Maternal and Child Nutrition
New Learnings and Implications for Development Agencies

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Talk Outline

- Implication of global obesity epidemic
- Life course framework for childhood obesity prevention
- How children learn to eat?
- How taste preferences get established?
- Food insecurity-obesity
- Implications for development agencies
Non-communicable Diseases (NCDs)

The Global Picture

- Annual cost to global economy of NCDs: Over US$1 trillion
  - If current trends persist experts forecast $35 trillion in economic output loss from 2005 to 2030 (Bloom 2013)
  - Due to diabetes, heart disease, breast cancer, and COPD (Bloom 2013)

- NCD’s risk factors include: Tobacco use, obesity, unhealthy diet, physical inactivity, and alcohol
  - Context: aging of the population and negative effects of urbanization, international trade and marketing

- Eight out of ten NCDs deaths occur in low- and middle-income countries
  - 30 % of NCDs deaths in people < 60
  - If current trends continue by 2030 52 million people will die of an NCD annually (WHO 2011)
BMI trends among 20-49 y old women: 1980-2008

AFRICA

AMERICAS & CARIBBEAN

ASIA

EUROPE

2013 Lancet Series
Trends in prevalence and numbers of children with overweight (WHZ>2), by selected UN regions and globally, 1990–2010, and projected to 2025

2013 Lancet Series
Prevalence of Weight for Recumbent Length > 95th %ile among US Children From Birth to 2 Years of Age, 2011-2012

- White: 6.6%
- Black: 8.4%
- Hispanic: 9.4%

Ogden, C. L. et al. JAMA 2014;311:806-814
Prevalence of BMI > 30 among US Women >19 Years of Age, 2011-2012

Ogden, C. L. et al. JAMA 2014;311:806-814
Disparities in Early Nutrition: Where the Problem Begins?

ASN Symposium
Experimental Biology Meetings
Tuesday April 12, 2011
Washington DC

Chair: R. Perez-Escamilla, Yale University
Co-Chair: O. Bermudez, Tufts

Advances in Nutrition (2012)
Childhood obesity life course framework

- Pre-pregnancy BMI
- Gestational weight gain
- Early childhood obesity risk
- Infancy weight gain rate
- Post-partum weight retention
- Suboptimal Infant feeding
- Neonatal predisposition

Pérez-Escamilla & Bermudez (2012)
Odds of each childhood obesity risk factor in black and Hispanic participants, relative to white participants*

*Odds ratios adjusted for maternal age, education, parity, and prepregnancy BMI; paternal BMI; household income; and child gender.
Integrate through 2020 USA Dietary Guidelines?
Executive summary: evaluating the evidence base to support the inclusion of infants and children from birth to 24 mo of age in the Dietary Guidelines for Americans—“the B-24 Project”

Daniel J Raiten, Ramkripa Raghavan, Alexandra Porter, Julie E Obbagy, and Joanne M Spahn

- **WG1**: 0-6 months
- **WG2**: 6-12 months
- **WG3**: 12-24 months
- **WG4**: Caregivers

- **Phase I** (2012-2013): Develop key topics and questions to serve as a basis for future DGA for B-24 population (B-24 Project)
- **Phase II** (2014-2017): Conduct systematic review using existing and new data
- **Phase III** (2018): Develop unified dietary guidelines for B-24 for use by the DGA Advisory Committee 2020
- **Phase IV** (2020): Publish DGAC for Americans including B-24 population
Framework for actions to achieve optimum fetal and child nutrition and development

Benefits during the life course

- Morbidity and mortality in childhood
- Cognitive, motor, socioemotional development
- School performance and learning capacity
- Adult stature
- Obesity and NCDs
- Work capacity and productivity

Optimum fetal and child nutrition and development

Nutrition specific interventions and programmes
- Adolescent health and preconception nutrition
- Maternal dietary supplementation
- Micronutrient supplementation or fortification
- Breastfeeding and complementary feeding
- Dietary supplementation for children
- Dietary diversification
- Feeding behaviours and stimulation
- Treatment of severe acute malnutrition
- Disease prevention and management
- Nutrition interventions in emergencies

Benefits during the life course

- Breastfeeding, nutrient-rich foods, and eating routine
- Feeding and caregiving practices, parenting, stimulation
- Low burden of infectious diseases
- Food security, including availability, economic access, and use of food
- Feeding and caregiving resources (maternal, household, and community levels)
- Access to and use of health services, a safe and hygienic environment
- Knowledge and evidence
  - Politics and governance
  - Leadership, capacity, and financial resources
  - Social, economic, political, and environmental context (national and global)

Nutrition sensitive programmes and approaches
- Agriculture and food security
- Social safety nets
- Early child development
- Maternal mental health
- Women’s empowerment
- Child protection
- Classroom education
- Water and sanitation
- Health and family planning services

Building an enabling environment
- Rigorous evaluations
- Advocacy strategies
- Horizontal and vertical coordination
- Accountability, incentives regulation, legislation
- Leadership programmes
- Capacity investments
- Domestic resource mobilisation

2013 Lancet Series
Macrosystem: Social and health policies, cultural norms and values

Microsystem: Home, school, work

Mesosystem: Neighborhood, home-work-social life relationships

Exosystem: Decision from town council regarding use of public spaces for leisure

Individual: Lifestyles (nutrition, physical activity), obesity status

Perez-Escamilla & Kac (IJOS, 2013)
## Child Mortality Due to Nutritional Disorders

<table>
<thead>
<tr>
<th>Nutritional Disorders</th>
<th>Attributable deaths with UN prevalences*</th>
<th>Proportion of total deaths of children younger than 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal growth restriction (&lt;1 month)</td>
<td>817,000</td>
<td>11.8%</td>
</tr>
<tr>
<td>Stunting (1-59 months)</td>
<td>1,017,000*</td>
<td>14.7%</td>
</tr>
<tr>
<td>Underweight (1-59 months)</td>
<td>999,000*</td>
<td>14.4%</td>
</tr>
<tr>
<td>Wasting (1-59 months)</td>
<td>875,000*</td>
<td>12.6%</td>
</tr>
<tr>
<td>Severe Wasting (1-59 months)</td>
<td>516,000*</td>
<td>7.4%</td>
</tr>
<tr>
<td>Zinc deficiency (12-59 months)</td>
<td>116,000</td>
<td>1.7%</td>
</tr>
<tr>
<td>Vitamin A deficiency (6-59 months)</td>
<td>157,000</td>
<td>2.3%</td>
</tr>
<tr>
<td>Suboptimum breastfeeding (0-23 months)</td>
<td>804,000</td>
<td>11.6%</td>
</tr>
<tr>
<td>Joint effects of fetal growth restriction and suboptimum breastfeeding in neonates</td>
<td>1,348,000</td>
<td>19.4%</td>
</tr>
<tr>
<td>Joint effects of fetal growth restriction, suboptimum breastfeeding, stunting, wasting, and vitamin A and zinc deficiencies (&lt;5 years)</td>
<td>3,097,000</td>
<td>44.7%</td>
</tr>
</tbody>
</table>

Data are to the nearest thousand. *Prevalence estimates from the UN.

SGA also linked with obesity and NCD risk later on in life
Countries with the highest burden of malnutrition
These 34 countries account for 90% of the global burden of malnutrition

2013 Lancet Series
Learning to eat: birth to age 2 y\textsuperscript{1–4}

*Am J Clin Nutr* 2014;99(suppl):723S–8S

*Leann L Birch and Allison E Doub*
• Familiarization
  – Repeatedly offer healthy foods such as vegetables to young children

• Associative learning
  – Food preferences develop based on the context and psycho-emotional atmosphere in which it’s offered

• Observation learning
  – Children may also establish food preferences by observing what their caregivers eat

The toddlerhood and preschool periods represent a major sensitive period for the development of food preferences
• Positive caregiver verbalizations during feeding may increase child acceptance of food
• Need consensus on what responsive feeding is
• Prospective studies needed
Flavors passed from mother to fetus through amniotic fluid
Flavors passed from mother to infant through breast milk
Breastfed babies accept more easily fruits and vegetables than children who were formula fed.
  - However, formula fed infants can end up accepting food low in sugar, salt and bitter tasting if the mothers are advised on repeatedly exposing the infants to them
  - Promoting the consumption of complementary foods low in salt and sugar is likely to have a positive influence on dietary choices, growth and weight outcomes later on in life
Conclusions

• Integrate preconceptional, gestational, post-partum and infancy and early childhood as part of national childhood obesity prevention strategies
• Social-ecological model
• Social marketing framework
  • Generate political support
  • Mass media
  • Inter-sectoral initiatives/programs
Implications for Development Agencies

- Prenatal care
- Infant and Young Child feedings programs
- Parenting programs
- Early Child Development programs
- Youth programs
- Food security programs
  - Conditional cash transfer programs

**Challenge:** Requires strong coordination between health, education, and social development sectors
Hunger and Obesity: Understanding a food insecurity paradigm. IOM Workshop Report, 2011.

Household food insecurity and excess weight/obesity among Brazilian women and children: a life-course approach
Michael Maia Schlüssel 1
Antonio Augusto Moura da Silva 2
Rafael Pérez-Escamilla 3
Gilberto Kac 1

Dietary Energy Density and Body Weight in Adults and Children: A Systematic Review
Rafael Pérez-Escamilla, PhD; Julie E. Obbagy, PhD; RD; Jean M. Altman, MS; Eve V. Essery, PhD; Mary M. McGrane, PhD; Yat Ping Wong, MLS, MPH; Joanne M. Spahn, MS, RD, FADA; Christine L. Williams, MD, MPH
The need for global visionary leadership to prevent childhood obesity

Past Results

Silo approach

Future Results

Interdisciplinary, multi-level, multi-sectorial collaborations

Impact of new paradigm should be much more than the sum of silos’ results
Monitoring & Evaluation

Multi-component maternal-child “life course” indicator
-e.g., proportion of women who:

• enter pregnancy with appropriate weight
• gain weight during gestation within recommendations
• return to pre-pregnancy weight by 6 months post-partum
• breastfeed their babies exclusively for 6 months
• introduce nutritious complementary foods at 6 months
• continue breastfeeding until child is two years old
Thank you!