
Pattanee Winichagoon, Mahidol University Phnom Penh, Cambodia | December 13, 2014
Outline

• Nutrition and life cycle & causal pathway of malnutrition
• Key evidence on nutrition and health interaction
• Conceptual framework for improving maternal and child nutrition – multi-sectoral strategy
• Thailand multi-sectoral nutrition strategy and implementation
Lifecycle: the proposed causal links

- **Elderly Malnourished**
  - Reduced capacity to care for baby
  - Inadequate food, health & care

- **Woman Malnourished**
  - Pregnancy Low Weight Gain
  - Higher maternal mortality
  - Inadequate foetal nutrition
  - Inadequate food, health & care

- **Baby Low Birth Weight**
  - Higher mortality rate
  - Reduced mental capacity
  - Reduced catch up growth
  - Impaired mental development
  - Inadequate catch up growth
  - Weaning
  - Untimely/inadequate
  - Frequent infections
  - Inadequate food, health & care

- **Visceral obesity, H/T, Diabetes**
  - Reduced mental capacity

- **Child Stunted**
  - Reduced mental capacity
  - Inadequate food, health & care

- **Adolescent Stunted**
  - Inadequate food, health & care
  - Reduced mental capacity

- **Baby Low Birth Weight**
  - Rapid Growth

- **Adult chronic diseases**
  - Frequent infections
  - Inadequate food, health & care
Determinants and consequences of maternal & child malnutrition

Short term consequences
• stunting & wasting
• child morbidity
• child mortality
• low cognitive development

Long term consequences
• adult size and body composition
• intellectual ability
• economic productivity
• obesity and metabolic syndrome

Maternal and child undernutrition

Inadequate (quantity/quality) Dietary intakes
Infection/illnesses
Inadequate maternal & child care
Poor basic health services/unhygienic environmental

Household food insecurity

Resources: Human and financial Political and Economic structure

Source: modified from UNICEF, 1990; FNB 2000
Undernutrition and child mortality

“Undernutrition (fetal growth restriction, suboptimal breastfeeding, stunting, wasting and deficiencies of Vit A & Zn) is responsible for 45% of all underfive mortality, representing 3 million deaths per year”

(Lancet 2013)
<table>
<thead>
<tr>
<th>Nutritional Disorder</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>
Maternal mortality from anemia

- Mild to moderate anemia contributes to maternal mortality, not just severe anemia
- Risk of maternal mortality decreases by 20% for every 1 g/dl increase in Hb conc.
Stunting sets in early: First 1,000 days

Victora, et al, Pediatrics, 2010
Environmental enteropathy: villus atrophy and a cycle of infections and malnutrition
<table>
<thead>
<tr>
<th>Height/Length -for-Age Z-Score</th>
<th>All Deaths HR (95% CI)</th>
<th>Pneumonia Deaths HR (95% CI)</th>
<th>Diarrhoea Deaths HR (95% CI)</th>
<th>Measles Deaths HR (95% CI)</th>
<th>Other Infectious Deaths HR (95% CI)</th>
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<tbody>
<tr>
<td>&lt; -3</td>
<td>5.5 (4.6, 6.5)</td>
<td>6.4 (4.2, 9.8)</td>
<td>6.3 (4.6, 8.7)</td>
<td>6.0 (3.0, 12.0)</td>
<td>3.0 (1.6, 5.8)</td>
</tr>
<tr>
<td>-3 to &lt; -2</td>
<td>2.3 (1.9, 2.7)</td>
<td>2.2 (1.4, 3.4)</td>
<td>2.4 (1.7, 3.3)</td>
<td>2.8 (1.4, 5.6)</td>
<td>1.9 (1.0, 3.6)</td>
</tr>
<tr>
<td>-2 to &lt; -1</td>
<td>1.5 (1.2, 1.7)</td>
<td>1.6 (1.0, 2.4)</td>
<td>1.7 (1.2, 2.3)</td>
<td>1.3 (0.6, 2.6)</td>
<td>0.9 (0.5, 1.9)</td>
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<tr>
<td>&gt; -1</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
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<tr>
<td>&lt; -3</td>
<td>11.6 (9.8, 13.8)</td>
<td>9.7 (6.1, 15.4)</td>
<td>12.3 (9.2, 16.6)</td>
<td>9.6 (5.1, 18.0)</td>
<td>11.2 (5.9, 21.3)</td>
</tr>
<tr>
<td>-3 to &lt; -2</td>
<td>3.4 (2.9, 4.0)</td>
<td>4.7 (3.1, 7.1)</td>
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<td>-2 to &lt; -1</td>
<td>1.6 (1.4, 1.9)</td>
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<td>1.7 (1.0, 2.8)</td>
</tr>
<tr>
<td>≥ -1</td>
<td>1.0</td>
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</table>
Stunting & risk of various malaria-related outcomes

- Prevalence malaria parasitemia
- Prevalence of high density parasitemia
- Prevalence of clinical malaria
- Prevalence of severe anemia

Intensity of the recurrent infection w/ ascaris & trichuris at 4 mo was lowest in children receiving both MMN fortification and deworming (Nga, et al, JN 2009;139: 1013)
Children who received adequate food during and after diarrhea episodes avoided stunting

Lutter, et al, 1992
Micronutrient interventions in childhood

• **Vitamin A supplementation**
  – significantly reduces all cause mortality
  – diarrhea-related mortality
  – Incidence of diarrhea & measles

• **Preventive zinc supplementation**
  – Significantly reduces incidence of diarrhea, pneumonia
  – Improves height gain

• **Iron supplementation**
  – Reduces anemia, increases hemoglobin & ferritin concentration
  – Development benefits in school-age children

• **Micronutrient powders**
  – Reduces anemia, significantly improves hemoglobin
Packages of Nutrition Interventions

Optimal maternal nutrition during pregnancy
- Maternal multiple micronutrient supplements to all
- Calcium supplementation to mothers at-risk of low intake
- Maternal balanced energy protein supplements as needed
- Universal salt iodization

Infant and young child feeding
- Promotion of early, exclusive breastfeeding for 6 months; continued breastfeeding until 24 months
- Appropriate complementary feeding education in food secure populations and additional complementary food supplements in food insecure populations

Micronutrient supplementation in children at risk
- Vitamin A supplementation between 6-59 months age
- Preventive zinc supplements between 12-59 months of age

Management of acute malnutrition
- Supplementary feeding for moderate acute malnutrition
- Management of severe acute malnutrition

Lancet nutrition series 2013
# Effect of Packages of Nutrition Interventions at 90% Coverage

<table>
<thead>
<tr>
<th>Nutrition interventions</th>
<th>Number of lives saved</th>
<th>Cost per life-year saved</th>
</tr>
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<tbody>
<tr>
<td>Optimum maternal nutrition during pregnancy</td>
<td>102,000 (49,000-146,000)</td>
<td>$571 (398-1,191)</td>
</tr>
<tr>
<td>Infant and young child feeding</td>
<td>221,000 (135,000-293,000)</td>
<td>$175 (132-286)</td>
</tr>
<tr>
<td>Micronutrient supplementation in children at risk</td>
<td>145,000 (30,000-216,000)</td>
<td>$159 (106-766)</td>
</tr>
<tr>
<td>Management of acute malnutrition</td>
<td>435,000 (285,000-482,000)</td>
<td>$125 (119-152)</td>
</tr>
</tbody>
</table>
Framework for actions to achieve ‘OPTIMUM’ fetal & 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

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

Optimum fetal and child nutrition and development
- 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

Thailand multi-sectoral policy & planning, and scaling up community-based nutrition program
Thailand multi-sectoral strategy and implementation

Embedding nutrition in the national policy and plans

1. Poverty Alleviation Plan (PAP)
2. Primary Health Care/
   Basic Minimum Need
PAP in the 5th NESDP (1982-1986)

1. Streamline resource allocation to ‘poverty’ areas
   - Defined by a set of criteria: income, land, soil fertility, access to basic svc, etc

2. Goal: Improve ‘Quality of Life’

3. Reorganizing the rural development administrative structure
   - National rural development – chaired by PM, with strong commitment to rural development

Tontisirin, 1992
Primary Health Care (PHC) in Thailand

1. Paradigm shift
   - From service provision to self-help care
   - H personnel = facilitator; people = actor

2. Building village-based manpower to mobilize community participation

3. Increased outreach of MCH at community level
   - Ratio volunteer : HH = 1:10-20
Community financing and management

- Village revolving funds or cooperatives
  - Seed money from govt. + contribution from community
- Training and technical support from government – capacity development at community level
- Technical cooperation among villages (TCDV) = transfer knowledge
- Successful communities selected as training/demonstration center in scaling-up
Community-based nutrition program

Underfives

Weighing

Every 3 mo.

Every month

Normal & 1°

2° & 3°

Interventions

Poverty

Improper Dietary Practices

Illness

Inadequate Child Care

– actor = mothers/care takers
– Supporter = village health volunteers

Nu educ/counseling

supplementary food

Individual level

Community level

- actor/mobilizer = vill H volunteers
- facilitator = health personnel

Source: MOPH, undated
Village committee
(organization)

- VHV /VHC
- Mother’s Group
- Other Volunteers
  (Manpower)

Village nutrition fund
(Finance)

Village complementary
food processing

Drug fund

Free food assistance

Children 2º & 3º

Normal & 1º
Other communities

monitor &
evaluate

Government fund, 3000฿
(One time)

Revolution fund

Contribute
in kind

support
Roles of Agriculture in maternal and child nutrition

• Agricultural extension
  – Promote local food production with focus on nutritious foods for complementary foods for children & supplementary foods for pregnant/lactating mothers
### Activities to improve maternal nutrition, morbidity and mortality

<table>
<thead>
<tr>
<th>Activity</th>
</tr>
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<tbody>
<tr>
<td><strong>VHV</strong></td>
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<tr>
<td>- encourage pregnant women to have at least 4 ANC visits spreading in 3 trimesters</td>
</tr>
<tr>
<td><strong>H-personnel</strong></td>
</tr>
<tr>
<td>- Identifying high risk pregnancy &amp; tmt</td>
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<tr>
<td>- Monitoring wt gain &amp; supplementary food</td>
</tr>
<tr>
<td>- Iron, folate &amp; MTV supplementation</td>
</tr>
<tr>
<td>- Nutrition and health education</td>
</tr>
<tr>
<td><strong>Basic H svc and referral system</strong></td>
</tr>
<tr>
<td><strong>Access to clean water &amp; sanitation</strong></td>
</tr>
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Strengthen multi-sectoral interventions at the community level: From PHC to BMN

Quality of Life

- Morality
- Adequate Nutritious Food
- Proper Shelter
- Basic Social Services
- Family Planning
- Adequate food production
- Security in Life & Property
- Participate in local Politics and admin.

Basic Minimum Need (BMN) Approach
Analysis of causes & resources

Problem identification

Formulating action plan

Community organization & management

Community action

Village development plan

BMN indicators/criteria

Training & facilitation

Implementation & supervision

Provincial action plan & budget allocation

Multi-sectoral policy/program planning

Provincial

District

Central

Subdistrict (tambol) council

1. Nutrition
2. Housing & environment
3. Basic services & occupation
4. Security life safety
5. Food production & availability
6. Family planning
7. Participation in development
8. Spiritual & morality
Trend in nutritional status among Thai underfive children from national surveys

- Underfive MN rates declined substantially since mid 1980s due to strong community-based program
- While wasting and underwt declined further, **stunting remains ~10-14%**
Time Frame of the national food and nutrition plans and related policies (1961 - 2006)

National Economic & Social Development Plan (NESDP)

1  2  3  4  5  6  7  8  9

Nat’l FN Policy (NFNP)  
Primary H Care (PHC) (1979)  
Poverty Alleviation Plan (PAP)  
Basic Minimum Needs (BMN)  
Rural Development (RD)  
Decentralization to Tambon council
Nutritional status by urban/rural areas using Thai growth reference, 2542 (NHES4, 2008/9)

<table>
<thead>
<tr>
<th></th>
<th>Urban 1-5 y</th>
<th>Rural 1-5 y</th>
<th>Urban 6-11 y</th>
<th>Rural 6-11 y</th>
<th>Urban 12-14 y</th>
<th>Rural 12-14 y</th>
</tr>
</thead>
<tbody>
<tr>
<td>overweight</td>
<td>6.3%</td>
<td>6.2%</td>
<td>5.8%</td>
<td>5.3%</td>
<td>6.3%</td>
<td>6.1%</td>
</tr>
<tr>
<td>obese</td>
<td>3.5%</td>
<td>2.9%</td>
<td>3.9%</td>
<td>2.7%</td>
<td>4.6%</td>
<td>4%</td>
</tr>
<tr>
<td>stunting</td>
<td>2.7%</td>
<td>2.9%</td>
<td>3.9%</td>
<td>2.7%</td>
<td>3%</td>
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<td>underweight</td>
<td>3%</td>
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<td>3%</td>
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<td>4%</td>
<td>3.4%</td>
</tr>
<tr>
<td>wasting</td>
<td>4%</td>
<td>3.4%</td>
<td>4.4%</td>
<td>3.7%</td>
<td>3.2%</td>
<td>2.9%</td>
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</tbody>
</table>
Conclusion

• Malnutrition and infection interaction: evidence consequences and interventions
• Multi-sectoral strategy is crucial and has to be broaden beyond specific nutrition interventions
• Evidence from Thailand – implementation of the multi-sectoral strategy needs effective integration & participation at the community
• Available innovations & technological development in the present context
Thank you for your attention