Factors associated with child malnutrition in mountainous ethnic minority communities in Lao PDR

Sayvisene Boulor1,3, Dirk R. Essink2, Myung-Hee Kang1, Sengchanh Kounnavong2, Jacqueline E.W. Broerse3

1. Rural Economic and Food Technology Department, Faculty of Agriculture, National University of Laos, PhD Candidate at Athena Institute, Vrije Universiteit Amsterdam, boulom.s@hotmail.com. 2. Lao Tropical and Public Health Institute. 3. Athena Institute, Faculty of Science, Vrije Universiteit Amsterdam

Survey team: NSA/CANTEEN team in Nong district, Savannakhet province
Background

• Malnutrition is a serious global health problem [1].
• Low- and middle-income countries (LMICs) have been mostly faced with undernutrition, including underweight, wasting and stunting.
• Based on field reports and the scarce scientific evidence, in Lao PDR there are pockets where malnutrition is much higher than the averages provided by national statistics.
• These areas hardly benefit from national policies targeting nutrition, and risk falling even further behind in socio-economic development.
• Demonstrating the inequitable distribution of poor nutritional status is the first step in solving it.
Objectives:
The study aimed to identify the extent of malnutrition and factors associated with it among children aged 12-47 months in remote mountainous communities in Lao PDR.

Hypothesis:
The underlying causes are the main factors of malnutrition in children aged between 12 and 47 months in Nong district, Savannakhet province.

Methodology

➢ An analytical cross-sectional survey was conducted in Nong district, Savannakhet province

➢ study population: 23 villages, 173 households were selected and consisted of father, a mother and at least one child between 12 and 47 months of age

➢ Measurement variables:
  ➢ Questionnaire: socio-economic status, HDDs, MDDs, Food Insecurity experience scale and IYCF
  ➢ Anthropometric measurement: wasting, underweight and stunting (WHO standard, WHO Anthro software)
  ➢ 24 hour food intake recall
Conceptual framework of the causes of malnutrition

Inadequate dietary diversity
- MDDs for Children 12-47 months
- Macronutrient and micronutrient deficiency

Household food insecurity
- Household dietary diversity
- Agricultural production diversity
- Wealth index and HH incomes
- Food insecurity experience scale
- Non-timber forest products

Nutritional status
Underweight, wasting and stunting

Disease of children
- Diarrhea (underweight)
- Respiratory issues
- Fever

Inadequate care and feeding practices (Core indicators for IYCF)

Results: socio-economic characteristics

- Ethnic groups: Mang-kong 73%, Ta-oy 27%

- Education level:
  - No schooling: 91%
  - Primary level: 32%
  - Secondary level: 8%
  - Higher level: 0%

- Occupation:
  - No occupation: 15%
  - Family worker (non-wage): 14%
  - Worker in farms: 39%
  - Housewife: 41%
  - Construction worker: 31%

- Household income:
  - ≤ 3,000,000 kip: 84%
  - > 3,000,000 kip: 16%

Source: UNICEF 2013
Underlying causes: Household food insecurity

Agricultural production diversity

Harvesting non-timber forest products

Food insecurity experience scale

Distance to Market

Underlying causes: care, feeding practice and child health

Variables for children (12-47 months) N=173

| Core indicators for IYCF          | Male   | Female  |
|----------------------------------|--------|---------|
| Male_Double-Bar graph            | 84     | 48.6    |
| Female                           | 89     | 51.4    |
| < 7 Days after birth             | 160    | 92.5    |
| 1-6 weeks after birth            | 11     | 6       |
| > 6 Months after birth           | 55     | 32      |
| 1-3 months after birth           | 28     | 16      |
| 4-6 months after birth           | 56     | 32      |
| Don’t know                       | 34     | 20      |
| Types of first supplementary feeds |        |         |
| Cow milk                         | 1      | 0.6     |
| Infant formula                   | 2      | 1.2     |
| Rice water                       | 136    | 78.6    |
| Pre-chewed rice                  | 27     | 15.6    |
| Don’t know                       | 3      | 1.7     |
| Minimum dietary diversity for children |        |         |
| Less than 4 food groups          | 92     | 53      |
| More than 4 food groups          | 81     | 47      |

Child health

| Disease                  | Percentage |
|--------------------------|------------|
| Diarrhea                 | 20.2       |
| Cough/Respiratory problems | 11        |
| Fever                    | 32.4       |
| Malaria                  | 35         |
Nutrition status of children

|                | World (2019) | Laos (2017) | Nong (2018) |
|----------------|--------------|-------------|-------------|
| Wasting        | 7.3          | 9           | 18          |
| Underweight    | 27           | 53.3        | 21.9        |
| Stunting       | 21.9         | 33          | 72.8        |

Comparison with WHO standard
### Dietary nutrient intake adequacy

**Table 3. Number (%) of children aged 12-47 months who consumed the nutrients below the 50%, 50~74.9%, 75~99.9% and over the 100% of the Thai DRI (N=173)**

| Nutrient   | Mean ±SD | DRI | Under 50% | 50%~74.9% | 75%~99.9% | Over 100% |
|------------|----------|-----|-----------|-----------|-----------|-----------|
| Energy     | 723 ± 28.4 | 1000 | 52 (30.0%) | 53 (30.6%) | 30 (17.3%) | 38 (21.9%) |
| Protein    | 23 ± 1.3    | 18   | 22 (12.7%) | 40 (23.1%) | 29 (16.8%) | 82 (47.4%) |
| Calcium    | 136 ± 14.4  | 500  | 156 (90.1%) | 8 (4.6%)  | 6 (3.5%)  | 3 (1.7%)   |
| Iron       | 4.13 ± 0.2  | 5.8  | 82 (47.4%) | 31 (17.9%) | 14 (8.1%) | 47 (27.2%) |
| Vitamin A  | 144 ± 24    | 400  | 108 (62.4%) | 17 (9.8%) | 20 (11.6%) | 9 (5.2%)   |
| Thiamin    | 0.3 ± 0.05  | 0.5  | 111 (64.2%) | 26 (15.0%) | 24 (13.9%) | 12 (6.9%)  |
| Riboflavin | 0.4 ± 0.02  | 0.5  | 70 (40.5%) | 33 (19.1%) | 29 (16.8%) | 41 (23.7%) |
| Vitamin C  | 16 ± 1.9    | 40   | 80 (46.2%) | 19 (11.0%) | 18 (10.4%) | 16 (9.2%)  |
| Niacin     | 6.7 ± 0.3   | 6    | 37 (21.4%) | 44 (25.4%) | 12 (6.9%) | 80 (46.2%) |

SD: standard deviation, DRI: dietary recommendation intake

---

### Factors associated with malnourished children:

**Table 4. Prevalence of wasting and its odds ratio.**

| Independent variables | Wasting (N=173) | OR (95% CI) | p-value |
|-----------------------|-----------------|-------------|---------|
|                       | Yes  | No   | Total |                         |                 |
| **Wealth Index**      |      |      |       |                         |                 |
| Poor                  | 9    | 59   | 68    | 1 (0.89-1.95)           | 0.780           |
| Middle                | 2    | 33   | 35    | 0.397 (0.08-1.95)       | 0.255           |
| Rich                  | 6    | 62   | 68    | 0.634 (0.21-1.89)       | 0.414           |
| Unknown               | 2    |      | 2     |                         |                 |
| **Household assets**  |      |      |       |                         |                 |
| Radio                 |      |      |       |                         |                 |
| Yes                   | 5    | 16   | 21    | 0.299 (0.09-0.95)       | 0.048*          |
| No                    | 13   | 139  | 152   |                         |                 |
| Mobile phone          |      |      |       |                         |                 |
| Yes                   | 6    | 83   | 89    | 2.3 (0.82-6.45)         | 0.13            |
| No                    | 12   | 72   | 84    |                         |                 |
| Rice mill             |      |      |       |                         |                 |
| Yes                   | 1    | 18   | 19    | 2.10 (0.26-16.8)        | 0.7             |
| No                    | 16   | 137  | 153   |                         |                 |
| Unknown               |      |      | 1     |                         |                 |
Table 5. Prevalence of stunting and its odds ratio.

| Independent variables | Stunting |   | OR (95% CI) | p-value |
|-----------------------|----------|---|-------------|---------|
|                       | Yes      | No| Total      |          |
| Wealth Index          |          |   |            |         |
| Poor                  | 20       | 48| 68         | 1       |
| Middle                | 6        | 29| 35         | 2.014 (0.73–5.59) | 0.18 |
| Rich                  | 21       | 47| 68         | 0.933 (0.45–1.94) | 0.85 |
| Unknown               |          |   |            |         |
| Household assets      |          |   |            |         |
| Radio                 |          |   |            |         |
| Yes                   | 19       | 2 | 21         | 0.25 (0.05–1.12) | 0.06 |
| No                    | 107      | 45| 152        |         |
| Mobile phone          |          |   |            |         |
| Yes                   | 63       | 26| 89         | 1.23 (0.63–2.42) | 0.6 |
| No                    | 63       | 21| 84         |         |
| Rice mill             |          |   |            |         |
| Yes                   | 10       | 9 | 19         | 2.72 (1.03-7.2)  | 0.038*|
| No                    | 115      | 38| 153        |         |
| Unknown               |          |   |            |         |

Table 6. Prevalence of underweight and its odds ratio

| Independent variables | Underweight |   | OR (95% CI) | p-value |
|-----------------------|-------------|---|-------------|---------|
|                       | Yes         | No| Total (N=173) |          |
| Household assets      |             |   |             |         |
| Radio                 |             |   |             |         |
| Yes                   | 12          | 9 | 21          | 0.73 (0.29-1.84) | 0.64 |
| No                    | 75          | 77| 152         |         |
| Mobile phone          |             |   |             |         |
| Yes                   | 38          | 51| 89          | 1.87 (1.02-3.43) | 0.048*|
| No                    | 49          | 35| 84          |         |
| Rice mill             |             |   |             |         |
| Yes                   | 5           | 14| 19          | 3.15 (1.08-9.17) | 0.049*|
| No                    | 81          | 72| 153         |         |
| Unknown               |             | 1 |             |         |
| Non-timber forest products |       |   |             |         |
| < 3 types             | 42          | 29| 71          | 1       |
| 3-7 types             | 43          | 53| 96          | 0.56 (0.3-1.04) | 0.067 |
| >7 types              | 0           | 4 | 4           | 0 (0)   | 0.99 |
| Unknown               | 2           |   |             |         |
| gather insects        |             |   |             |         |
| Yes                   | 26          | 40| 66          | 0.5 (0.27-0.94) | 0.041*|
| No                    | 59          | 46| 105         |         |
| Unknown               | 2           |   |             |         |
| gather ant eggs       |             |   |             |         |
| Yes                   | 2           | 9 | 11          | 0.2 (0.04-0.98) | 0.031*|
| No                    | 83          | 77| 160         |         |
| Unknown               | 2           |   |             |         |
### Underweight (continued)

| HDDS          |          |          |          |          |          |
|---------------|----------|----------|----------|----------|----------|
|               |          |          |          |          |          |
| 4-6 Medium    | 40       | 39       | 79       | 1.30     | 0.56     |
| 7-9 Good      | 32       | 28       | 60       | 1.45     | 0.43     |
| 10-12 well    | 4        | 5        | 9        | 1.01     | 0.98     |
| HDDS1         |          |          |          |          |          |
| Cereal group  | Yes      | 65       | 67       | 132      | 0.83     |
|               |          |          |          |          |          |
|               | No       | 22       | 19       | 41       | 0.72     |
| HDDS2         |          |          |          |          |          |
| White roots and tubers group | Yes | 63 | 45 | 108 | 2.39 |
|               | No       | 24       | 41       | 65       | 0.008*   |

### Discussion and recommendation

- Child malnutrition in highland areas of Laos is a persistent and complex problem for public health.
- The children’s vulnerability to malnutrition resulted from lack of adequate nutrient intake, low dietary diversity, and infectious diseases.
- Nutritional interventions should include both nutrition-specific as well as nutrition-sensitive interventions.
- Vitamin A supplementation should continue and calcium insufficiencies can be addressed by improving the supply chain to include milk and/or small fish with edible bones.
- In addition to nutrition-specific interventions, water, sanitation and hygiene programs and strengthening primary health care are critical to manage the frequent episodes of fever and diarrhoea, which affect nutrient uptake. Nutrition education should also be established more firmly within healthcare.
Thanks for your attention

Q & A