Program integration to achieve the global nutrition targets

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Stunted growth and development, anemia, and overweight/obesity are associated with an array of often overlapping risk factors.

Integrated programs are appealing as an efficient way to reach vulnerable households.
Exogenous factors associated with anemia

Thurnham & Northrop-Clewes in Kramer & Zimmerman, Nutritional Anemia, 2007
Obesity

Social Norms and Values

Sectors of Influence

Behavioral Settings

Individual Factors

Food and Beverage Intake

Physical Activity

Energy Intake

Energy Expenditure

Energy Balance

- Government
- Public Health
- Health Care
- Agriculture
- Education
- Media
- Land Use and Transportation
- Communities
- Foundations
- Industry
  - Food
  - Beverage
  - Restaurant
  - Food Retail
  - Physical Activity
  - Leisure and Recreation
  - Entertainment

- Demographic Factors (e.g., age, sex, SES, race/ethnicity)
- Psychosocial Factors
- Gene-Environment Interactions
- Other Factors

Communities
- Worksites
- Health Care
- Schools and Child Care
- Home

IOM, Progress in Preventing Childhood Obesity, 2007
Nutrition sensitive programs and approaches

- Agriculture & food security
- Social safety nets
- Early child development
- Maternal mental health
- Women’s empowerment
- Child protection
- Classroom education
- Water quality, hygiene, sanitation systems
- Health and family planning

Ruel et al, Lancet, 2013
How might WASH programs impact nutrition?

“Vicious Cycle” of Undernutrition & Infection

- Complement system impaired and decreased lysozyme levels in leukocytes
- Secretory IgA levels are low and antibody responses reduced
- Reduced cell-mediated immune response
- Phagocytic & bactericidal activities reduced

- Loss of appetite
- Reduced food intake
- Malabsorption of nutrients
- Metabolic losses

West, Stewart, Caballero, & Black, 2011
Sanitation and hygiene are associated with stunting

Height-for-age and access to toilets

Hygiene, exposure to animals & stunting

<table>
<thead>
<tr>
<th>Stunting</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal corral in sleeping room</td>
<td>2.43 (1.08, 5.43)*</td>
</tr>
<tr>
<td>Mother has visibly dirty hands</td>
<td>1.44 (0.69, 3.00)</td>
</tr>
</tbody>
</table>

Spears, 2013

Community-led total sanitation program improved growth and reduced stunting, particularly among <2 y

- CLTS reduced stunting by 6 percentage points
- Improved child height-for-age by 0.18 SD
  - ↑ 0.24 height-for-age among children <2 y at baseline

Could integrated WASH+Nutrition programs have a larger impact on growth than stand-alone programs?
Integrated nutrition and child development

- Early childhood is an important period for both nutrition as well as child development.
- In many LMIC settings, health and nutrition activities are already operational, but early child development (ECD) interventions are less common.
- Combining nutrition + ECD offers an opportunity to deliver both interventions at marginal extra cost and it is possible that there could be synergistic benefits. But, there is a risk of intervention dilution when combined.
- A systematic review concluded that there was some evidence that the effects of nutrition + ECD interventions were additive, but no studies have been conducted at large scale. (Grantham-McGreggor et al, 2014)
Original Article

Cluster-randomized trial on complementary and responsive feeding education to caregivers found improved dietary intake, growth and development among rural Indian toddlers

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Study design

Control
- Routine ICDS services
  - Center-based supplemental food to 1-6 y olds, pregnant & lactating women
  - Home visit counseling on breastfeeding and complementary feeding
  - Growth monitoring monthly
  - Non-formal preschool education for 3-5 y old children

Complementary feeding
- Routine ICDS services PLUS:
  - More frequent visits by trained village women
  - 11 age-appropriate intervention messages and materials on complementary feeding and sustained breastfeeding

Complementary feeding and play
- Routine ICDS services PLUS
  - Complementary feeding intervention package PLUS
  - 8 age-appropriate messages on responsive feeding
  - 8 child stimulation messages and 5 toys.
  - Messages and skills focused on how to understand and respond to infants cues of hunger/appetite or satiety and messages on play and stimulation

Vazir et al, Matern Child Nutr, 2012
## Results

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Complementary feeding group</th>
<th>Complementary feeding plus play group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of complementary feeding</td>
<td>Improved</td>
<td>Improved</td>
</tr>
<tr>
<td>Reported consumption of nutritious complementary foods</td>
<td>Improved</td>
<td>Improved</td>
</tr>
</tbody>
</table>
| Infant growth                         | Greater change in length from 3-15 m  
No difference in weight or weight change | No difference               |
| Motor development                      | No difference               | No difference                         |
| Mental development                     | No difference               | Improved                              |

Vazir et al, Matern Child Nutr, 2012
Potential risk associated with integrated programs

- They may fail to deliver equal benefits compared to stand alone programs
  - Overload the capacity of the program or front line workers to deliver the intervention
  - Overload the target beneficiaries with too many messages
- Uptake of the targeted behaviors might be lower if focus is diluted
- Benefits may not be additive
What works? How? Where?

**Program components**
- Maternal & child nutrition
- Water, sanitation, hygiene
- Child stimulation, responsive parenting

**Program implementation pathways**

**Impact / outcomes**
- Child growth
- Anemia
- Early child development
How?

Biological pathways

Program components
- Maternal and child nutrition
- Water, sanitation, hygiene
- Child stimulation, responsive parenting

Program implementation pathways
- Intervention delivery (supplement distribution, hardware distribution)
- CHP trainings, household visits, women’s group meetings
- Uptake of the interventions (supplement adherence, feeding practices, food storage, water quality, toys & books available…)

Impact / outcomes
- Child growth
  - Anemia
- Early child development

Biospecimens:
- Blood
- Stool
- Saliva
- Environmental samples
"The wonder and horror of epidemiology is that it’s not enough to just measure one thing very accurately. To get the right answer, you may have to measure a great many things very accurately.”

-Jerry Avorn
Conclusions

• Many of the nutritional problems highlighted with the global nutrition targets are associated with risk factors operating at multiple levels. Multi-sectoral or multi-level solutions should be considered.

• Integrated interventions offer potential to help achieve the targets, but evidence of the benefits of integration vs. stand-alone programs is lacking.

• To really understand what works, where, and how, we need to strengthen our scientific approach impact evaluation, program evaluation, and reporting of results.
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