Early Childhood Development, Nutrition, and Eating Behavior: Strategies to Prevent Non-communicable Diseases Throughout Life

Maureen M Black, PhD
University of Maryland School of Medicine
RTI International
mblack@som.umaryland.edu

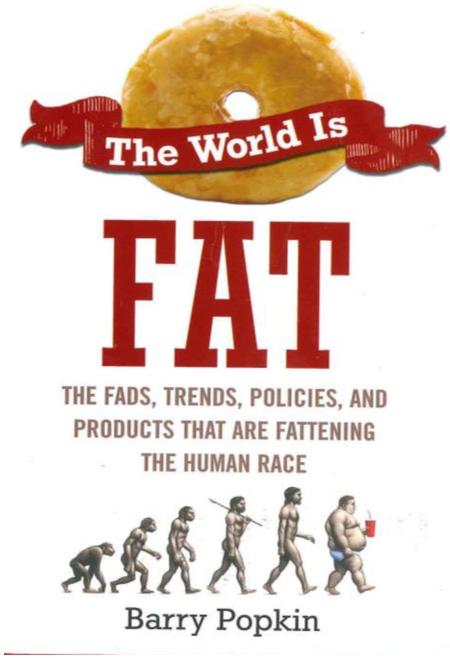
Objectives

- When do risks of NCDs begin?
- How are early nutrition and child development related to NCDs?
- Interventions to prevent NCDs

Nutrition Transition

- Change in growth patterns
  - Less underweight
  - Fewer micronutrient deficiencies
  - More overweight, obesity

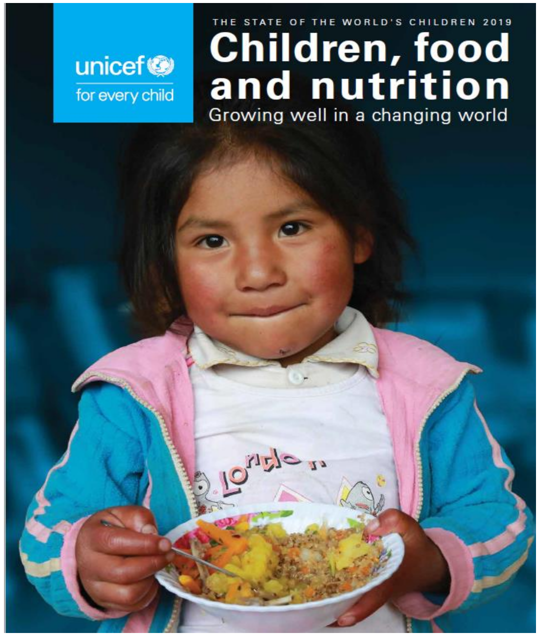
- Change in disease patterns
  - More chronic diseases




CORN
FLAKES
CRACKETS

What is the Double Burden of Malnutrition?

- Coexistence of undernutrition with obesity or non-communicable diseases (NCDs)
  - **Individual** (overweight with iron deficiency anemia
  - **Family** (child - stunted growth & parent - overweight)
  - **Community or country** (stunting or micronutrient deficiencies with increasing rates of overweight and NCDs)



https://data.unicef.org/resources/state-of-the-worlds-children-2019/

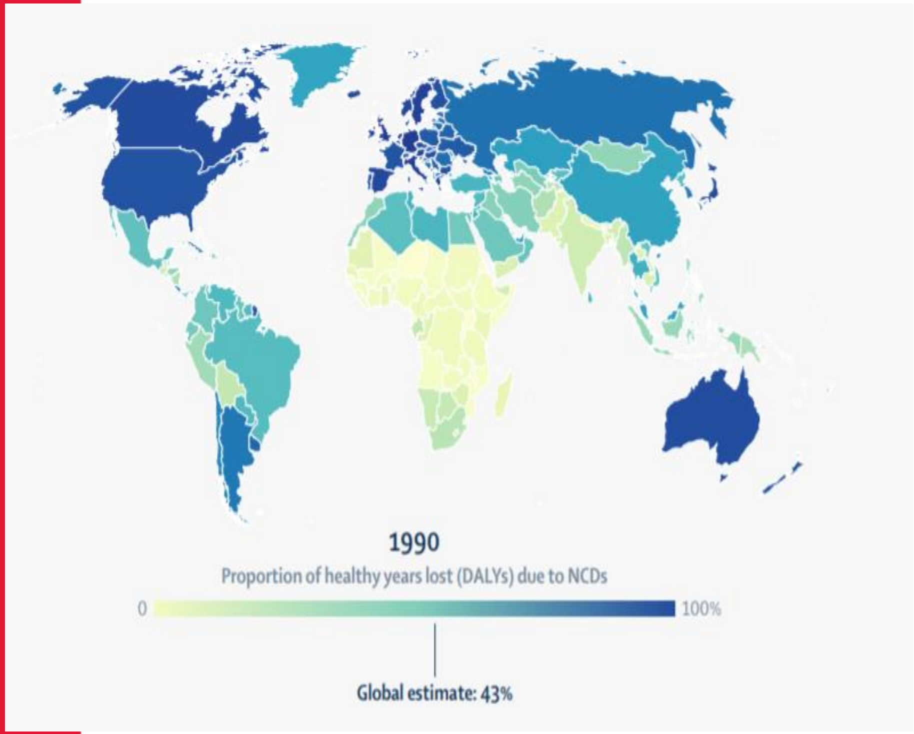
Chronic Diseases vs Infectious Diseases

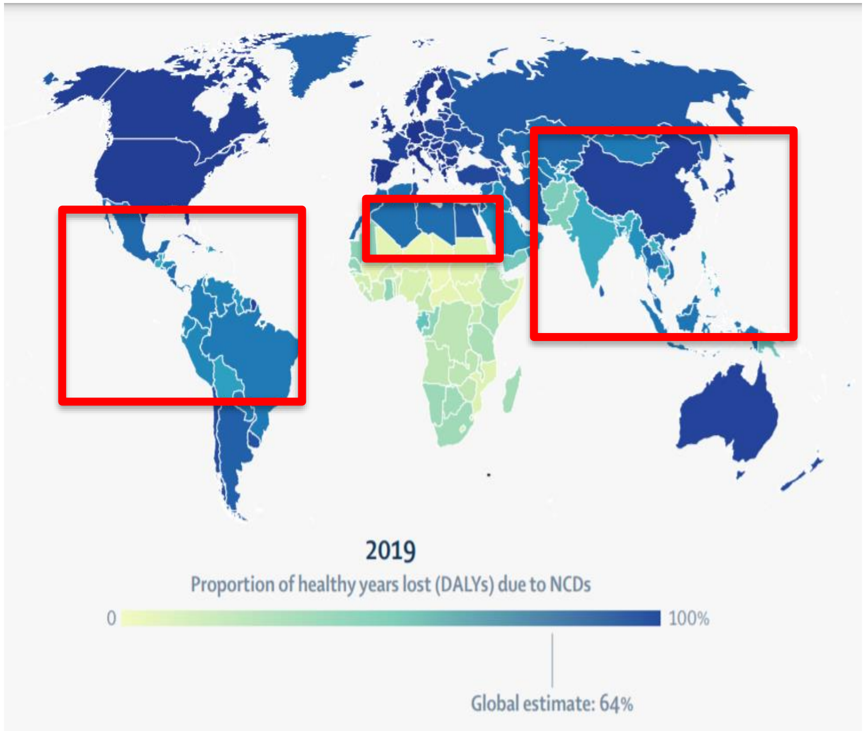
- Infectious Diseases (Malaria, TB, HIV, COVID-19)
  - Some prevented/cured with vaccine
  - Declining
  - Focus of health policy

- Chronic Diseases (CVD, Diabetes, Cancer)
  - Associated with lifestyle behaviors (smoking, unhealthy eating)
  - As life span increases, more time to get chronic disease
  - Require complex intervention
  - Overtaken infectious diseases as world’s greatest health problem

- Double burden: infectious and chronic

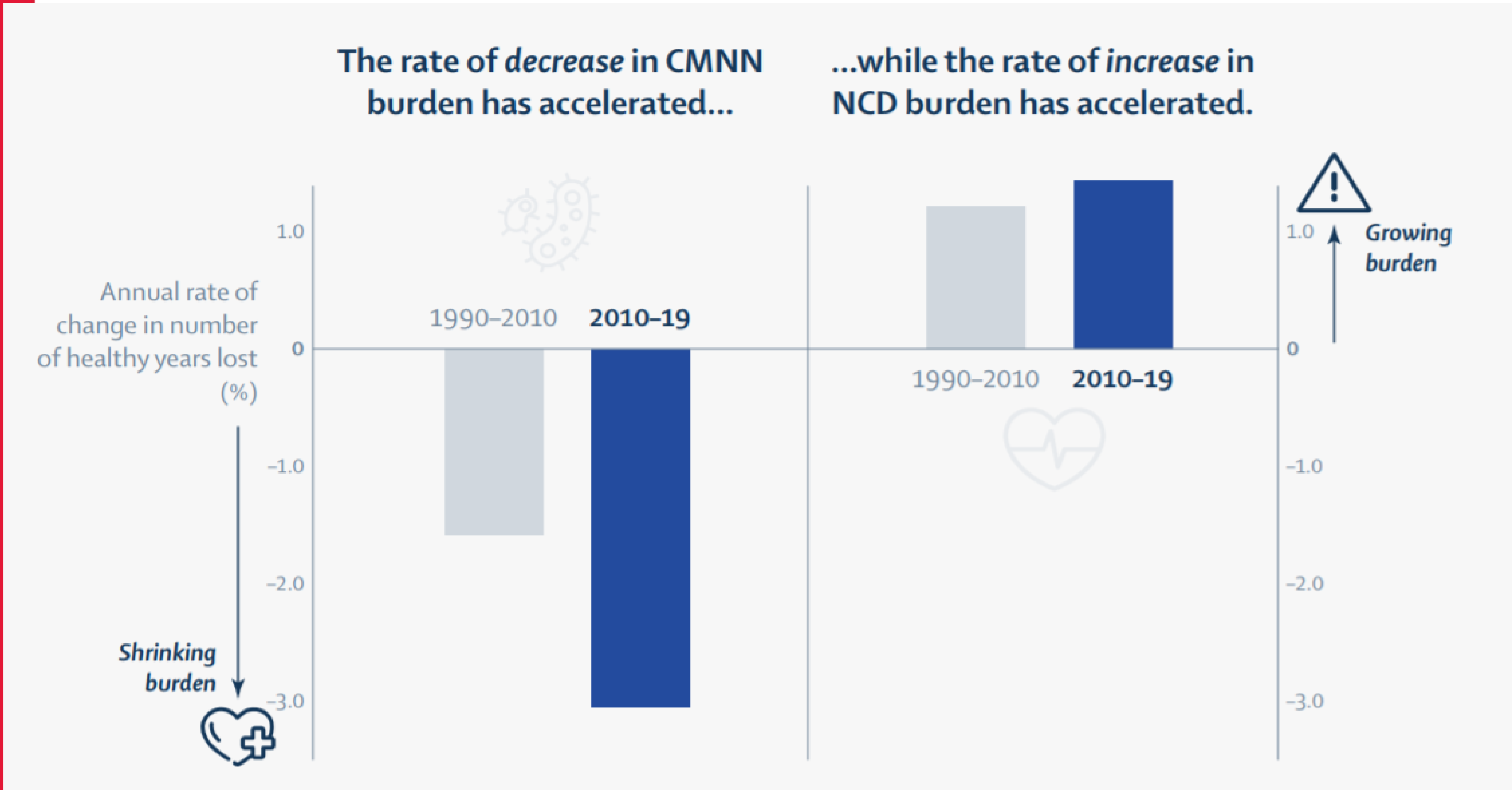
Increase in global NCDs 1990-2019 from 43% to 64% of global health loss



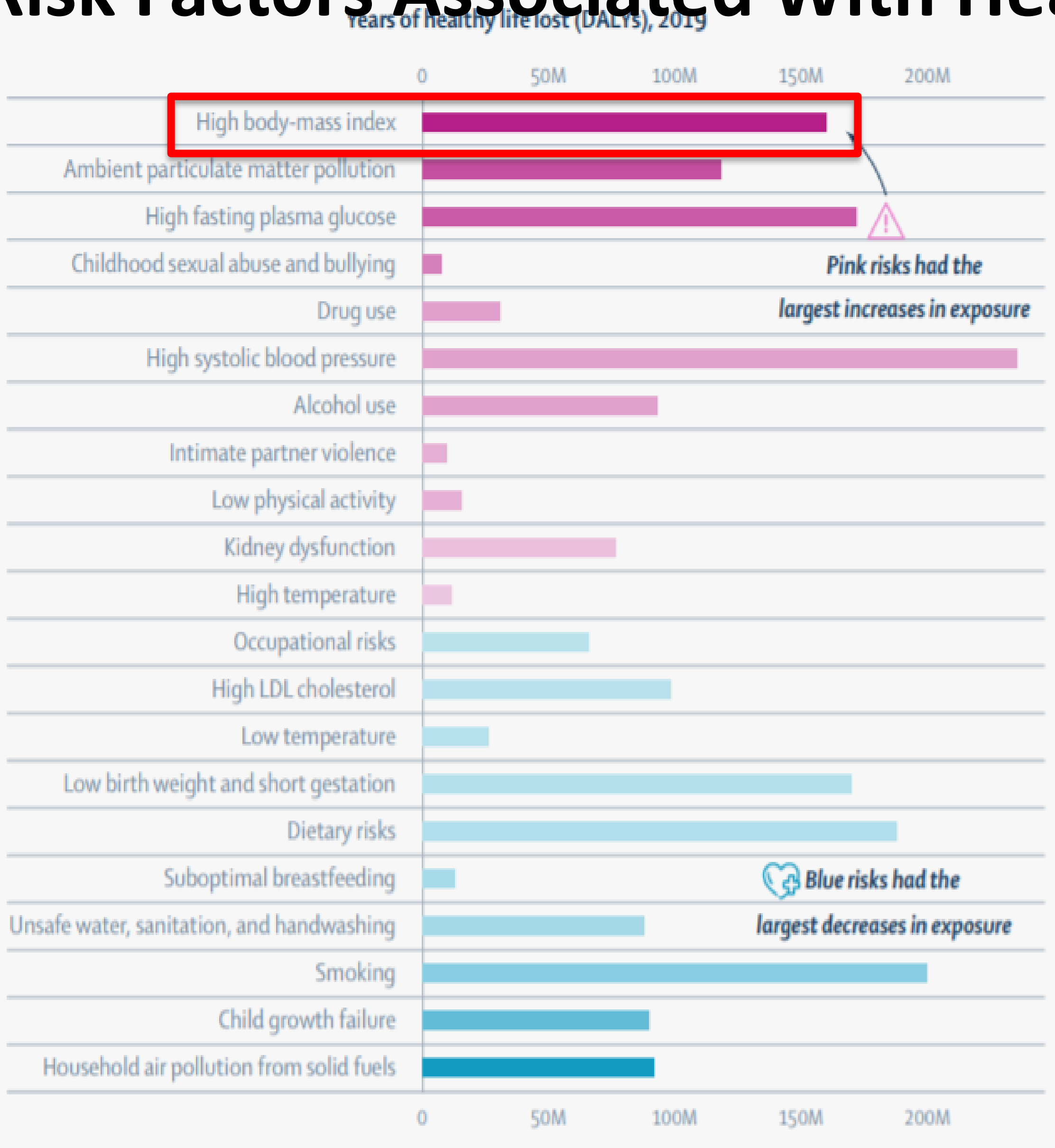


Source: Global Burden of Disease 2019
Data available from http://ghdx.healthdata.org/gbd-results-tool.

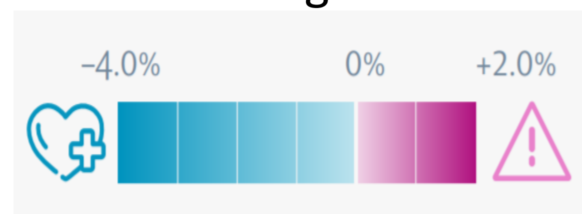
Shift from communicable, maternal, neonatal, & nutritional diseases (CMNN) to NCDs



Risk Factors Associated With Healthy Years Lost



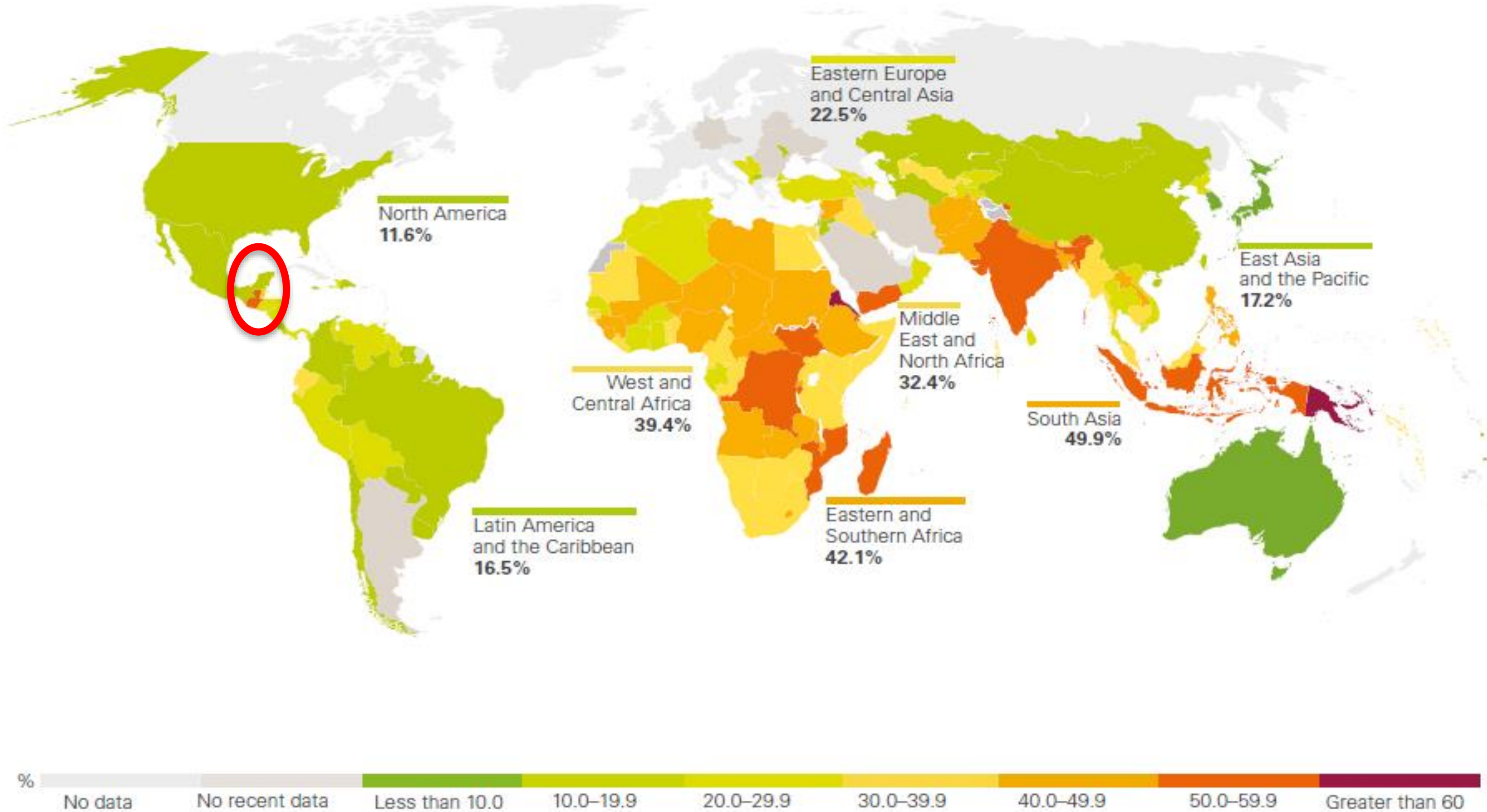
Color indicates annual rate of change 2010-2019



Global Burden of Disease 2019 • http://ghdx.healthdata.org/gbd-results-tool.

Prevalence of children < age 5 globally not growing well: stunted, underweight, overweight

1 in 3 children worldwide not growing well



https://data.unicef.org/resources/state-of-the-worlds-children-2019/

Poverty and Health

- Challenges to Health
  - Lack of health services
  - Unsafe water, Hygiene
  - Low education
  - Environmental risks

- **Less ability to avoid risks**
- **Less investment in social and environmental conditions & resources**
- **Poorest are the sickest**

- Development does not lead to better health
  - Social Inequities
  - Rich – richer, Poor – not

FIGURE 2. Relationship between obesity and socioeconomic status.

High Income Country

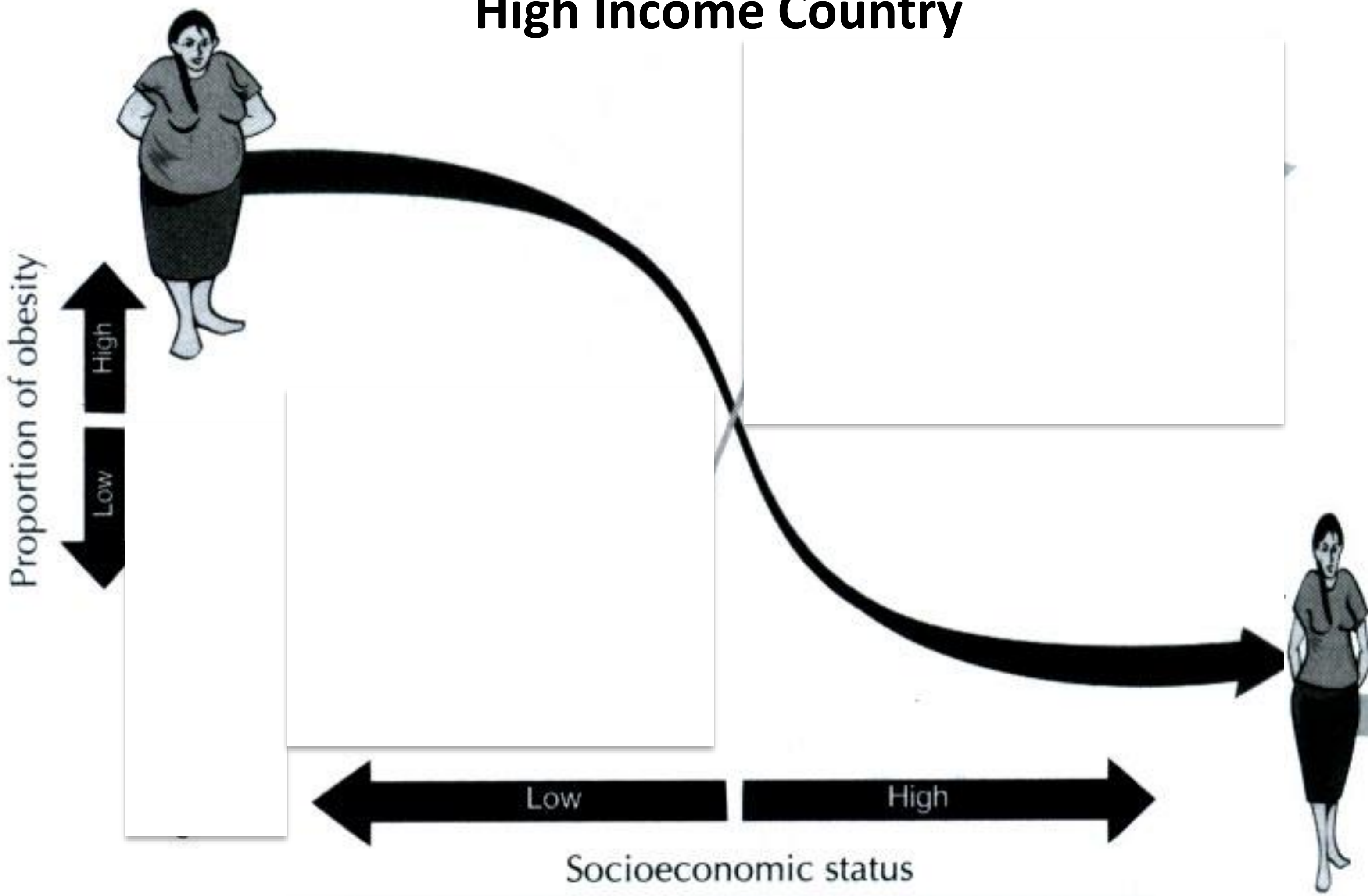


FIGURE 2. Relationship between obesity and socioeconomic status.

Low Income Country

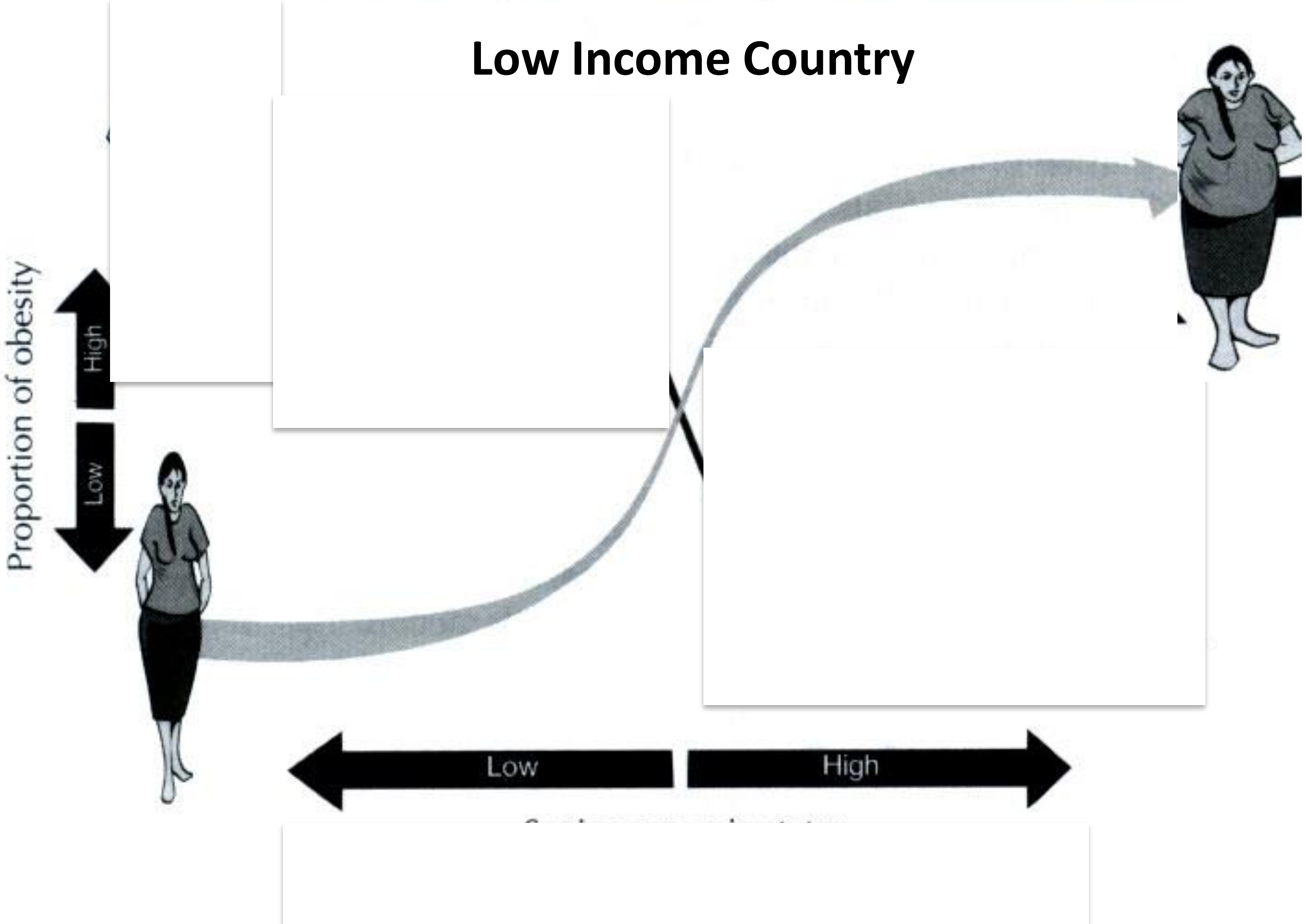
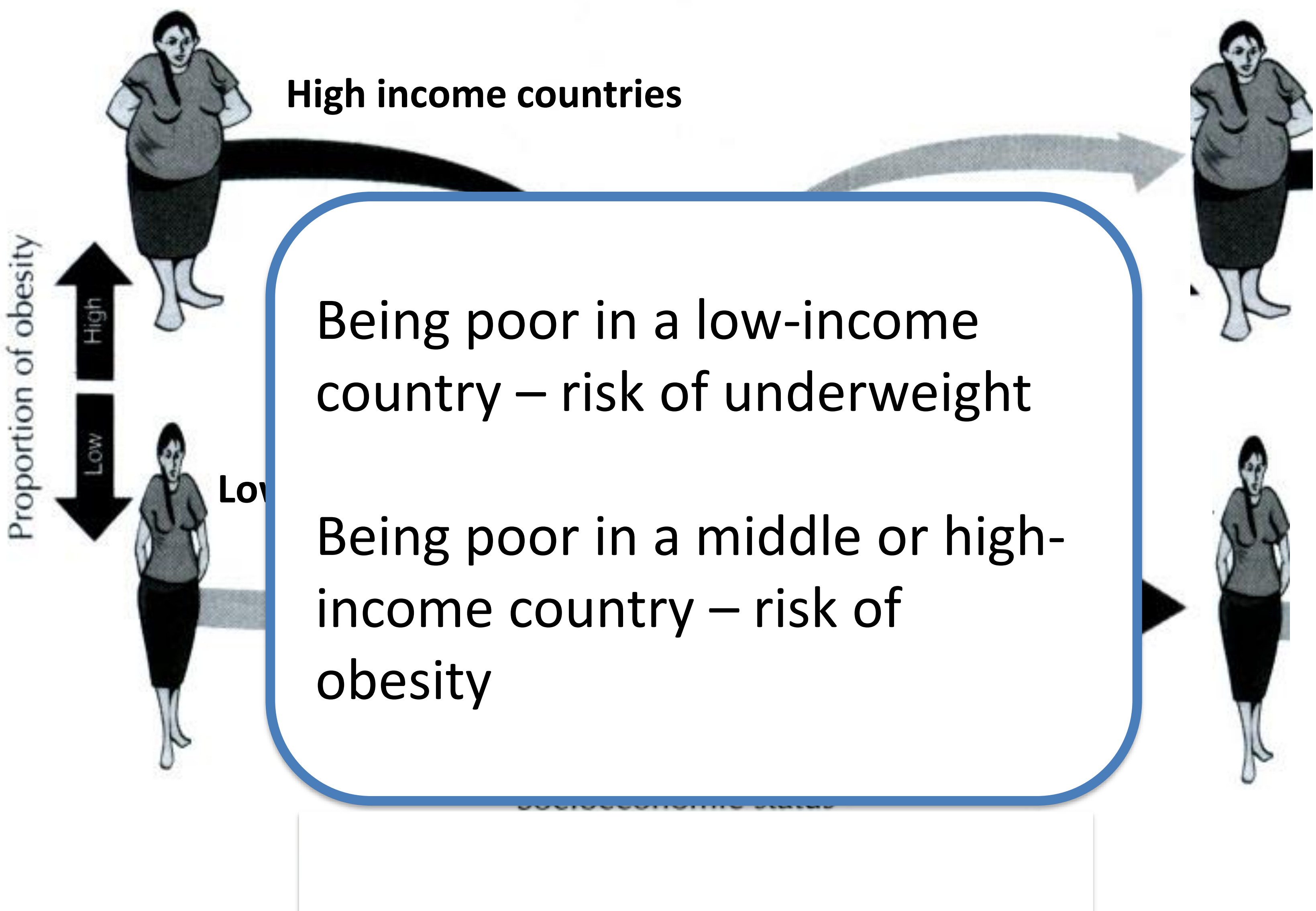
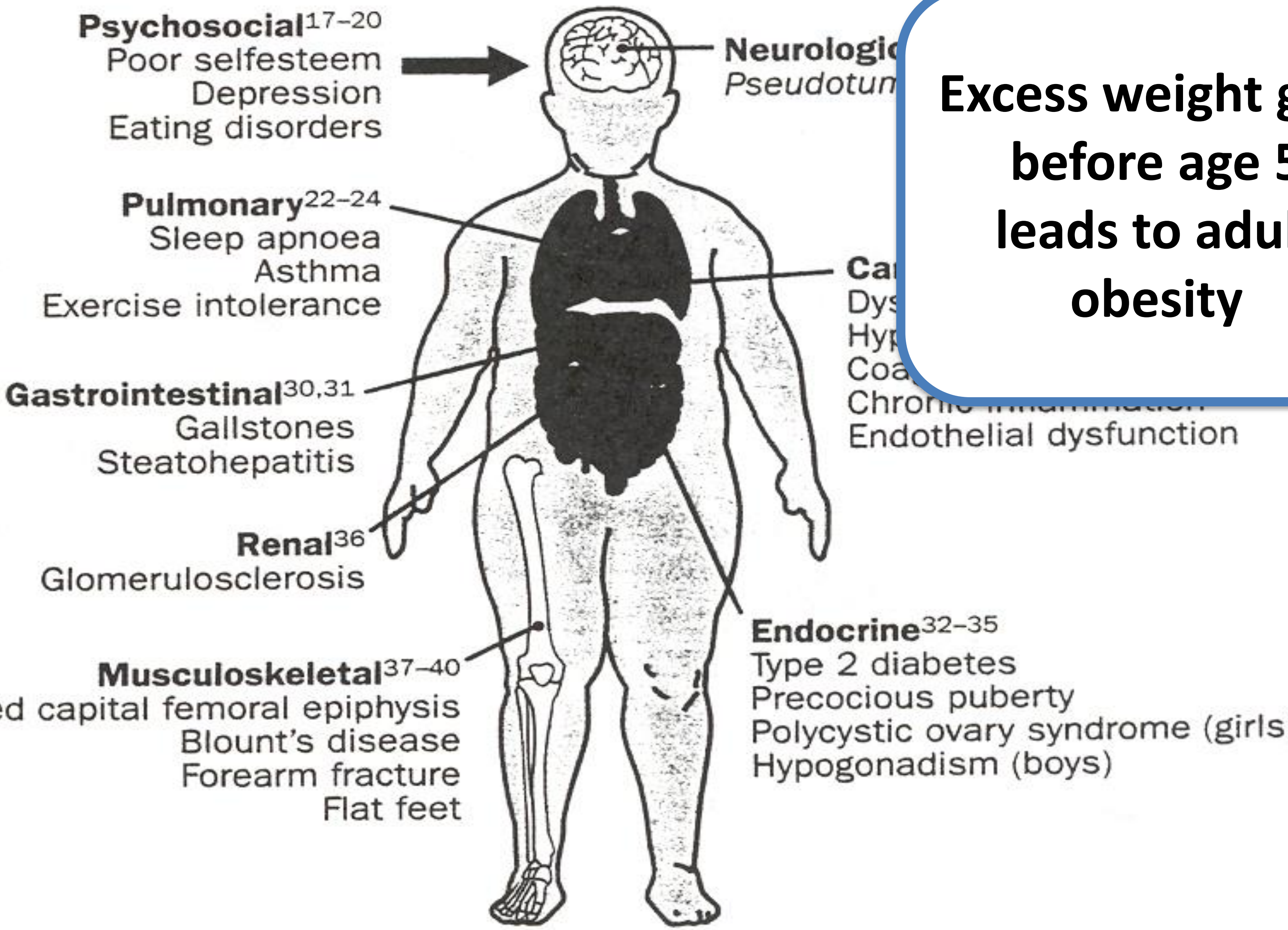


FIGURE 2. Relationship between obesity and socioeconomic status.



Being poor in a low-income country – risk of underweight

Being poor in a middle or high-income country – risk of obesity



Excess weight gain before age 5 leads to adult obesity

Patterns of Weight Gain Begin Early

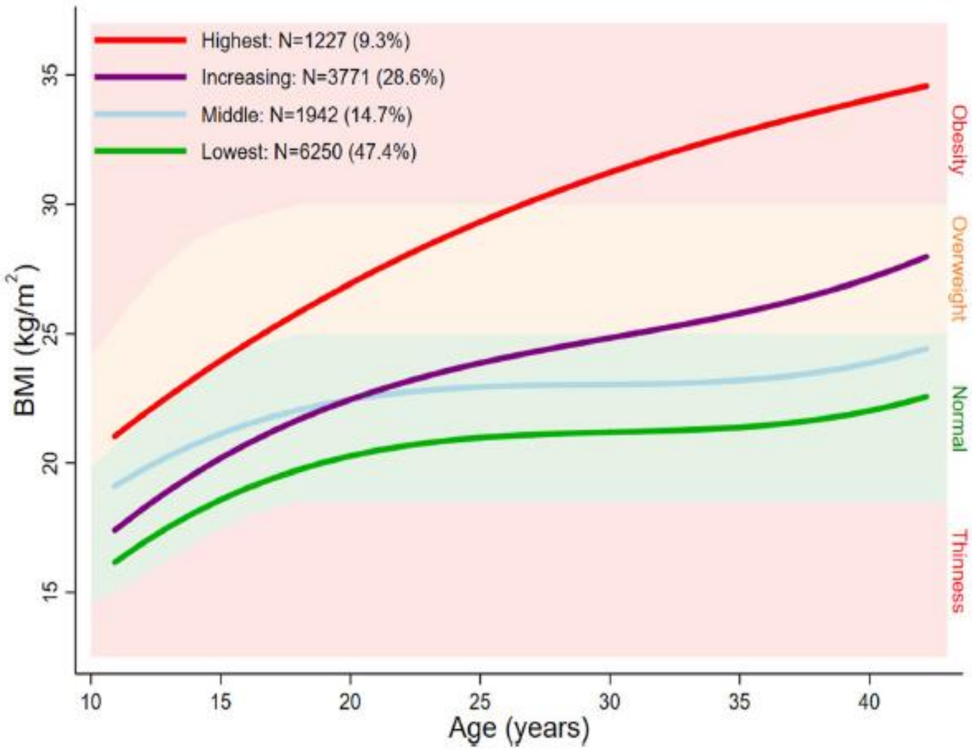
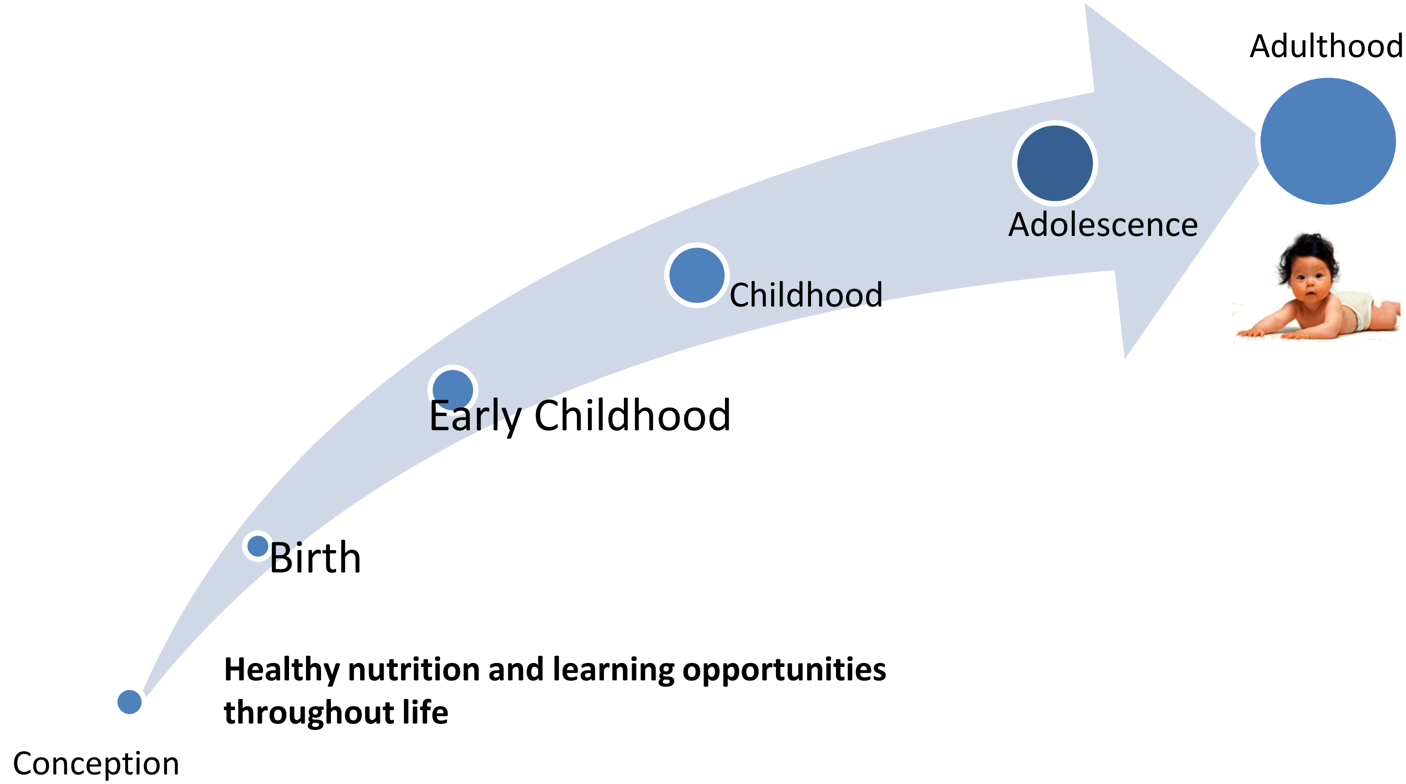


Fig. 2 Average fitted trajectories from the final mixture model superimposed on thinness, normal weight, overweight, and obesity ranges: females

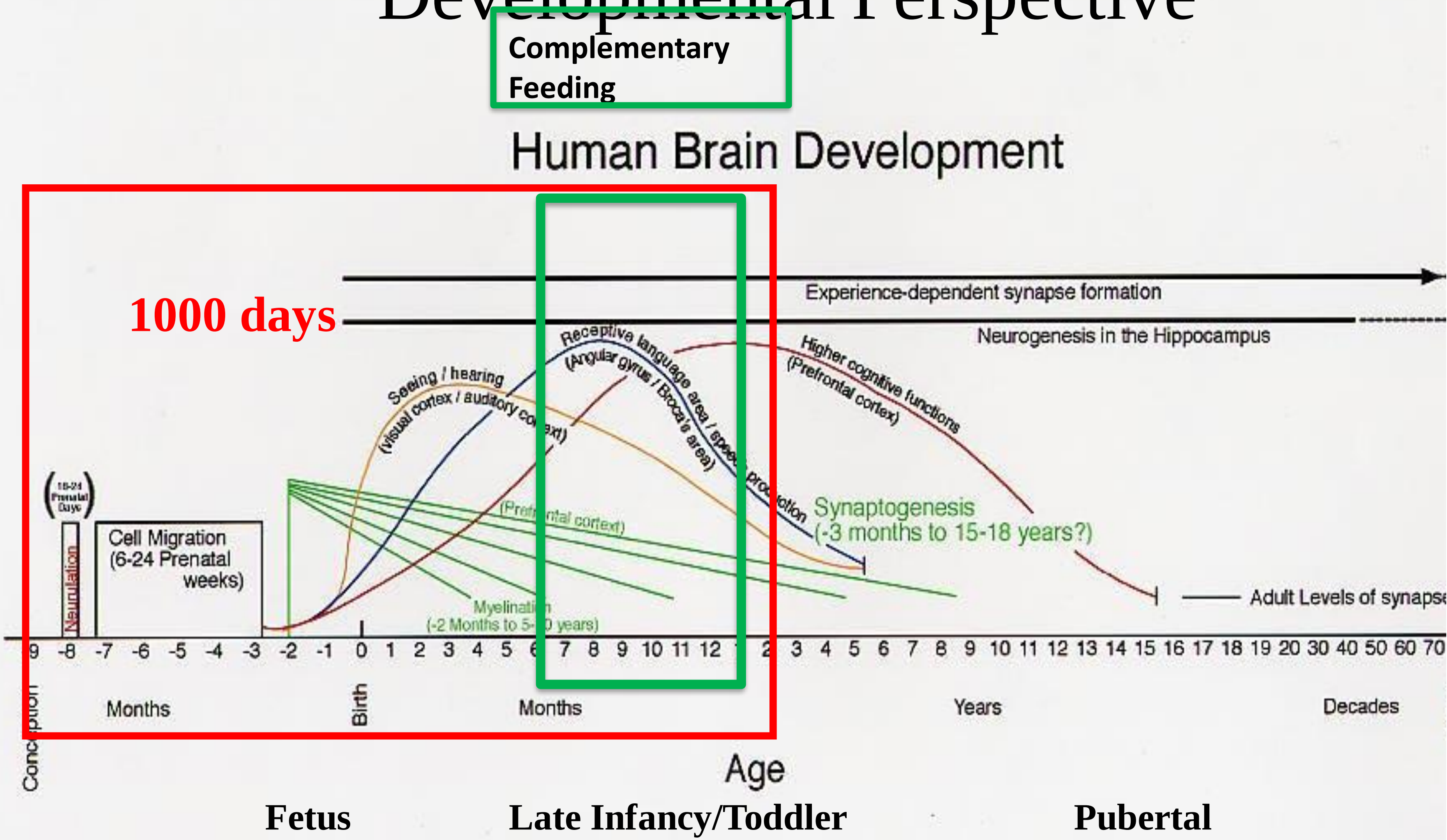
Norris et al., BMC Medicine, 2021

Life Course Perspective to Child Growth, Health, and Development



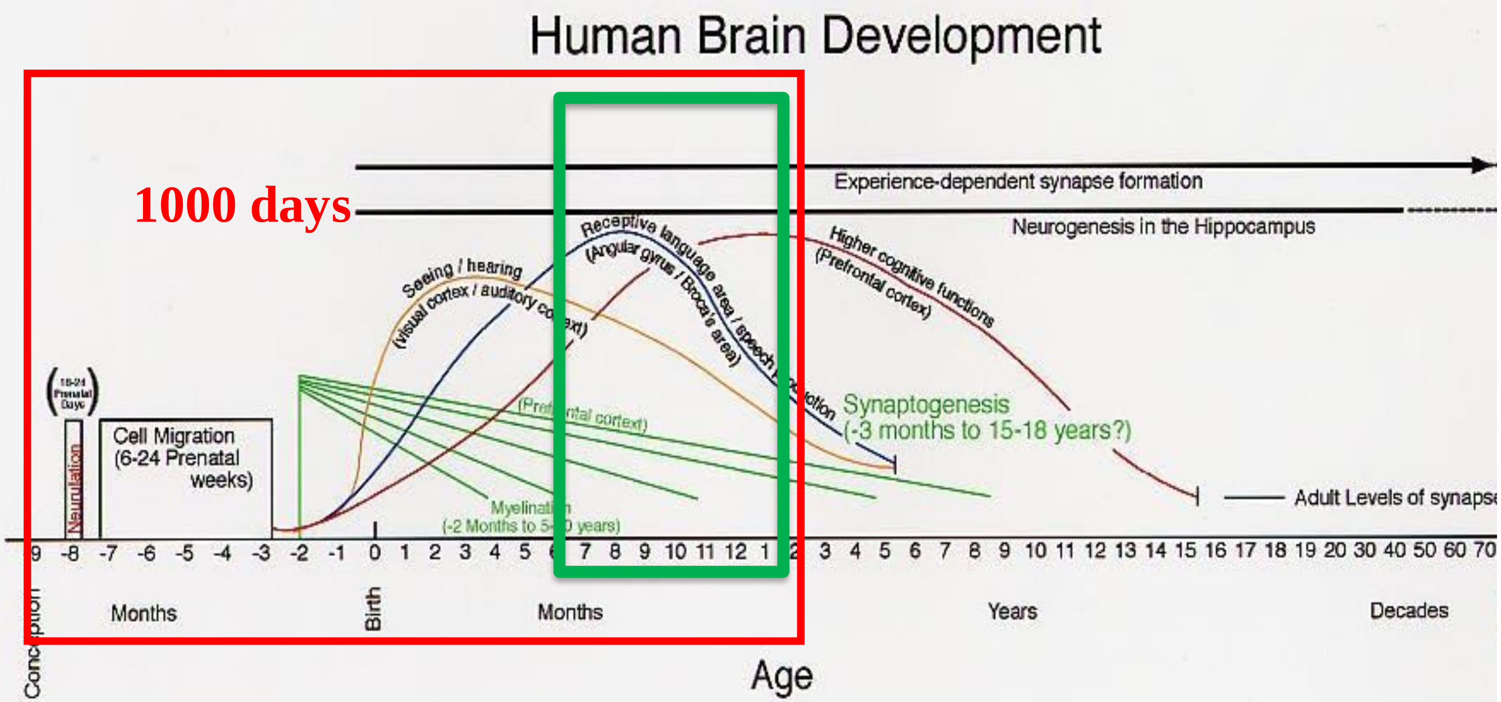
Black et al., Lancet, 2017

Developmental Perspective



Thompson & Nelson, 2000

Developmental Perspective



Fetus **Late Infancy/Toddler** **Pubertal**

Iron: **0.27 mg/day** **11 mg/day** **7 mg/day**

0–6 months **6-12 months** **1-3 years**

Thompson & Nelson, 2000

Environments Across the Life-course

Parents' Health/Wellbeing Pre-pregnancy

Pregnancy Environment

Environment In infancy / childhood

Health

Learning

Behavior

Genetic Blueprint for Development

Quality of early environments shape a child's future potential

Timing of Nutritional Deficiencies

First 1000 Days

- Metabolic events
  - Timing
  - Programming – impact on health throughout life
  - Diet – influence flavor & taste preferences
  - Severe malnutrition/famine increases risk for cardio-metabolic disease in adulthood (visceral adiposity)
- Stress
  - Disrupt hypothalamic–pituitary–thyroid (HPT) axis – neuroendocrine system
  - State of hyper vigilance
  - "Weathering" – disrupt immune functioning
  - Health and mental health risks

Koletzko, Am. J. Clin Nutr, 2011; Koletzko et al., Ann Nutr Metab, 2014; Grey BMJ GH, 2021

Breastfeeding

- Breastfeeding recommended universally!
- Why?
  - Human milk – nutrients, immunity
  - Skin-to-skin contact – releases oxytocin, emotion regulation
  - Mother-infant relationship - responsivity, attachment
  - Infant regulates – self-regulation
  - Cost
  - Convenience

Responsive Feeding
Bidirectional concepts

Mother offers vegetable

Mother feeds a bite

Mother smiles, offers finger food

Baby whines, signals hunger

Baby opens mouth

Baby fusses

Baby smiles, takes veggie, eats

Black & Dewey, 2014

Practical Tips for Initial Meals

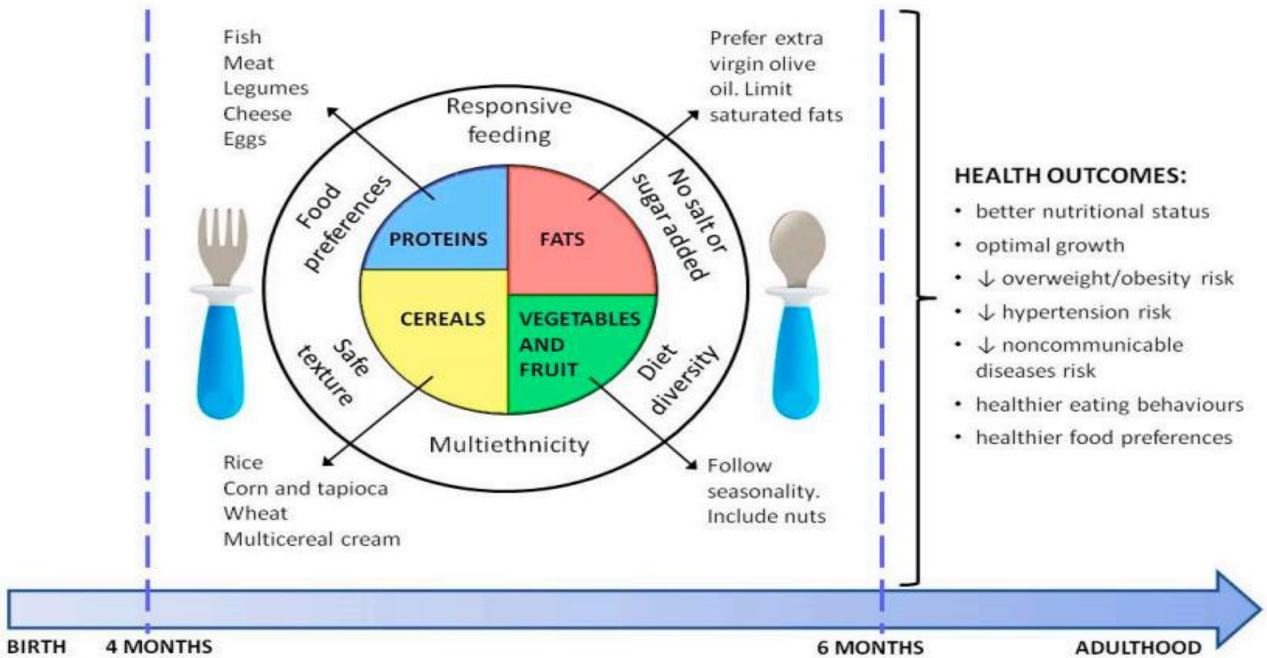


Figure 1. Suggested composition of the infant's first meal and health outcomes.

D'Auria et al., Intl J Environ Research & Public Health, 2020

Practical tips for complementary feeding

- Complementary foods should not be introduced before 4 months but should not be delayed beyond 6 months
- During complementary feeding, if possible, continue breastfeeding for up to 2 years of age
- Respect the adequate daily caloric intake (70–75 kcal/kg/day)
- Do not introduce excessive quantities of hyper-caloric and high-protein foods, choosing instead low-energy density foods (e.g., fruits and vegetables)
- Propose age-appropriated portion sizes (pay attention to the protein intake
- Do not introduce cow’s milk before 12 months of age
- Avoid adding salt and/or sugar to the infant’s food
- Avoid proposing fruit juices and sugar sweetened beverages
- Promote dietary diversity to propose a range of tastes and textures
- Foods should always be safe: ensure they have appropriate texture and consistency for the infant’s developmental level
- Recognize infant cues, avoid feeding to comfort and reward
- Try repeated exposure to foods (8–10 exposures)

D’Auria et al., Intl J Environ Research & Public Health, 2020

Responsive Parenting Principles

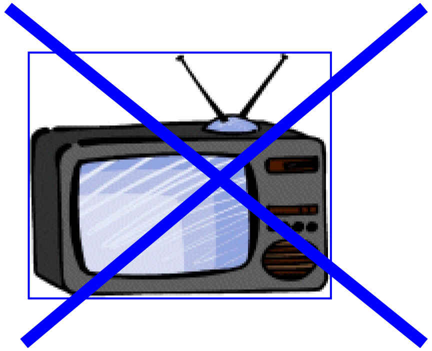
- Routines
  - Help child feel secure
- Manage the setting
  - Junk food out of sight
- Modeling
  - Eat what you want your child to eat
- Control – give your child choices
  - Broccoli or Carrots
- Celebrate effort & successes
  - Hugs and High 5's

Be a Role Model!

- Children learn from watching others
  - Eat fruits and vegetables
  - Eat healthy snacks (F & V)
  - Eat healthy portions (small plates)
  - Eat breakfast every morning
  - Regular physical activity
  - Limit your time watching TV

Create a Healthy Home Environment

- Plan regular family activities (take a walk after dinner, trips to the park)
- When thirsty, choose water
- Take TVs and Video games out of the bedrooms

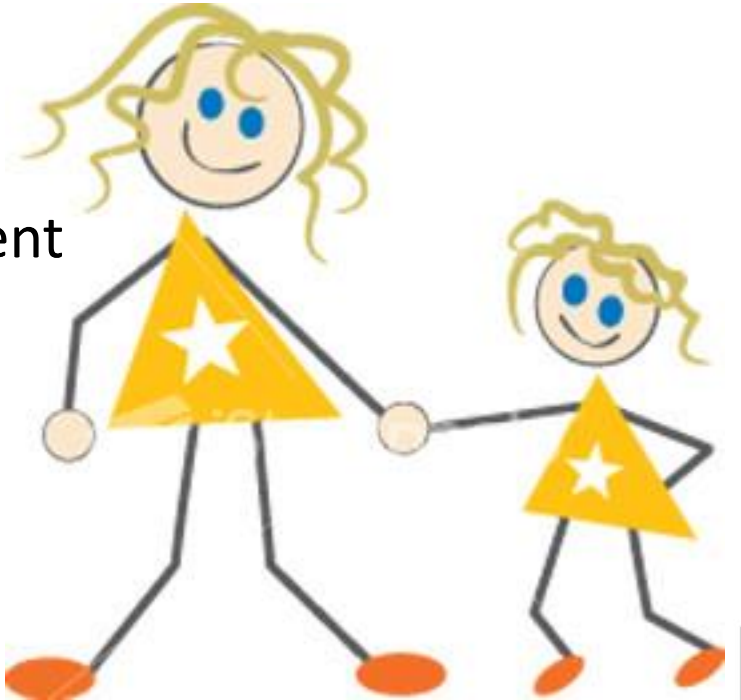


Limit Fast Food Meals

- When you do go to fast food
  - Order grilled, not fried
  - Share the fries
  - Have a salad
  - Alternatives to sweetened drinks

Establish Healthy Diet and Physical Activity Patterns in Early Childhood

- Model healthy diet & physical activity everyday
- Provide opportunities for healthy diet & physical activity
- Focus on healthy diet and physical activity, not weight
- Avoid restrictions, fear and punishment – they boomerang



Nurturing Care

What the child's brain expects and needs

Enabling environments for nurturing care

Nurturing Care for Early Childhood Development, WHO

Social Determinants of Health (SDH)

- Conditions where people are born, live, learn, work, play, worship, and age that affect health, functioning, and quality-of-life outcomes and risks

- Health equity: guiding principle
  - Human rights: collective well-being of social groups
  - Inequities - modifiable
  - Inequalities - not necessarily modifiable

Marmot, 2005, 2011, et al.

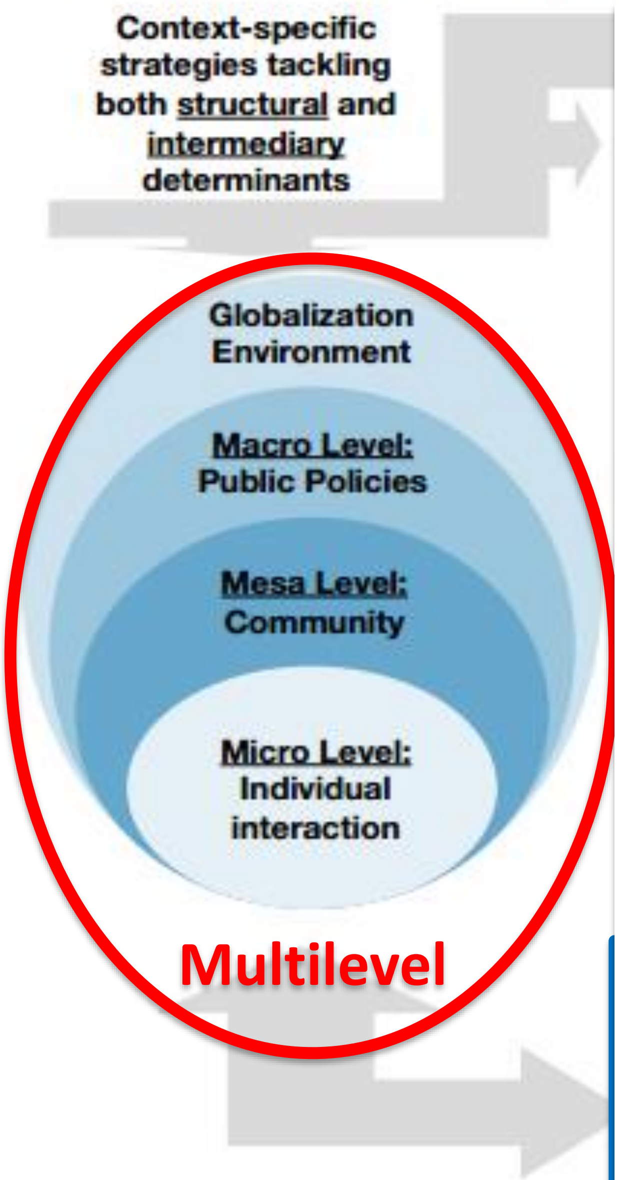
Social Determinants of Health (SDH),

Modifiable:

- Health Care Access & Quality
- Educational Access & Quality
- Economic stability
- Neighborhood & Build Environment
- Social & Community Context

- Improve condition of daily life
- Adjust inequitable distribution of power
- **Measurement**, **evaluation**, and **workforce** focused on alleviating social inequities

Figure 7. Framework for tackling SDH inequities



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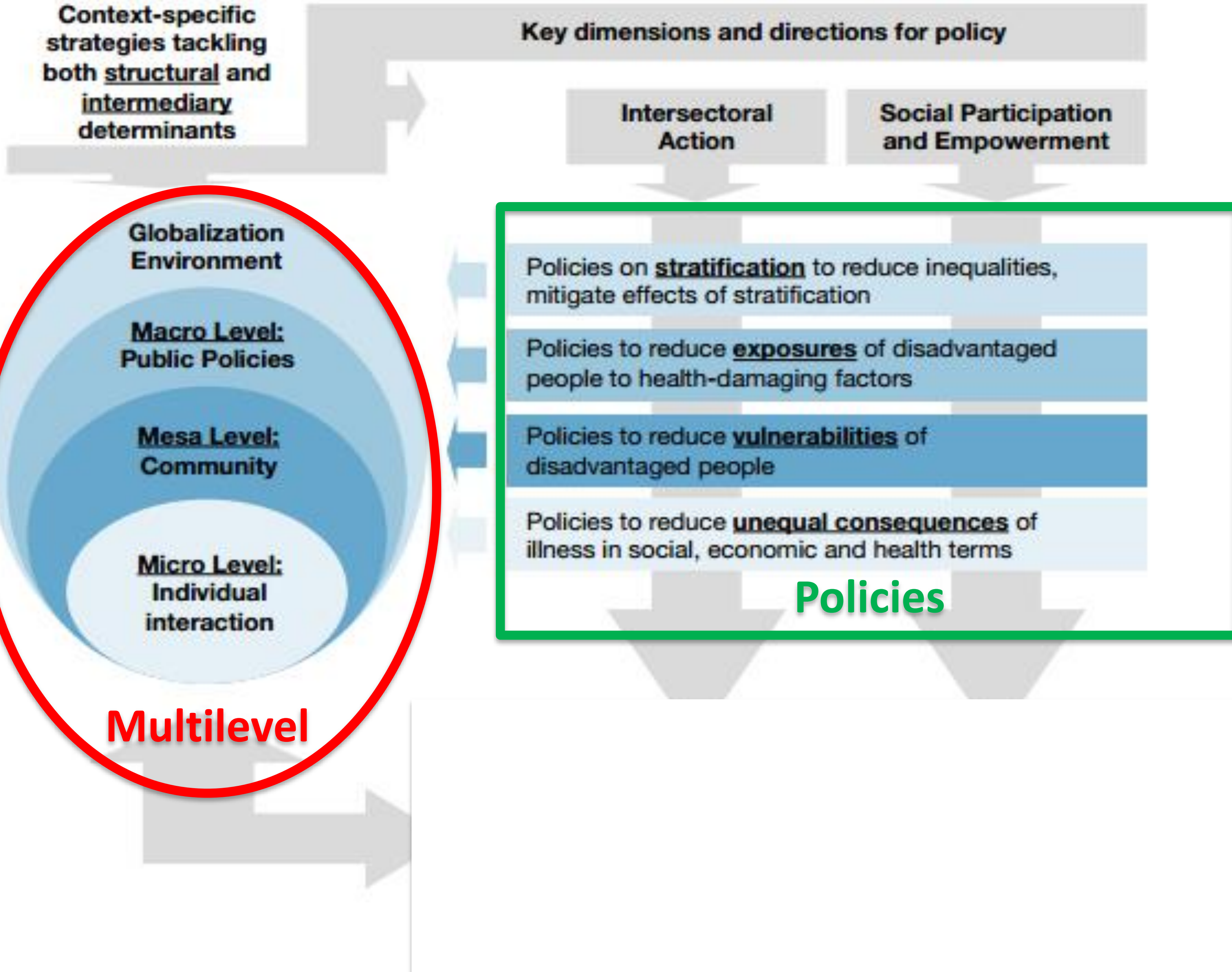

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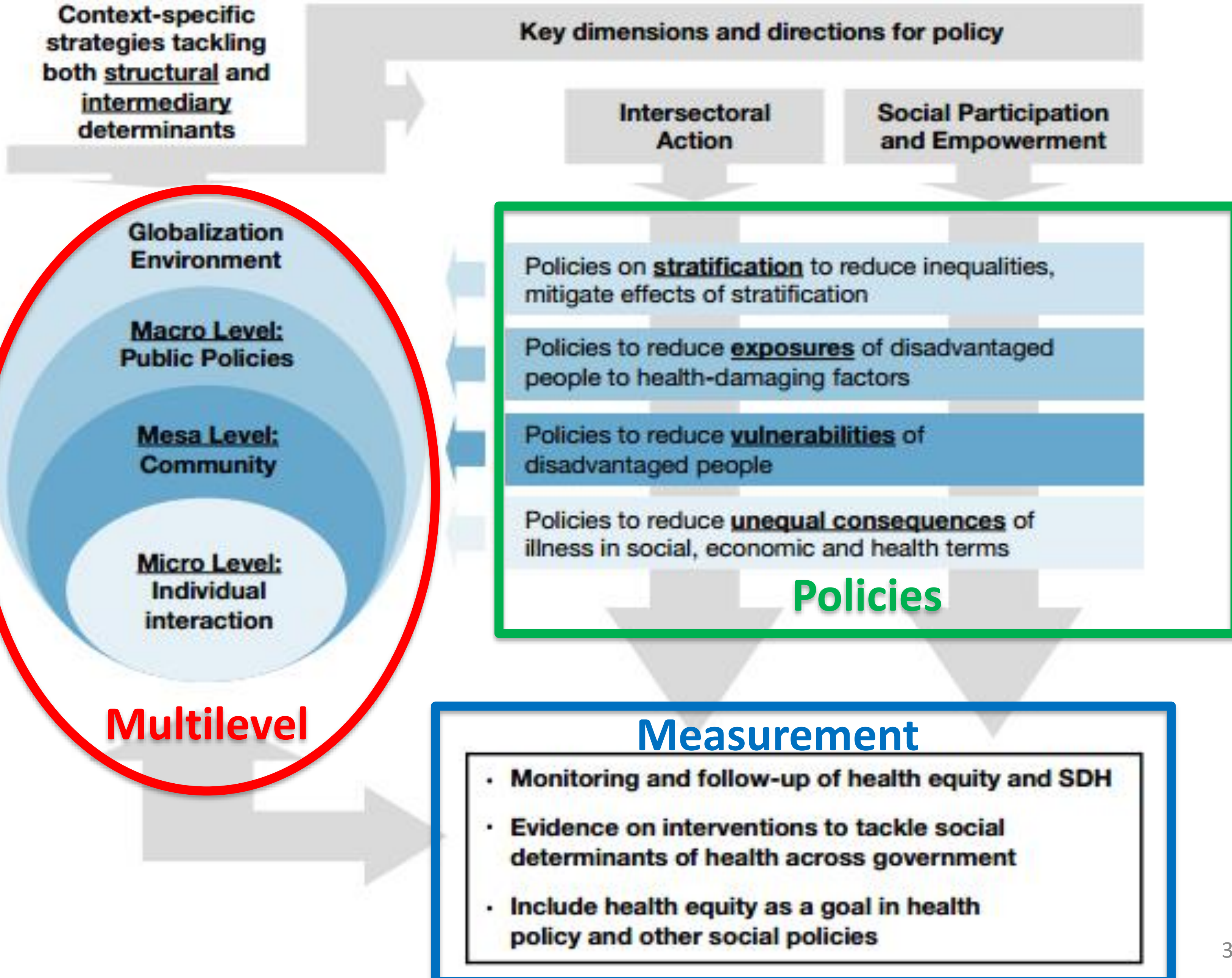


COVID-19 Accentuates Disparities
Longitudinal Trends in BMI in the USA Before and During COVID-19

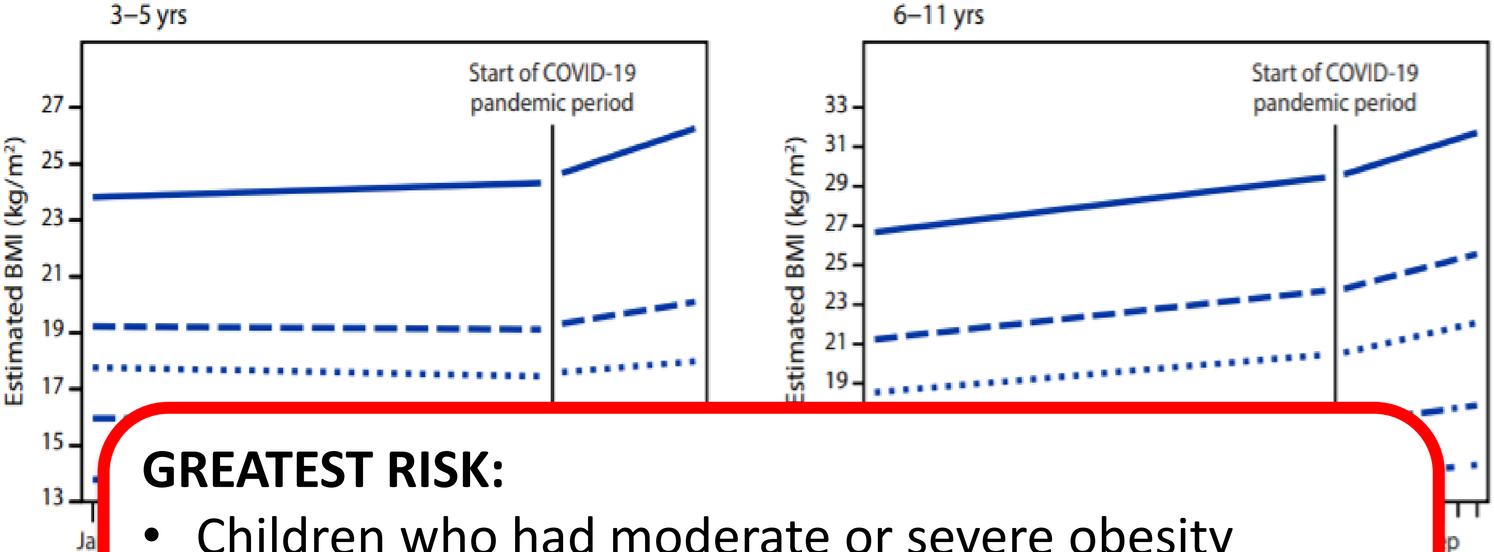
- CDC examined change in BMI
  - 432,302 children (aged 2–19) from large multinational Electronic Medical Records outpatient visits geographically diverse U.S. patient population
  - Pre-pandemic: 2018–2019; mid-pandemic: 2020

- Rate of BMI increase doubled

- Prevalence of obesity: 19% August 2019 and 22% August 2020

Lange, MMWR / September 17, 2021 / Vol. 70 / No. 37

Estimated BMI before and during the COVID-19 pandemic, by initial BMI



GREATEST RISK:

- Children who had moderate or severe obesity (average gain 1.0 and 1.2 pounds per month)
- Preschool and school-aged children

Obesity Prevention

- Obesity prevention
  - Health care provider screening for BMI, food security, and social determinants of health
- Family
  - Healthy food
  - Physical activity
- Community
  - Life style opportunities
- Obesity is a multi-level problem, requiring multi-level solutions

Obesity prevention policies

- Partial ban on junk food advertising on TV and online in the UK
- Taxes on sugary drinks levied in Mexico
- UK National Food Strategy advocating for taxes on foods with high sugar and salt to encourage reformulation, greater subsidised provision of healthy foods to children from deprived families, and funding for nutrition and cooking classes in schools.
- Schools could deliver healthy nutrition, and physical and food education.
- Greater intersectional collaboration between the education and health sectors.
- Inequalities in our societies, including across the food system.
- Re-think priorities of health versus commercial interests and protect children and adolescents.

Editorial, The Lancet Public Health, August 2021

Chile: Food Labeling & Advertising Law

- June 2016
- Front-of-package warning labels
- Market restrictions for unhealthy foods and beverages
- Ban sales at school
- Reformulation: Regulatory cutoffs defined based on natural foods and liquids considered gold standards of healthy diet

Reyes M et al., PLoS Medicine, 2020; 17(7): e1003220;

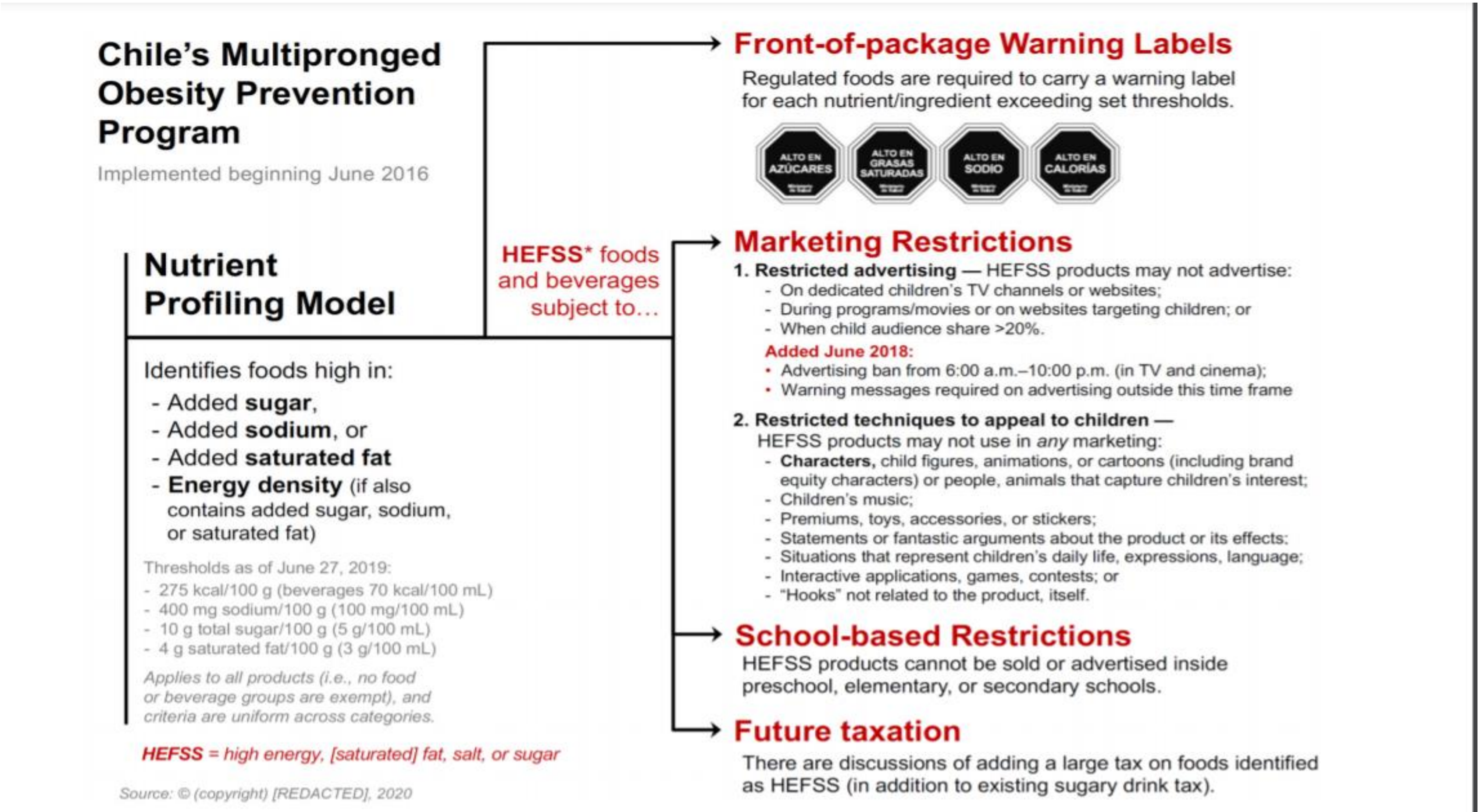


Figure 1. Chile's multipronged Obesity Prevention Program. * HEFSS: high energy, (saturated) fat, salt, or sugar.

Chile: Food Labeling & Advertising Law

- Changes in the proportion of products exceeding cutoffs of the initial phase of the law for energy, total sugars, saturated fats, & sodium
- Decreases were most common in “high in” sugars (beverages, milks and milk-based drinks, breakfast cereals, sweet baked products, sweet and savory spreads)
- Proportion of any “high in” product decreased from 51% to 44%, mostly in food and beverage groups

Reyes M et al., PLoS Medicine, 2020; 17(7): e1003220;

Chile: Food Labeling & Advertising Law

- Declines in the sugar content of packaged **foods**
- NNS increased from 77.9% to 92.0% (p-value < 0.01). The mean intake increased for sucralose, aspartame, acesulfame-K and steviol glycosides (+20.3, +15.1, +6.1 and +3.3 mg/day, respectively).
- Unknown whether the **law** led to an increase in **nonnutritive sweetener** (NNS) **intake**, particularly among preschool children.

Reyes M et al., PLoS Medicine, 2020; 17(7): e1003220;

Build physical activity into your community

Eat healthy food

Strengthen schools as source of wellness

Encourage employers to focus on health

Markets that sell healthy food

Nurturing Care:
Center of Sustainable Development Goals

17 Goals
169 Targets

THANK YOU!