Working Together to Improve Nutritional Outcomes: The Global Landscape

Patrick Webb
Session Objective:

Participants will obtain a common understanding of key trends in nutrition initiatives and agricultural investments and technologies and the impact that these trends and other challenges – such as food prices, global climate change, agricultural input access, post-harvest storage and handling, market access and gender inequalities in the agriculture sector – have on malnutrition.
### 5. Ensure Food Security and Good Nutrition

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5a. End hunger and protect the right of everyone to have access to sufficient, safe, affordable, and nutritious food</td>
<td>1, 2</td>
</tr>
<tr>
<td>5b. Reduce stunting by x%, wasting by y%, and anemia by z% for all children under five</td>
<td>1, 2</td>
</tr>
<tr>
<td>5c. Increase agricultural productivity by x%, with a focus on sustainably increasing smallholder yields and access to irrigation</td>
<td>3</td>
</tr>
<tr>
<td>5d. Adopt sustainable agricultural, ocean and freshwater fishery practices and rebuild designated fish stocks to sustainable levels</td>
<td>1</td>
</tr>
<tr>
<td>5e. Reduce postharvest loss and food waste by x%</td>
<td>3</td>
</tr>
</tbody>
</table>
### Women of reproductive age and pregnancy
- Folic acid supplementation
- Iron and iron-folate supplementation
- MMN supplementation
- Calcium supplementation
- Iodine through iodisation of salt
- Maternal supplementation with balanced energy protein

### Neonates
- Delayed cord clamping
- Neonatal vitamin K administration
- Vitamin A supplementation
- Kangaroo mother care and promotion of breastfeeding

### Infants and children
- Complementary feeding promotion (6-24 months)
- Preventive vitamin A supplementation (6 months – 5 years)
- Iron supplementation
- MMN supplementation
- Zinc supplementation

### Disease prevention and management
- WASH interventions
- Maternal drowning
- Deworming in children
- Feeding practices in diarrhoea
- Zinc therapy for diarrhoea
- IPTp/ITN for malaria in pregnancy
- Malaria prophylaxis in children

Source: Lancet series 2013
Effect of Scale-up Interventions on Deaths in Children Younger than 5 Years

Source: Lancet series 2013
“Costs for scaling up 10 nutrition specific interventions globally is $9.6 billion per year.”

The Lancet, June 6th 2013

“Annual aid budget is currently $125 billion per year.”

The Economist, June 3rd 2013
Impacts

Mortality in children younger than 5 years could be reduced by 15% (range 9-19%)

- 35% (19-43) reduction in diarrhoea-specific mortality
- 29% (16-37) reduction in pneumonia-specific mortality
- 39% (23-47) reduction in measles-specific mortality
- Reduced deaths due to asphyxia and congenital anomalies
- Little effect on maternal mortality

Stunting overall reduced by at least 20.3% (range 11.1-28.9%)

Severe wasting reduced overall by 61.4% (range 35.7-72%)

Source: Lancet series 2013
Effect of Scale-up Interventions on Deaths in Children Younger than 5 Years

Source: Lancet series 2013
### 80 per cent of the world’s stunted children live in 14 countries

<table>
<thead>
<tr>
<th>Ranking</th>
<th>Country</th>
<th>Year</th>
<th>Stunting prevalence (%)</th>
<th>% of global burden (2011)</th>
<th>Number of stunted children (moderate or severe, thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>India</td>
<td>2005–2006</td>
<td>48</td>
<td>38</td>
<td>11,049</td>
</tr>
<tr>
<td>2</td>
<td>Nigeria</td>
<td>2008</td>
<td>41</td>
<td>7</td>
<td>9,663</td>
</tr>
<tr>
<td>3</td>
<td>Pakistan</td>
<td>2011</td>
<td>44</td>
<td>6</td>
<td>8,059</td>
</tr>
<tr>
<td>4</td>
<td>China</td>
<td>2010</td>
<td>10</td>
<td>5</td>
<td>7,547</td>
</tr>
<tr>
<td>5</td>
<td>Indonesia</td>
<td>2010</td>
<td>36</td>
<td>5</td>
<td>5,958</td>
</tr>
<tr>
<td>6</td>
<td>Bangladesh</td>
<td>2011</td>
<td>41</td>
<td>4</td>
<td>5,291</td>
</tr>
<tr>
<td>7</td>
<td>Ethiopia</td>
<td>2011</td>
<td>44</td>
<td>3</td>
<td>5,228</td>
</tr>
<tr>
<td>8</td>
<td>Democratic Republic of the Congo</td>
<td>2010</td>
<td>43</td>
<td>3</td>
<td>5,228</td>
</tr>
<tr>
<td>9</td>
<td>Philippines</td>
<td>2008</td>
<td>32</td>
<td>2</td>
<td>3,602</td>
</tr>
<tr>
<td>10</td>
<td>United Republic of Tanzania</td>
<td>2010</td>
<td>42</td>
<td>2</td>
<td>3,475</td>
</tr>
<tr>
<td>11</td>
<td>Egypt</td>
<td>2008</td>
<td>29</td>
<td>2</td>
<td>2,628</td>
</tr>
<tr>
<td>12</td>
<td>Kenya</td>
<td>2008–2009</td>
<td>35</td>
<td>1</td>
<td>2,403</td>
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<td>13</td>
<td>Uganda</td>
<td>2011</td>
<td>33</td>
<td>1</td>
<td>2,219</td>
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<tr>
<td>14</td>
<td>Sudan</td>
<td>2010</td>
<td>35</td>
<td>1</td>
<td>1,744</td>
</tr>
</tbody>
</table>

Source: UNICEF 2013
## Wasting: Burden estimates in the 10 most affected countries

<table>
<thead>
<tr>
<th>Ranked by burden (2011)</th>
<th>Country</th>
<th>Year</th>
<th>Wasting (% moderate or severe)</th>
<th>Wasting (% severe)</th>
<th>Number of wasted children, 2011 (moderate or severe, thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>India</td>
<td>2005–2006</td>
<td>20</td>
<td>6</td>
<td>3,783</td>
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<tr>
<td>2</td>
<td>Nigeria</td>
<td>2008</td>
<td>14</td>
<td>7</td>
<td>3,339</td>
</tr>
<tr>
<td>3</td>
<td>Pakistan</td>
<td>2011</td>
<td>15</td>
<td>6</td>
<td>2,820</td>
</tr>
<tr>
<td>4</td>
<td>Indonesia</td>
<td>2010</td>
<td>13</td>
<td>6</td>
<td>2,251</td>
</tr>
<tr>
<td>5</td>
<td>Bangladesh</td>
<td>2011</td>
<td>16</td>
<td>4</td>
<td>1,891</td>
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<tr>
<td>6</td>
<td>China</td>
<td>2010</td>
<td>3</td>
<td>–</td>
<td>1,156</td>
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<tr>
<td>7</td>
<td>Ethiopia</td>
<td>2011</td>
<td>10</td>
<td>3</td>
<td>1,024</td>
</tr>
<tr>
<td>8</td>
<td>Democratic Republic of the Congo</td>
<td>2010</td>
<td>9</td>
<td>3</td>
<td>817</td>
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<tr>
<td>9</td>
<td>Sudan</td>
<td>2010</td>
<td>16</td>
<td>5</td>
<td>769</td>
</tr>
<tr>
<td>10</td>
<td>Philippines</td>
<td>2008*</td>
<td>7</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

Source: UNICEF 2013
The donors’ double dilemma:

“What if global poverty is increasingly focused either in countries which *do not really need aid* or in countries who *cannot absorb aid* easily and quickly?”

Andy Sumner in *The Economist*, June 3rd 2013
THE FUTURE OF GLOBAL POVERTY IN A MULTI-SPEED WORLD:

NEW ESTIMATES OF SCALE, LOCATION AND COST

Peter Edward and Andy Sumner

15 May 2013
In 2012, ‘nutrition-specific actions’ 11% (US$437 million) of total funding requirements (US$7.7 bn) under UN’s Consolidated Appeals Process.

Nutrition-specific elements of food aid budget, total for nutrition actions in emergencies >US$0.5 billion.

In addition, agriculture reconstruction (28% of $7.7b), and WASH (a further 6%).
Source: FAO 2013 Food Outlook
Global cereal production, use and stocks

FAO (2013) Food Outlook
International Dairy Price Index
<table>
<thead>
<tr>
<th></th>
<th>2010/11</th>
<th>2011/12 estimate</th>
<th>2012/13 forecast</th>
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<tbody>
<tr>
<td><strong>PRODUCTION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>2 259.6</td>
<td>2 352.1</td>
<td>2 306.4</td>
</tr>
<tr>
<td>Developing countries</td>
<td>1 318.8</td>
<td>1 350.4</td>
<td>1 400.0</td>
</tr>
<tr>
<td>Developed countries</td>
<td>940.8</td>
<td>1 001.7</td>
<td>906.4</td>
</tr>
<tr>
<td><strong>TRADE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>284.9</td>
<td>317.1</td>
<td>302.9</td>
</tr>
<tr>
<td>Developing countries</td>
<td>93.7</td>
<td><strong>98.9</strong></td>
<td>119.6</td>
</tr>
<tr>
<td>Developed countries</td>
<td>191.2</td>
<td>218.2</td>
<td>183.4</td>
</tr>
</tbody>
</table>

Source: FAOSTAT 2013
Index of farm input and output prices, USA 2000-2012

Paid by farmers for fertilizer

Received by farmers for all crops

International fertilizer and oil prices

- DAP (U.S. Gulf)
- Urea (Ukraine)
- Potash (Canada)
- Crude Oil (Europe Brent Spot Price)

FAO 2013
What Makes Programmes Potentially Nutrition-sensitive?

- They address critical underlying determinants of undernutrition
- They are implemented at large scale and are effective at reaching the poor – who also have the highest malnutrition rates
- They can be leveraged to serve as delivery platforms for nutrition-specific interventions

Accelerating progress in nutrition requires increasing the nutritional impact of effective, large-scale, nutrition-sensitive development programmes

Source: Lancet series 2013
Key Findings

Programmes in these sectors are successful at addressing several underlying determinants of nutrition, but *evidence of nutritional impact is still limited*.

Source: Lancet series 2013
“Chronic malnutrition rates have not declined significantly over the years despite increased income from high value crops.

New approach to resolution of problem is required.”
New crop technology

Higher productivity

Men take over crop with higher productivity

Dispossession (women lose crop, income, status?)

Actually, women gain higher income from non-food crops

Higher household income, sales, consumption

Actually, women gain higher income from non-food crops

Women and children eat more and better

Child nutrition improves...

New crop technology

Higher productivity

Higher household income, sales, consumption

Women and children eat more and better

Net return/day of labor X3

Net rise in real income 13%/hh

Net gain of 47% calories

10% rise in income = 4.8% rise in calories

10% rise in calories = 2.4% fall in undernutrition

Child nutrition improved... a little!

“Children from villages with unclean drinking water—that is, where a high bacteria count was found in the water sample—were significantly more stunted.”

Table 55—Determinants of nutritional status

<table>
<thead>
<tr>
<th>Variable</th>
<th>Weight-for-Age Z-Scores of Children Aged 7-120 Months</th>
<th>Height-for-Age Z-Scores of Children Aged 7-120 Months</th>
<th>Weight-for-Height Z-Scores of Children Aged 7-120 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parameter</td>
<td>t-Value</td>
<td>Parameter</td>
</tr>
<tr>
<td>CAL</td>
<td>0.0091559</td>
<td>2.713</td>
<td>9.314474E-03</td>
</tr>
<tr>
<td>DIAR</td>
<td>-2.50525</td>
<td>-2.690</td>
<td>-4.05504</td>
</tr>
<tr>
<td>WATER</td>
<td>-0.01006</td>
<td>-2.248</td>
<td>-0.02183</td>
</tr>
<tr>
<td>EVA</td>
<td>-0.71560</td>
<td>-1.826</td>
<td>0.62056</td>
</tr>
</tbody>
</table>

“The combined effect of the increase in dietary energy available for work, and more efficiency in its conversion, appears to account for 50 percent of the British economic growth since 1790.”

“The immune system [improves] because the capacity of the gut to absorb nutrients is improved, especially as consequence of a reduction in diarrheal diseases.”

“Public health investments, such as the construction of facilities to improve the supply of water, cleaning up the milk supply, the draining of swamps, the development of effective systems of quarantines, and the cleaning up of slums.”

Robert Fogel’s Nobel Lecture, December 9, 1993
Targeted nutrition interventions covering 90% of population could reduce stunting by 20%.

Bhutta et al. (2013) Lancet Series

Optimal complementary feeding interventions achieved a 0.5-0.6 increase in height-for-age Z-score, which is 30% of average growth deficit [stunting].

Dewey and Chapparo (2009)

Doubling per capita income is associated with reduced stunting of 14.8%.

World Bank (2012)
“A 10% increase in per capita income is associated with a 6 percent reduction in stunting.”

Ruel (2013) IFPRI

“Rates of malnutrition...are projected to decline by an average of around 27 percent [through] per capita income growth of 2.5 percent per year.”


“A doubling of per capita income from agriculture is associated with a 21 percent reduction in stunting.”

Webb and Block (2012) PNAS
- A 10-point increase in food access insecurity score is associated with a 0.20 SD decrease in height-for-age Z score [stunting] - c.10%.
  Psaki et al. (2012) Population Health Metrics

- “Mothers’ schooling explains 13% of variability in child stunting” [Bihar versus Tamil Nadu]
  Cavatorta (2013) Undernutrition disparities among Indian states: counterfactual decomposition

- “Up to 43% of observed growth faltering [stunting] can be explained on the basis of ... long-term intestinal lesions.”
  Lunn et al. (1991) Intestinal permeability, mucosal injury, and growth faltering in Gambian infants Lancet
Poverty reduction - 15-34%

Agriculture income - 21%

Food sufficiency - 10%

Gut biome/EE - 43%

Open Defecation - 23-40%

Nutrition interventions - 11-29%

Complementary Feeding - 20%

Maternal education - 13%

Aflatoxins - 25%

Gut biome/EE - 43%

A thought experiment

15-25%?

10-30%?

25-50%?
Segmented versus geographic targeting?

We have little understanding “of the shape of impact trajectories...and even less understanding of how these trajectories vary for different kinds of projects operating in different contexts.”

Time Impact

New farm technology

Vaccines; supplements

Behavior change comm.

Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8
Working Together through Nutrition-Sensitive Actions?

Evidence of nutritional impact is inconclusive

Although there is some evidence of impact from home gardens and homestead food production systems on vitamin A intake and status of children.

Strong evidence from roll out of biofortified vitamin A rich orange sweet potato on vitamin A intake of mothers and children and vitamin A status of children.

Limited evidence likely due to

Weaknesses in program goals, design, targeting, implementation

Lack of rigor in impact evaluation, including lack of theory-based program impact pathway analysis.

Source: Lancet series 2013
Conclusions

1. ‘Working together’ is essential, not just desirable, to achieve scale (effect size) and coverage.

2. Trajectories of change vary by sector.


4. Stunting *is* declining; food output *is* increasing. Need concrete planning for 25 years hence, not just setting targets.
### Global disability-adjusted life year ranks

<table>
<thead>
<tr>
<th>Year</th>
<th>Rank</th>
<th>Condition</th>
<th>DALYs (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>1</td>
<td>Lower respiratory infections</td>
<td>1.0 (1 to 2)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Diarrhoea</td>
<td>2.0 (1 to 3)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Preterm birth complications</td>
<td>3.2 (2 to 5)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Ischaemic heart disease</td>
<td>4.9 (4 to 8)</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Stroke</td>
<td>6.6 (4 to 9)</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>COPD</td>
<td>6.7 (3 to 11)</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Malaria</td>
<td>6.7 (3 to 11)</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Tuberculosis</td>
<td>8.0 (5 to 11)</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Protein-energy malnutrition</td>
<td>8.1 (5 to 11)</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Neonatal encephalopathy*</td>
<td>10.8 (7 to 14)</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>Major depressive disorder</td>
<td>13.3 (11 to 17)</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Tuberculosis</td>
<td>13.4 (11 to 17)</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>Congenital anomalies</td>
<td>14.2 (12 to 16)</td>
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<td></td>
<td>14</td>
<td>Iron-deficiency anaemia</td>
<td>15.2 (11 to 22)</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Major depressive disorder</td>
<td>15.9 (10 to 26)</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Measles</td>
<td>17.3 (14 to 21)</td>
</tr>
<tr>
<td></td>
<td>17</td>
<td>Neonatal sepsis</td>
<td>18.8 (15 to 26)</td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>Meningitis</td>
<td>19.7 (16 to 25)</td>
</tr>
<tr>
<td></td>
<td>19</td>
<td>Falls</td>
<td>19.0 (16 to 26)</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>Protein-energy malnutrition</td>
<td>20.0 (16 to 26)</td>
</tr>
<tr>
<td></td>
<td>21</td>
<td>Neck pain</td>
<td>21.1 (14 to 28)</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>Diabetes</td>
<td>21.8 (17 to 27)</td>
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<td></td>
<td>23</td>
<td>Cirrhosis</td>
<td>23.0 (19 to 27)</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>Lung cancer</td>
<td>23.1 (19 to 27)</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>Meningitis</td>
<td>24.4 (20 to 27)</td>
</tr>
</tbody>
</table>
Official aid from European donors 2000-2008 est. US$1 billion

Roughly 44% of total supported micronutrient interventions, 40% to treat wasting, 14% to support community-based interventions.

Source: ACF (2012) Aid for Nutrition
Poverty reduction - 27-34%

Agriculture income – 15-24%

Food sufficiency – 10%

Complementary Feeding – 20%

Gut biome/EE – 43%

Aflatoxins – 25%

Open Defecation – 23% 40%

Nutrition interventions – 20-36%

Mattral and child undernutrition

Disease

Income poverty: employment, self-employment, dwelling, assets, remittances, pensions, transfers etc

Lack of capital: financial, human, physical, social, and natural

Social, economic, and political context

Source: Black et. al (2008)
“The link between income and health is not reliably mechanical.”

“The relationship between population heights and income is inconsistent and unreliable.”

Angus Deaton (2007)  
Height, health and development. *PNAS*