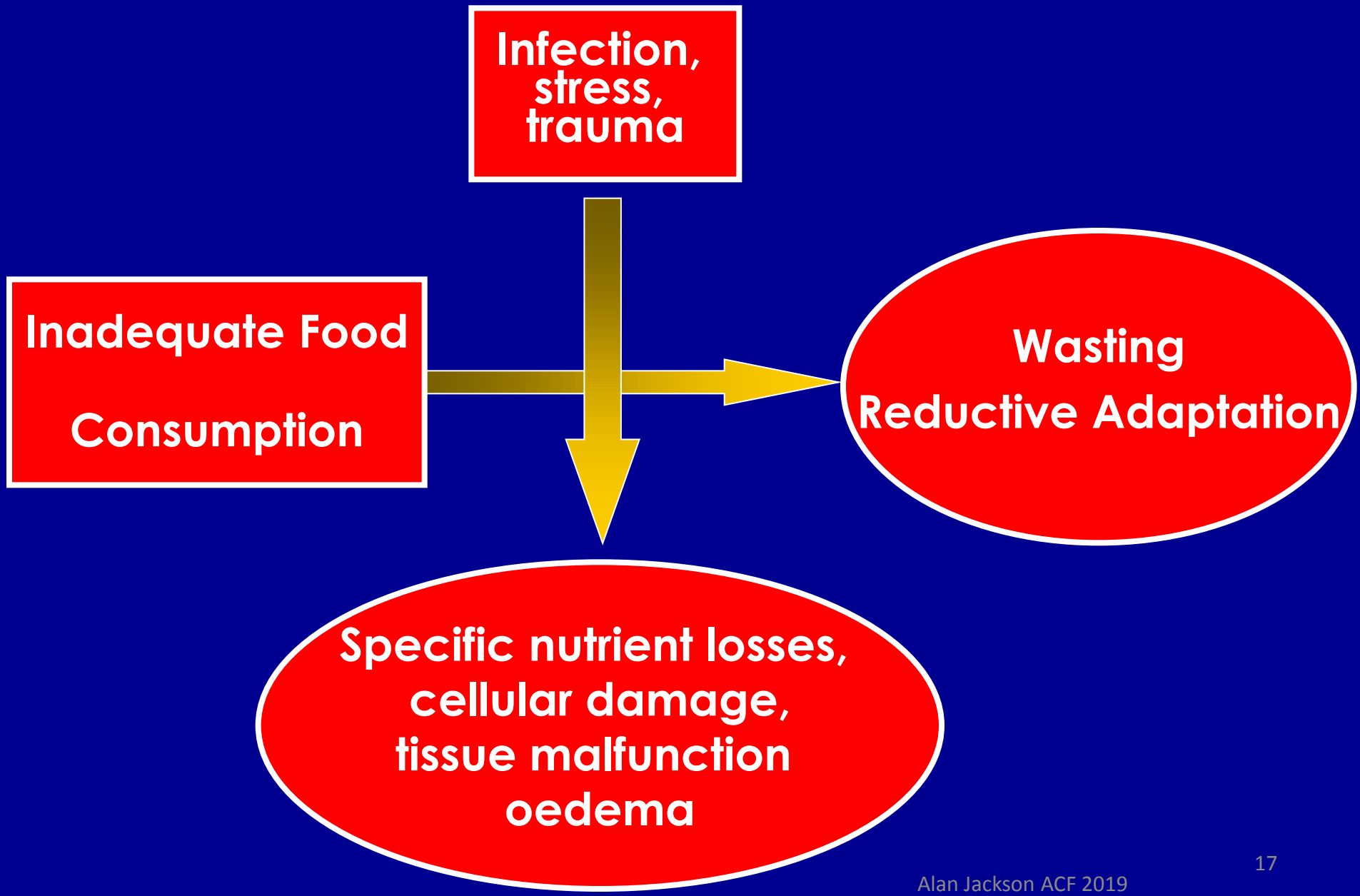
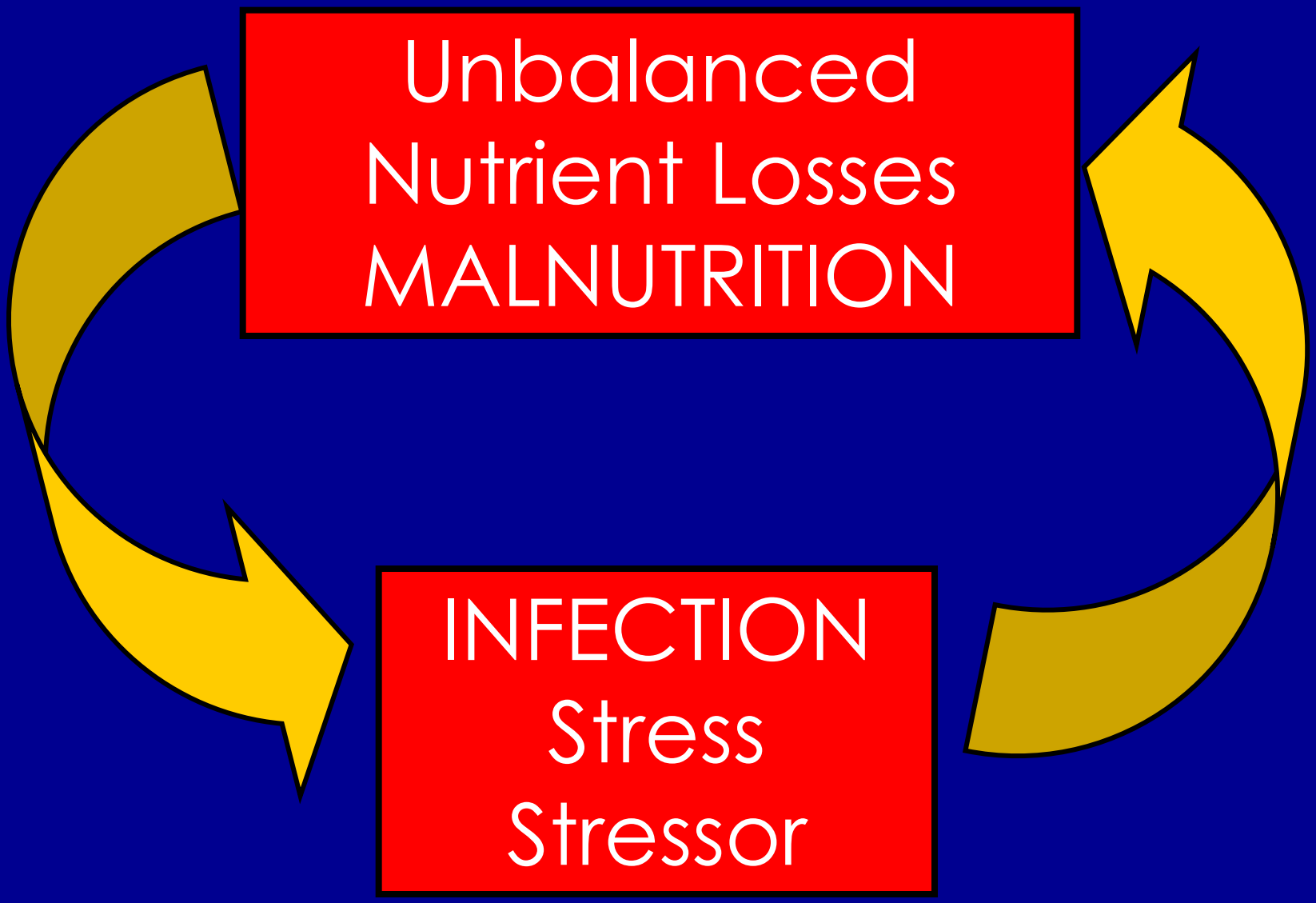


FIGURE 1 Effect of whooping cough on the growth of a Guatemala highland village child [Source: Mata 1978 (7)]. The deterioration in the nutritional status of a female child after an attack of whooping cough is graphically represented. Thirty-nine wk were required for a return to weight at the time of onset. The broken top line corresponds to the weight curve for well-nourished children. The broken line gives the average growth for children in the same village.

QUALITY AS WELL AS QUANTITY




Unbalanced
Nutrient Losses
MALNUTRITION
INFECTION
Stress
Stressor

QUALITY AS WELL AS QUANTITY

Assessment of malnutrition

NO Complications

degree of wasting
weight

Ready to Use
Therapeutic Foods

IUNS Malnutrition Task Force: Tanzania 2006

Integrated Management of Malnutrition
Nutritional status (anthropometry)

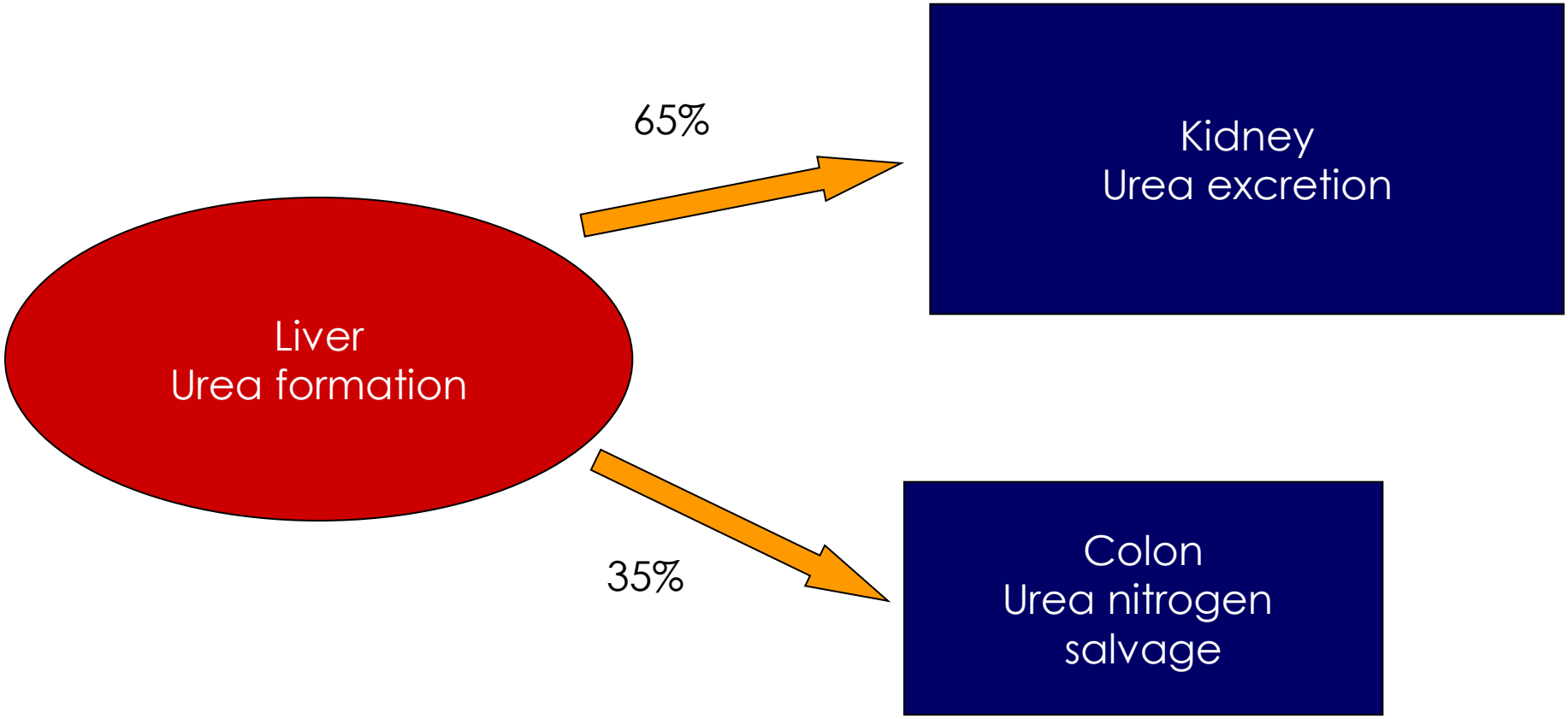
Normal	Food security
Mild to moderate malnutrition, stunting	Supplementary feeding
Severe Acute Malnutrition	Therapeutic food
Severe Acute Malnutrition - oedema - appetite loss	Facility based care

SAM without complications

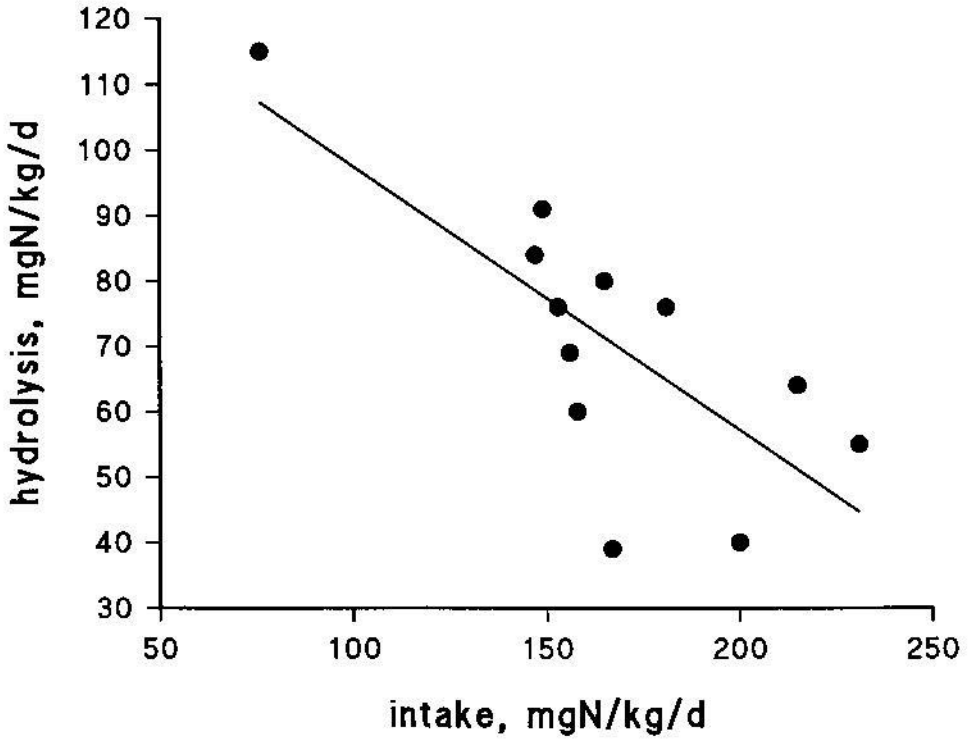
Regain weight and/or height

Rapid weight gain: protein

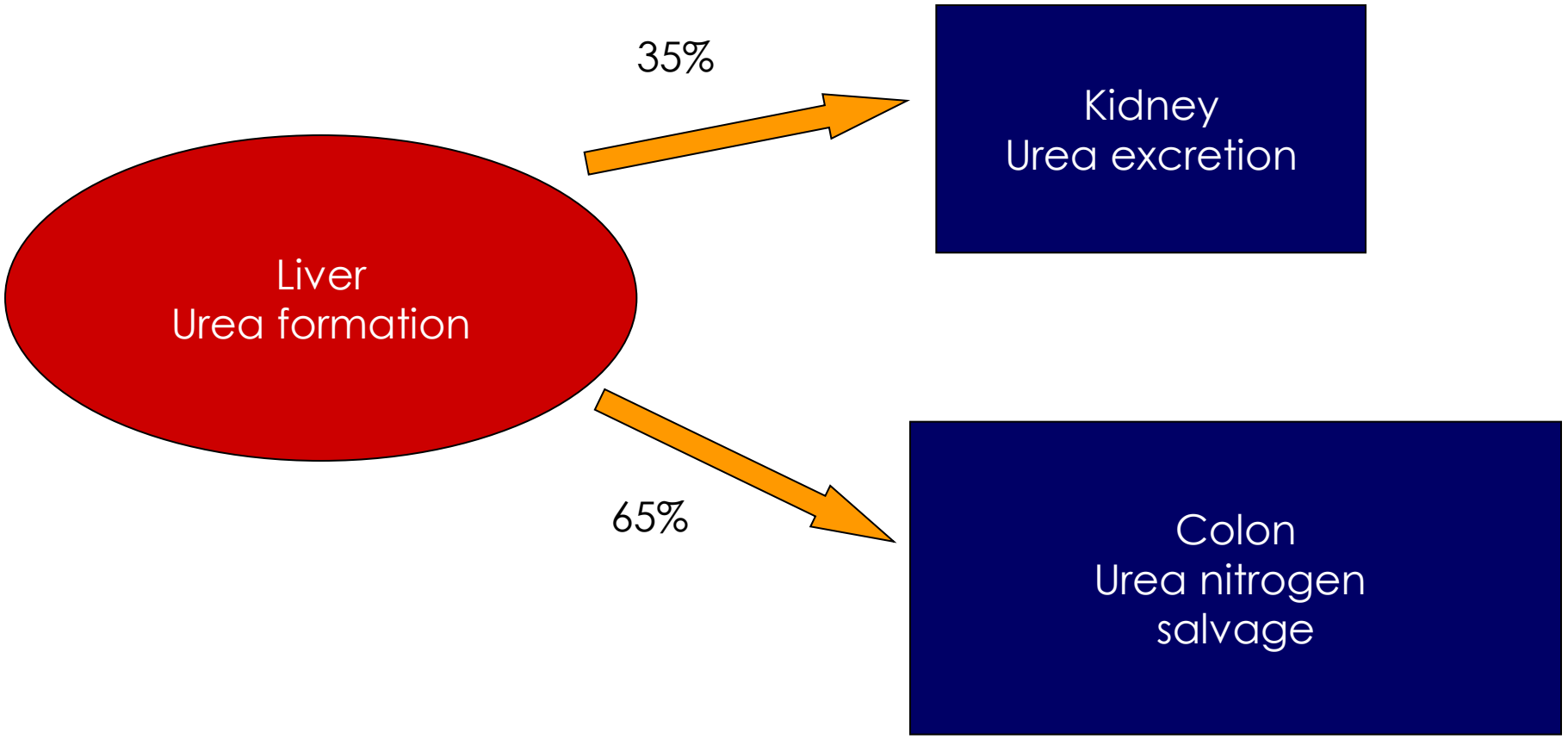
Urea synthesis, excretion and salvage adult usual omnivore diet



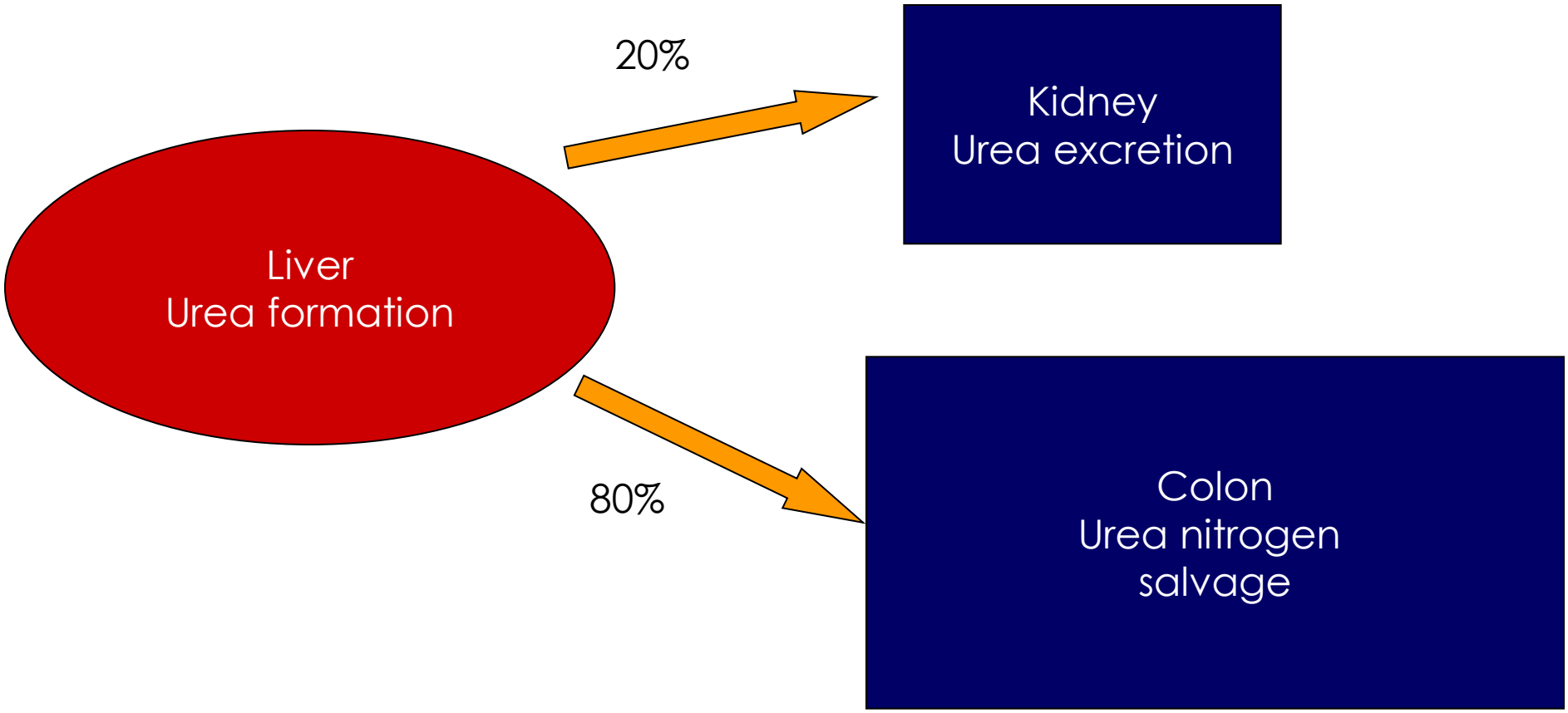
Colonic hydrolysis of urea and salvage of urea N increases as intake decreases



Urea synthesis, excretion and salvage
low protein diet, growth



Urea synthesis, excretion and salvage breast fed newborn infant (P:E ratio <7%: non-protein N ~25% total-N)



Factors affecting Urea-N Salvage

- energy intake (quantity and quality)
- protein intake (P:E ratio)
- metabolic demand (growth)
- antibiotic therapy (microbiota)
- diarrhoea

ENABLE

“BEST DEVELOPMENT”

POTENTIAL

Neurocognitive Development: stunting vs wasting. McGregor et al

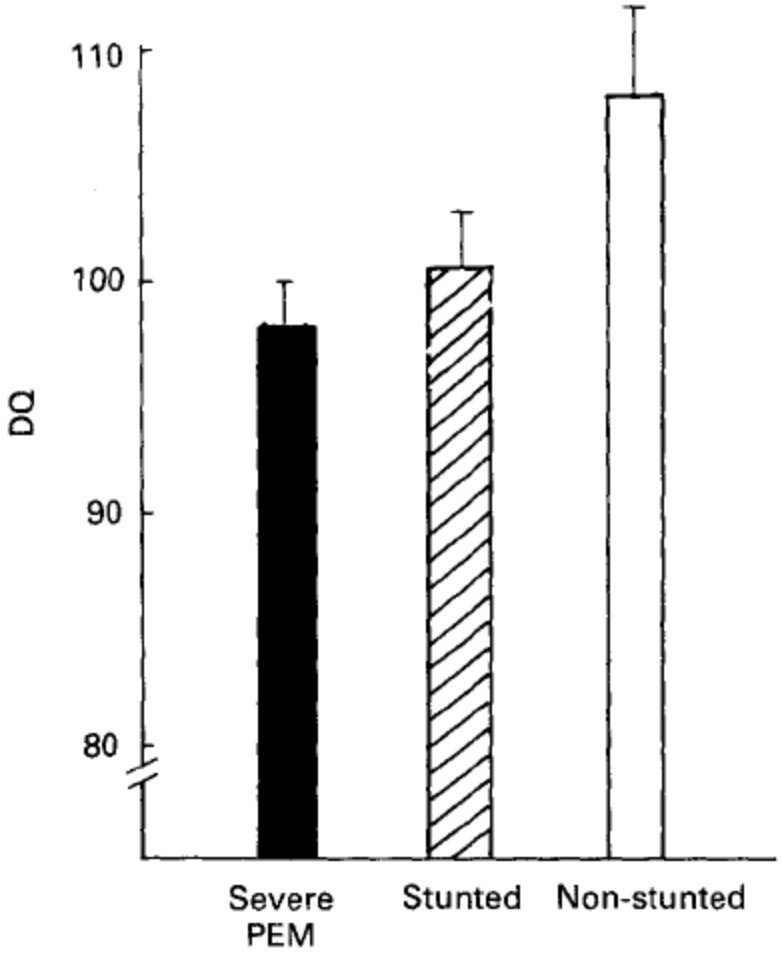


Fig. 2. Developmental quotients (DQ) of three groups of children: (■), recovered severely malnourished (*n* 29); (▨), group matched for age, sex and height (*n* 29); (□), non-stunted controls (*n* 15). Values are means with their standard errors represented by vertical bars. (From Grantham-McGregor *et al.* 1989.)

Remedial supplementation + stimulation: RCT with Jamaican stunted children

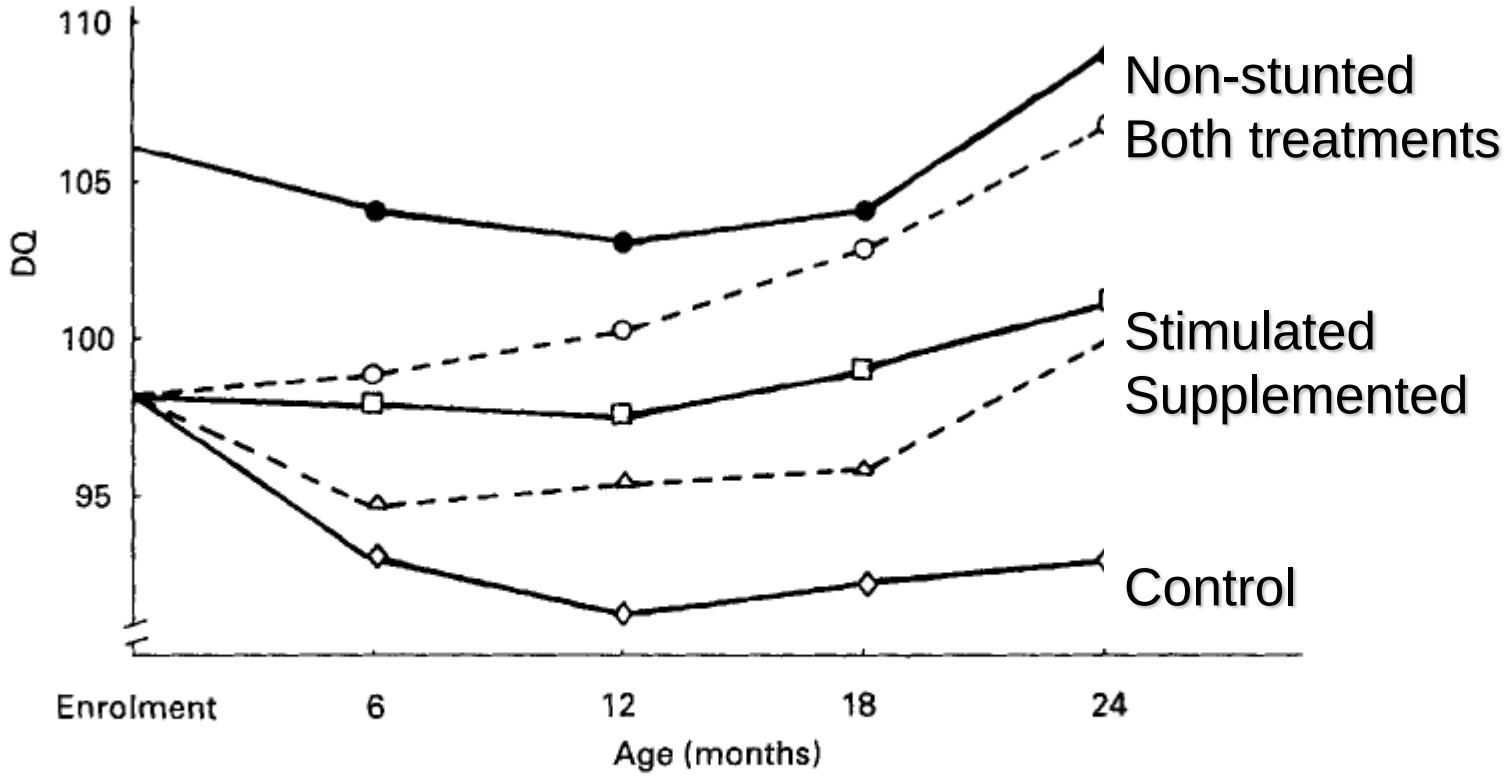


Fig. 3. Developmental quotients (DQ) of stunted groups adjusted for initial age and score, compared with non-stunted group adjusted for age only (Grantham-McGregor *et al.* 1991). (○– – –○), Both; (□——□), stimulated; (△– – –△), supplemented; (◇——◇), control; (●——●), non-stunted.

Long Term Implications:
achievement, behaviour, social competence

Nobel Prize in Economics 2019
"for their experimental approach to alleviating global poverty."

Abhijit Banerjee

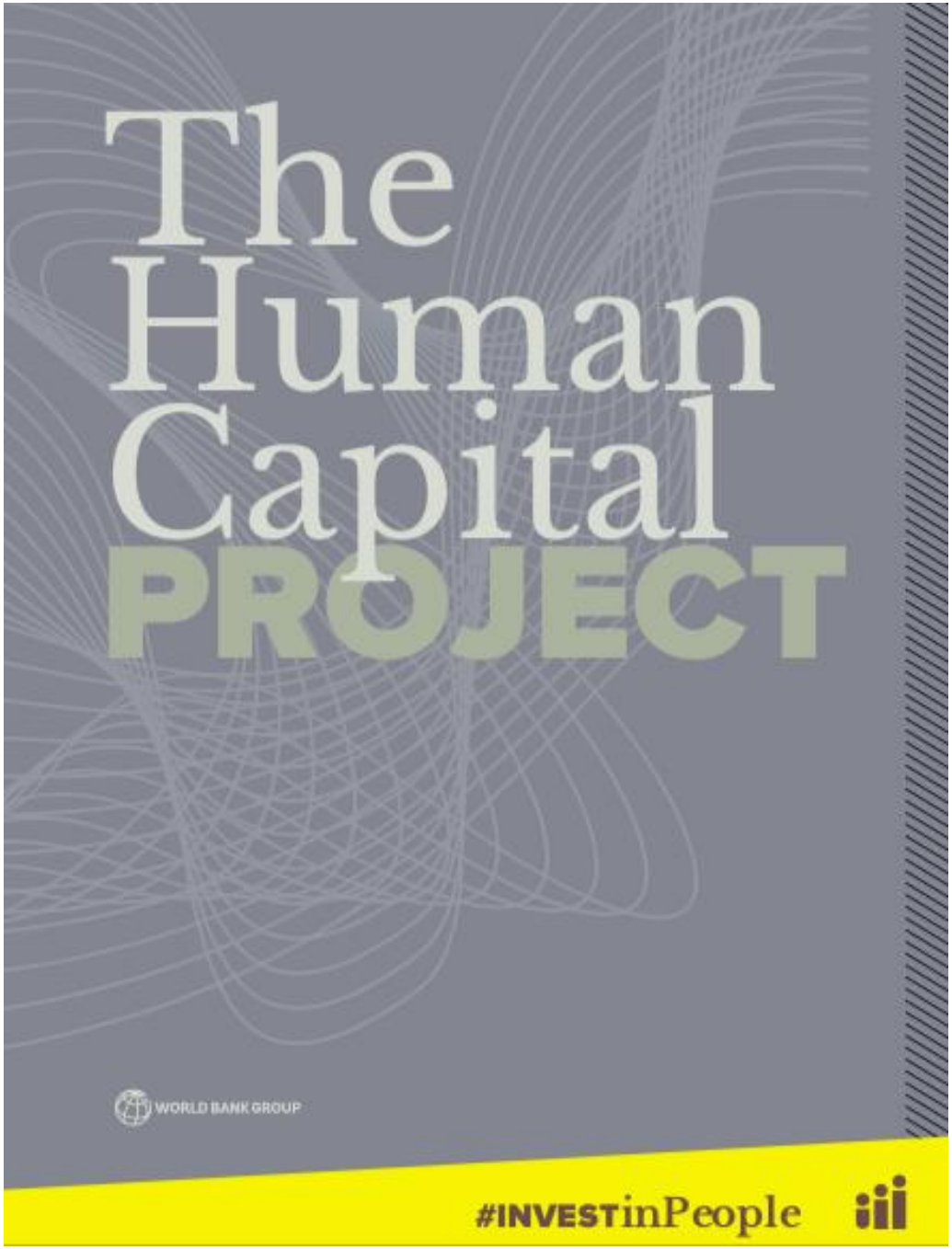
Esther Duflo

Michael Kremer

More than 700 million people still subsist on extremely low incomes. Every year, around five million children under the age of five still die of diseases that could often have been prevented or cured with inexpensive treatments.

Half of the world's children still leave school without basic literacy and numeracy skills. This year's Laureates have introduced a new approach to obtaining reliable answers about the best ways to fight global poverty. In brief, it involves dividing this issue into smaller, more manageable, questions – for example, the most effective interventions for improving educational outcomes or child health.

They have shown that these smaller, more precise, questions are often best answered via carefully designed experiments among the people who are most affected.

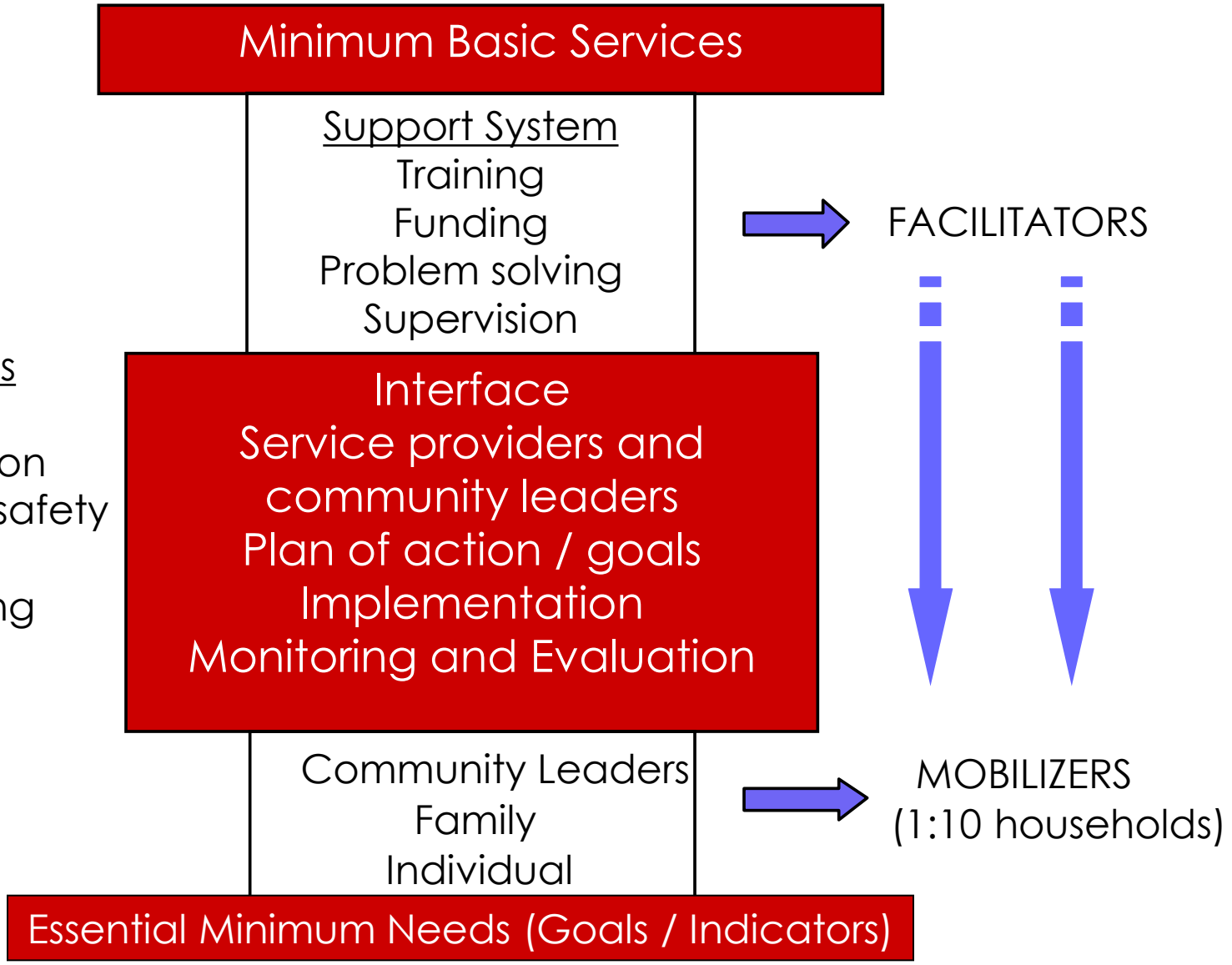


human capital
vs
human capability

Assets
vs
values, worth

Intergenerational value

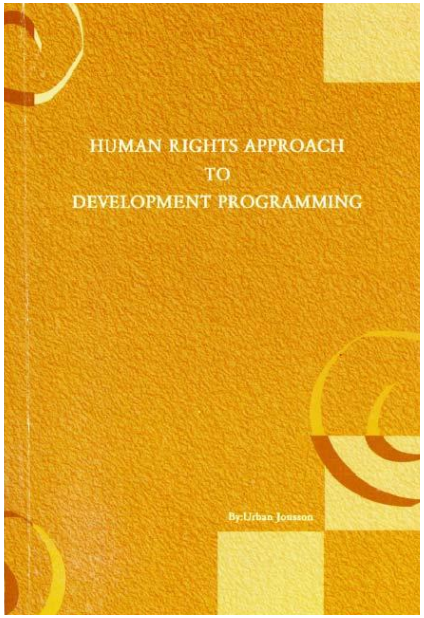
FAO Model for Sustainable Health

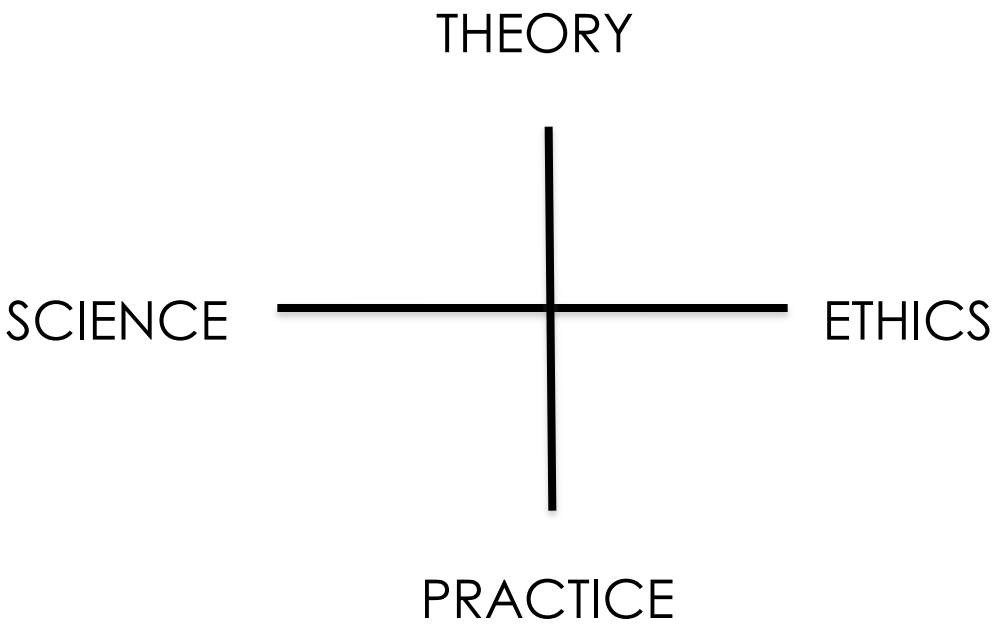


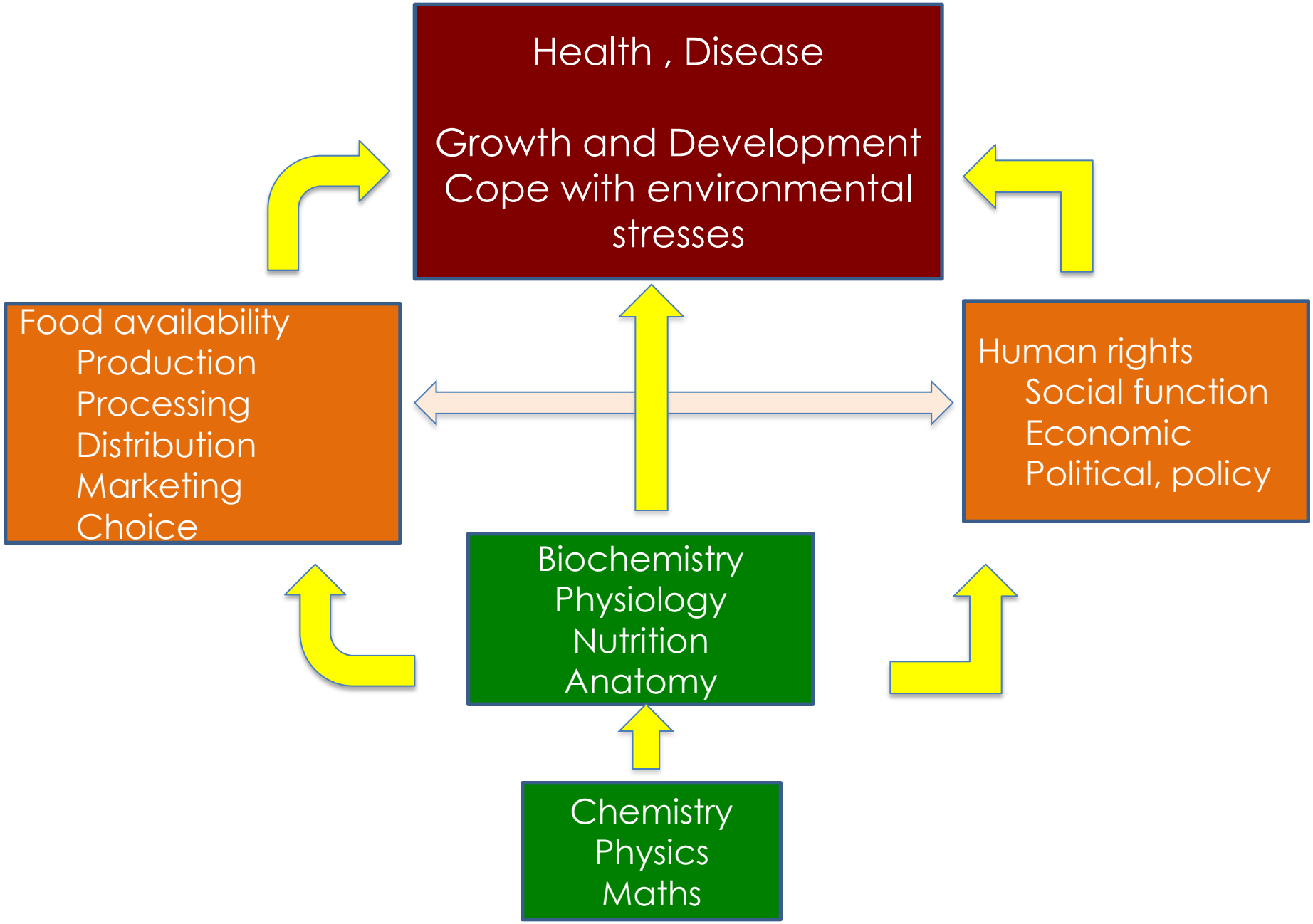
Human Rights Approach to Developmental Programming

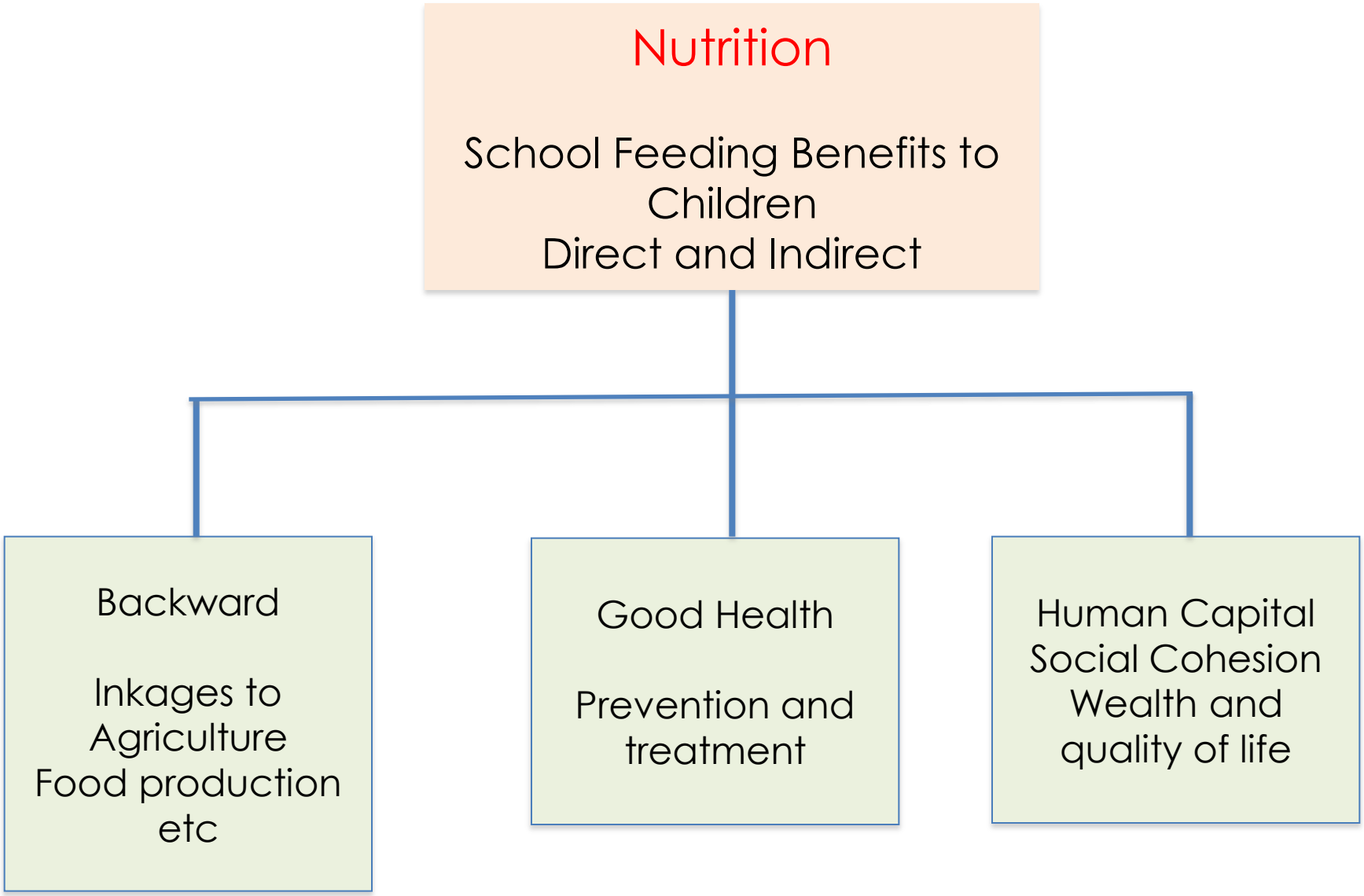
Science what we can do. Ethics what we ought to do.

Urban Jonsson






Health , Disease
Growth and Development
Cope with environmental stresses
Food availability
Production
Processing
Distribution
Marketing
Choice
Human rights
Social function
Economic
Political, policy
Biochemistry
Physiology
Nutrition
Anatomy
Chemistry
Physics
Maths


Nutrition
School Feeding Benefits to Children
Direct and Indirect
Backward
Inkages to Agriculture
Food production
etc
Good Health
Prevention and treatment
Human Capital
Social Cohesion
Wealth and quality of life

UNSCN:

Prepare children for life – 9000 days to grow a person

First 1,000 days: pregnancy, infancy, young child upto 2 years of age

Next 8,000 days: school, children,
lessons of life, preparation for parenthood
children teenagers and young adults.

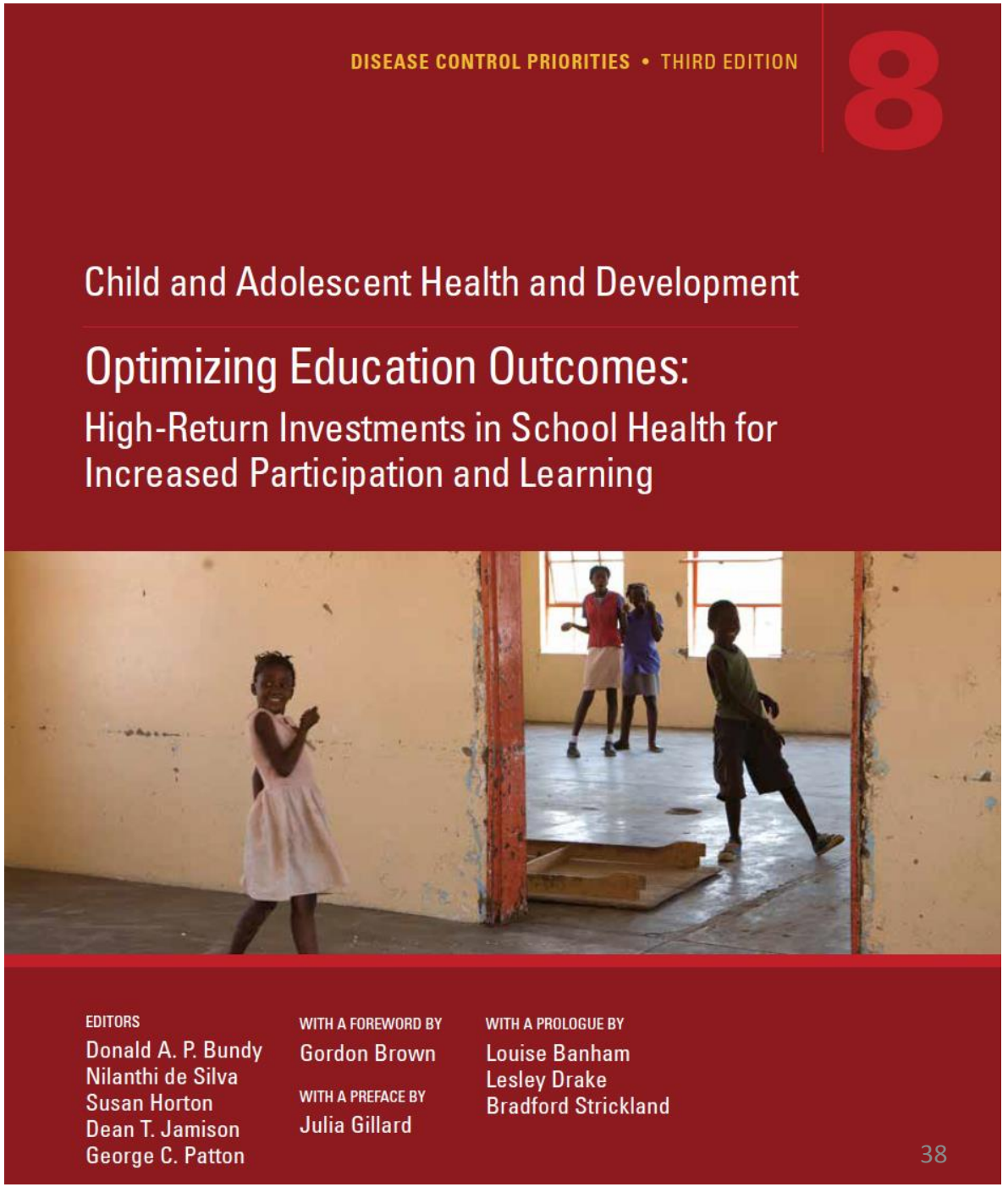
Periods of transition: dependence to independence.

From conception:
20 years to grow an adult

Changing vulnerability

Changing needs

Increasing biological and social capability



Investment in child and adolescent health and development: key messages from *Disease Control Priorities*, 3rd Edition

*Donald A P Bundy, Nilanthi de Silva, Susan Horton, George C Patton, Linda Schultz, Dean T Jamison, for the Disease Control Priorities-3 Child and Adolescent Health and Development Authors Group**

Lancet 2017

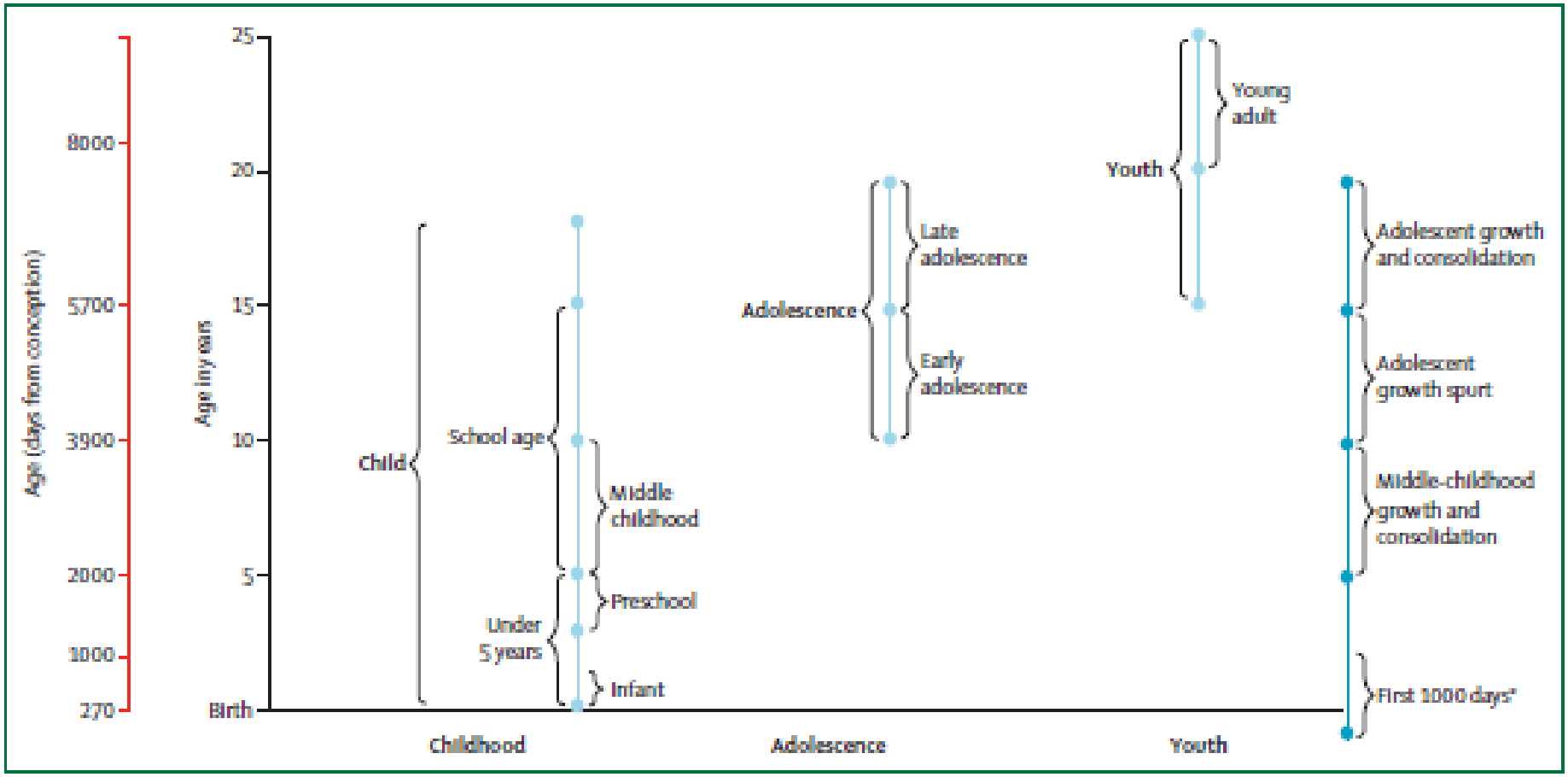


Figure 1: Nomenclature concerning age and four key phases of child and adolescent development

Changing vulnerability: consideration of timing
Move from dependent to increasing independence

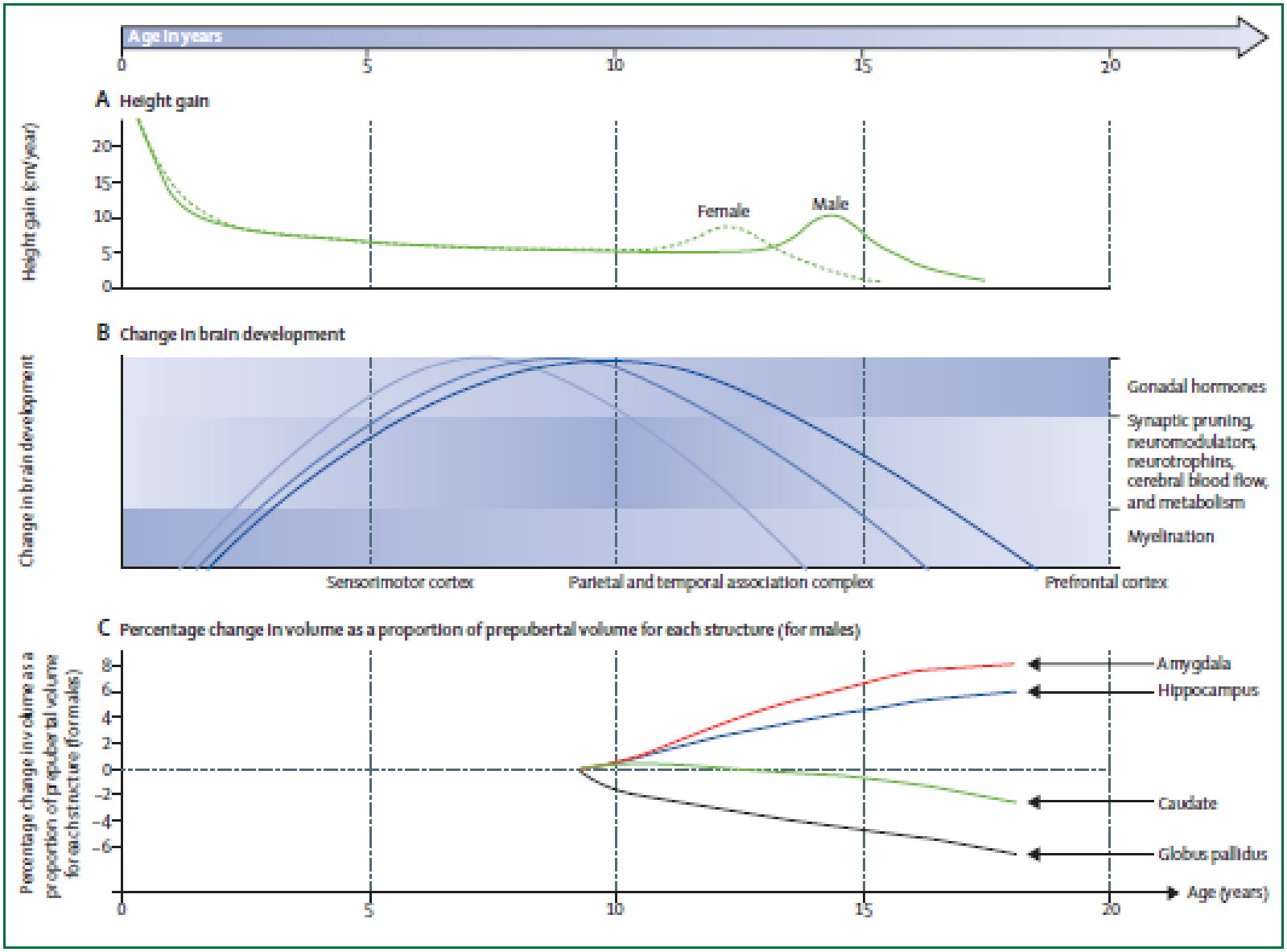


Figure 2: Human development to 20 years

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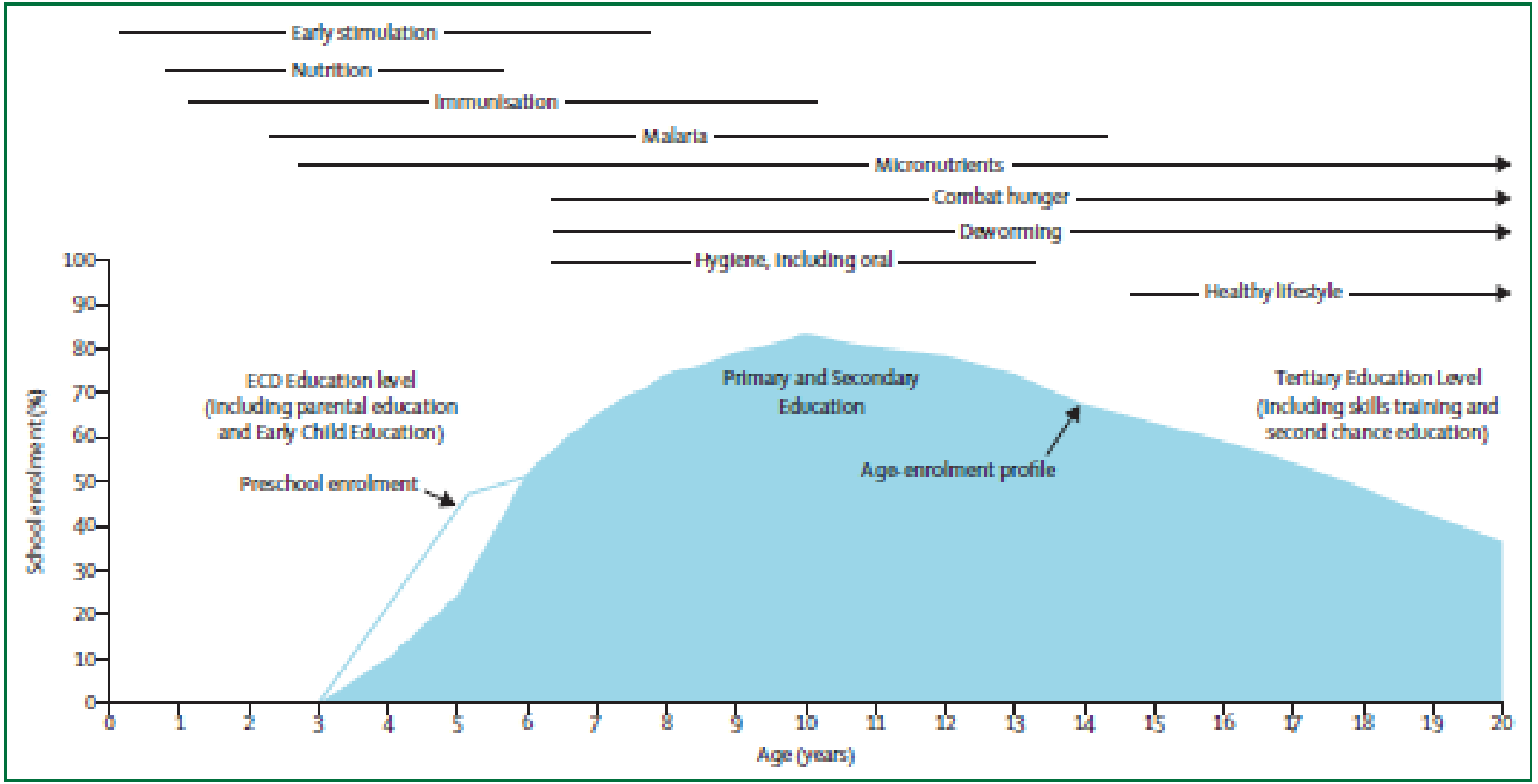


Figure 3: Indicative rate of school enrolment in LLMICs

Addressing Inequality

Children in School

– preparation to know what and how life should be led

Teachers:

- knowledgeable and competent to create a learning environment which reinforces better practices and how to cope with challenges

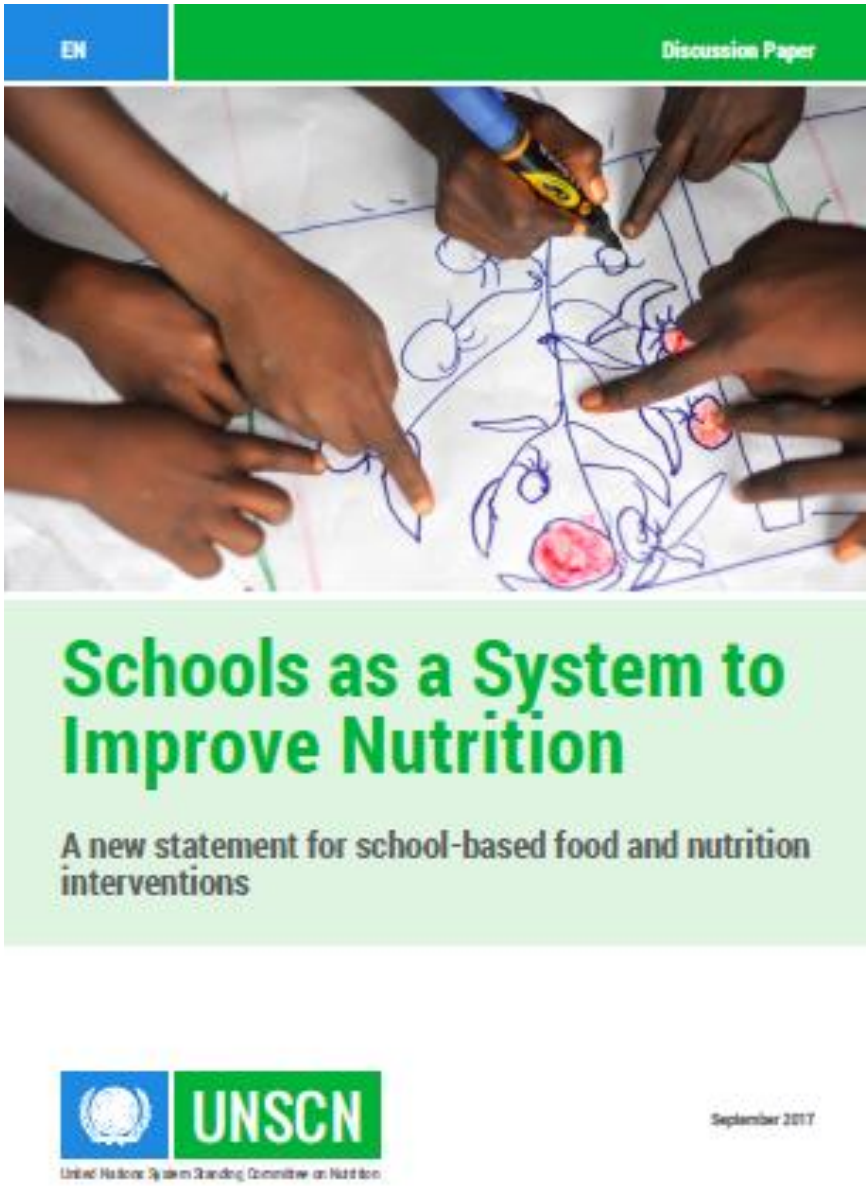


Table of contents

6 Food and nutrition education

Food and nutrition education in the school setting can provide children, adolescents, school staff and communities with learning experiences designed to encourage healthy eating habits and other positive nutrition-related behaviors. It is important to use a combination of evidence-based and behaviorally focused educational strategies that involve the active participation of students, school staff and the wider community. Guidance on implementing a food and nutrition curriculum should be established at a national level to ensure a defined role for nutrition in the national education system. Governments can also help by providing clear directives in terms of nutritional concepts to be mastered at each stage of the educational system and within which subjects, e.g. natural sciences and health and social science. However, schools should be allowed to adapt and prioritize elements of the curriculum based on the local situation, i.e. resource availability and population needs.

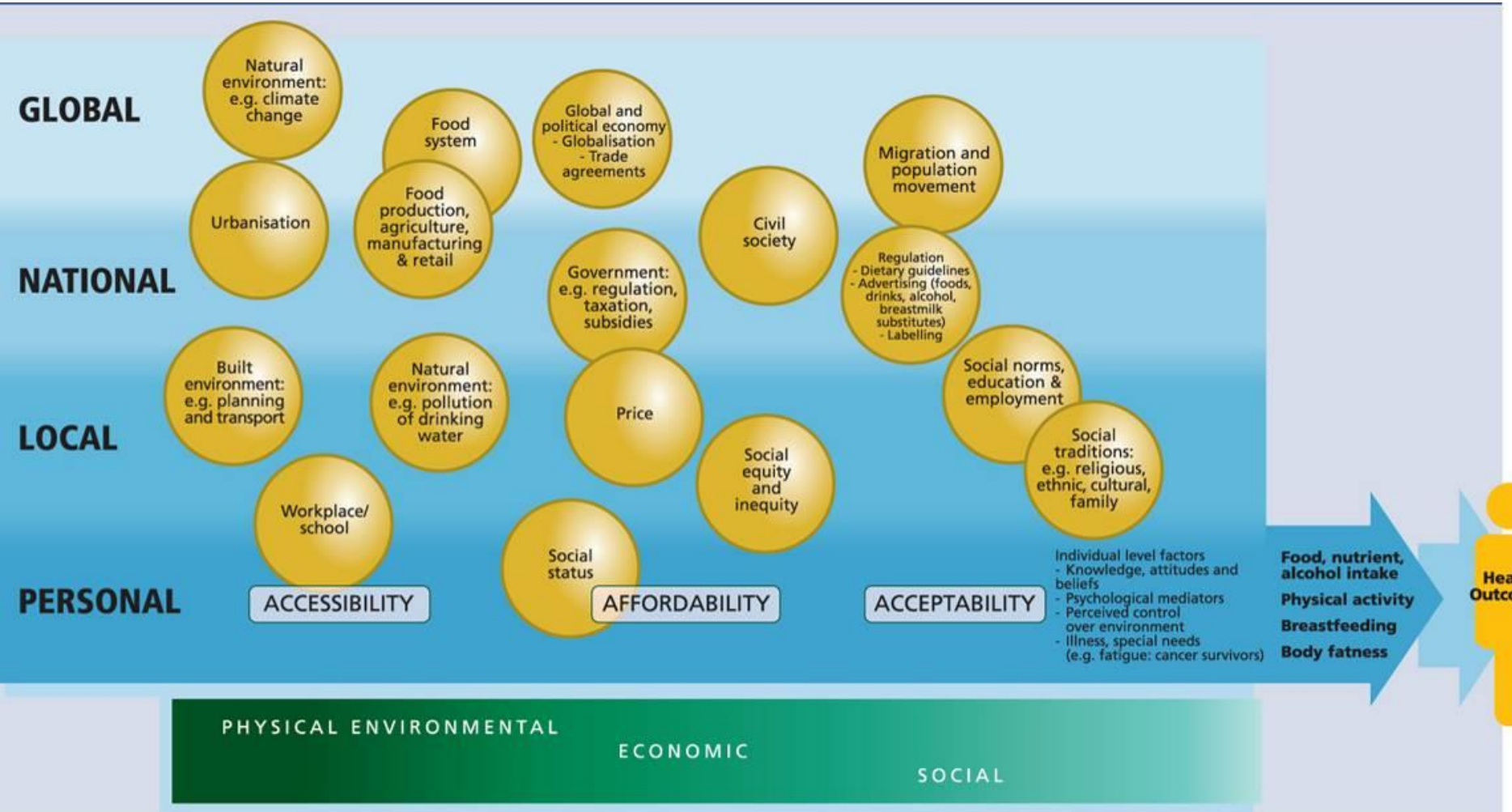
7 Teachers and other agents of change in promoting positive nutrition behavior

Changing the school environment and implementing nutrition- and health-related intervention requires capable, trained agents of change. Teachers, school staff, students, parents, caterers, food vendors, and farmers all have an important role to play in helping promote positive nutritional behavior. Developing capacity for these actors and equipping them with the necessary knowledge and skills on nutrition, food hygiene, healthy diets, and lifestyle is paramount. Teachers, in particular, will require more formal training and capacity development, as they can be among the most important promoters of positive nutritional behavior among the youth. They have the opportunity not only to influence eating habits through food and nutrition education, but also to address other issues, including the nutritional needs of adolescent girls and pregnant women, and maternal and infant care. Other actors, such as parents, caterers, food vendors, and farmers, can benefit from educational sessions too. Capacity-building activities should be integrated into school-based strategies to improve nutrition outcomes.

Behaviour

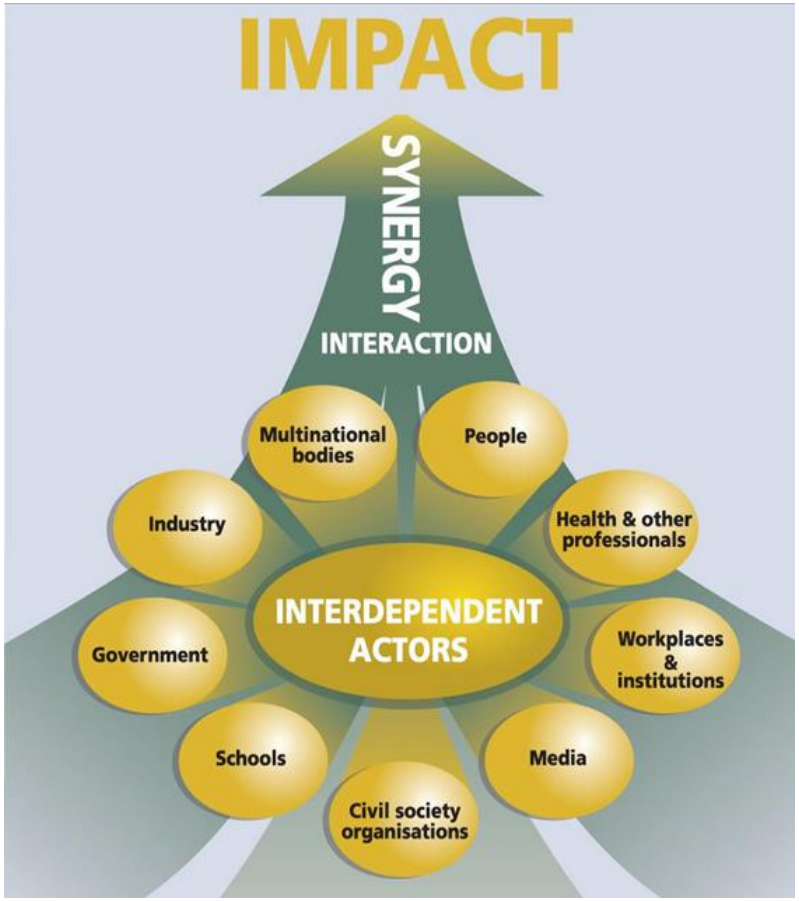
- People behave like those around them
  - social norms
- Asking people to behave very differently from their social norm only has limited or unsustained effect
- Personal choice determines individual variation around the social norm
  - small effect
- External factors determine social norms
  - big effect

Self Efficacy
What Constrains Personal Choice?



Policy and Action for Cancer Prevention

Impact of Concerted Action



- Everyone has a role
- Action to be coherent
- Leadership from
  - Government
  - Health professionals


Policy and Public Health
Community care, School services, Workplace
Doctor, health team: primary, secondary, tertiary etc
Social, cultural, religious values
Family environment and care
Personal Responsibility

Model: Community Based Approach

Create an Environment/People Centred Health Systems

Cannot do it TO people – pharma model

Have to do it for themselves: help, encourage, enable

Age-friendly communities that foster support for younger and older age groups

Community based care: fit for purpose, context specific

Develop skilled capability

Looking Forwards: It takes 20 years to grow a child

Role for everyone – all accountable

a) where we agree, basis for action

b) where we disagree: basis for research

principles unchanged
modified by context

Curriculum development:
principles, skills, competencies
to allow and enable responsibility and accountability

Planetary Health: protein
Social health: communities
Longer term investment: health and nutrition literacy