A Nutrition and Food Security Assessment of the Dry Zone of Myanmar, June 24th - July 18th 2013

January 16th 2014
OBJECTIVES

1. Estimate the prevalence of indicators of undernutrition in the Dry Zone, and three different agroecological zones within
2. Estimate infant and young child feeding practice rates
3. Assess the differences in the nutrition situation by agroecological zone and the likely reasons, examining the associations between nutrition and other indicators
4. Make recommendations for programming, policy and advocacy
<table>
<thead>
<tr>
<th>Agroecological zone number</th>
<th>Agroecological zone name</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dry land farming</td>
<td>1. Low land, not flood prone, no irrigation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Suitable soil for cultivation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Only single or double cropping possibilities</td>
</tr>
<tr>
<td>2</td>
<td>High land with sloping agriculture</td>
<td>1. High land (greater than 300 meters)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Soil suitable for orchards, plantations, forest</td>
</tr>
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<td></td>
<td></td>
<td>3. Sloping/ shifting cultivation agriculture practiced</td>
</tr>
<tr>
<td>3</td>
<td>Flood plains and irrigated areas</td>
<td>1. Flood plain with good soil fertility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Irrigated land</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Multi-cropping possibilities year round</td>
</tr>
</tbody>
</table>
METHODS (1/5): DESIGN

A cross sectional, two stage, random, cluster survey of rural villages, with 3 strata (agroecological zones)

Stage 1: Random selection of 50 village clusters per zone

Stage 2: Random selection of 40 households per village (12 households with children under 5 for nutrition/IYCF data and 13 (minimum 10) households with/without children under 5 for food security/HH data)

A household: “a person or group of people eating and sleeping in the same compound four nights weekly and sharing resources, not including those who may have migrated”
METHODS (2/5) SAMPLE SIZE

Nutrition:
• 1,800 children 0-59 months

Infant and Young Child Feeding:
• 522 0-24 month olds

Mothers:
• All of the children 0-59 months

Food security, wealth/poverty and Water Sanitation and Hygiene (WASH):
• 1,500 households (with/without U5s)
• Including 560 households with child nutrition and household food security data
METHODS (3/5): QUESTIONNAIRES

- Village profile: Population (for weighting); crop production; market, clinic and water source access and distance by season; and common diseases affecting children
- Household: Written consent and household demography
- Mother: Anthropometry; ANC/PNC; 24 hour diet recall
- Household Food Security, wealth/poverty, WASH
- Child under 5: Anthropometry; recent sickness; supplementation and vaccination status and hygiene practices
- Child under 2: Infant and Young Child Feeding practices
METHODS (4/5): MEASUREMENTS

• **Children**: weight, height/length, Mid Upper Arm Circumference (MUAC) and check for oedema. Date of birth
• **Mothers**: weight, height and MUAC. Age
• Salt iodisation test at household level
METHODS (5/5): FIELD LOGISTICS

• 64 staff (10 from DRD), 9 teams, 8 supervisors

• 2 weeks training, including practice anthropometry & village pilot

• 3.5 weeks field work
NUTRITION RESULTS

Short-term consequences:
Mortality, morbidity, disability

Long-term consequences:
Adult size, intellectual ability, economic productivity, reproductive performance, metabolic and cardiovascular disease

Maternal and child undernutrition

Inadequate dietary intake
Household food insecurity

Inadequate care

Unhealthy household environment and lack of health services

Immediate causes

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

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

Basic causes

Social, economic, and political context
## Sample Size Achieved:

<table>
<thead>
<tr>
<th>Maximum achieved sample sizes</th>
<th>Dry land farming zone (1)</th>
<th>Highland farming zone (2)</th>
<th>Flood plains/irrigated zone (3)</th>
<th>Dry Zone total</th>
<th>Planned sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Villages</td>
<td>51</td>
<td>50</td>
<td>51</td>
<td>152</td>
<td>150</td>
</tr>
<tr>
<td>Households with children U5</td>
<td>601</td>
<td>607</td>
<td>600</td>
<td>1808</td>
<td>ND</td>
</tr>
<tr>
<td>Households with OR without children U5</td>
<td>617</td>
<td>574</td>
<td>612</td>
<td>1803</td>
<td>1500</td>
</tr>
<tr>
<td>Children U5</td>
<td>687</td>
<td>689</td>
<td>600</td>
<td>2037</td>
<td>1800</td>
</tr>
<tr>
<td>Children U2</td>
<td>290</td>
<td>289</td>
<td>243</td>
<td>822</td>
<td>522</td>
</tr>
<tr>
<td>Mothers (children U5)</td>
<td>591</td>
<td>598</td>
<td>599</td>
<td>1789</td>
<td>ND</td>
</tr>
</tbody>
</table>
% Wasted / acutely malnourished (0-59 month olds)
% Stunted/chronically malnourished (0-59 month olds)
Weight for Height Z-score (WHZ) and Height for Age Z-score (HAZ) distributions

<-2 = wasted

<-2 = stunted
% Babies born Low Birth Weight (<2500g)
% Undernutrition in mothers

- Mean MUAC pregnant/lactating mothers: 26.0cm
- Mean MUAC non-pregnant/lactating mothers: 26.8cm
DISEASE AND PUBLIC HEALTH

Short-term consequences:
Mortality, morbidity, disability

Long-term consequences:
Adult size, intellectual ability, economic productivity, reproductive performance, metabolic and cardiovascular disease

Maternal and child undernutrition

Inadequate dietary intake
Household food insecurity

Inadequate care

Disease

Unhealthy household environment and lack of health services

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

Immediate causes

Underlying causes

Basic causes
% Child sickness (previous two weeks)

Dry Zone sickness prevalence: 28.0%
Health caring practices:
Care of children with diarrhoea

- More fluids
- More food
- ORS
- Home ORS
- Zinc tablet
- Zinc syrup

Proportion %

Diarrhoea care
Health caring practices:
Hygiene practices

- Handwashing after child defaecated
- Handwashing after child defaecated (with soap)
- Handwashing prior to food preparation for children (with soap)
- Handwashing prior to food preparation for children
- Disposal of faeces in toilet
Household latrine access

- **Flush latrine**
- **Pit latrine ventilated improved**
- **Pit latrine with slab**
- **Pit latrine without slab**
- **No latrine open defecation**

**Zone 1**
- 20%

**Zone 2**
- 40%

**Zone 3**
- 60%

**Aggregated**
- 42%
Village main water source

Households with access to protected water year round: 64.5%
DIET

Short-term consequences:
Mortality, morbidity, disability

Long-term consequences:
Adult size, intellectual ability, economic productivity, reproductive performance, metabolic and cardiovascular disease

Maternal and child undernutrition

Inadequate dietary intake

Household food insecurity

Inadequate care

Disease

Unhealthy household environment and lack of health services

Immediate causes

Underlying causes

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

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

Basic causes

Social, economic, and political context
Infant and Young Child Feeding practices

- Exclusive breastfeeding
- Timely initiation of breastfeeding
- Continued breastfeeding at 1 year
- Continued breastfeeding at 2 years
- Ever breastfed
- Bottle feeding
- Timely introduction of solid, semisolid, or soft foods
- Minimum acceptable diet (breastfed children)
- Minimum dietary diversity
- Consumption of iron-rich or iron-fortified foods
- Consumption of fortified foods
- Consumption of iron-rich or iron-fortified foods
- Consumption of fortified foods
- Consumption of MNP

Proportion (%)

Breastfeeding
Complementary feeding
Mean dietary diversity scores (child, mother, household)

- Individual Dietary Diversity Score non-pregnant/lactating mothers: 4.4
- Individual Dietary Diversity Score pregnant/lactating mothers: 4.2
Questions / Comments?
POTENTIAL CAUSES OF UNDERNUTRITION:

Using:

Descriptive analysis
• Q1: What indicators are inadequate?
• Q2: What patterns exist between agroecological zones?

And

Exploration of associations and risk factors

NOTWITHSTANDING THE LIMITATIONS OF THE CROSS SECTIOANL DATA...
Season

Seasonal timing places the survey in the hunger gap, impacting on the ‘high’ rates of acute malnutrition, and other indicators (e.g. diet diversity, sickness) – worst case scenario (acute malnutrition)?
Undernutrition in children and mothers

1. Wasting more likely in stunted children (a risk factor), and vice versa

2. Birth weight determines later nutrition status (and LBW is a risk factor for stunting)

3. Mother’s nutrition status (BMI) determines child’s nutrition status (WHZ) (and low BMI is a risk factor for wasting)
Inadequate diets

1. Late and non-exclusive breastfeeding
2. Poor dietary diversity and meal frequency for children during the complementary feeding period
3. Low diet diversity diets for mothers, particularly pregnant/breastfeeding – affects their nutrition and the nutrition of their baby
4. Diet diversity of mother a determinant of child’s diet, regardless of HH economic status, suggesting need to tackle poverty and/or increase knowledge and change attitudes around IYCF/diets
Disease and poor public health environment, including WASH

1. Sickness – similar trends as wasting and stunting

Recent sickness/age

Wasting/age

Disease and poor public health environment, including WASH

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Recent sickness/age

Wasting/age

Disease and poor public health environment, including WASH

1. Sickness – similar trends as wasting and stunting

Recent sickness/age

Wasting/age
Disease and poor public health environment, including WASH

2. Inappropriate care of sick children

3. Poor hygiene practices, particularly hand washing

4. Poor latrine access

5. Use of unprotected water sources

6. Poor drinking water treatment practices
Household food insecurity

1. Low contribution of household subsistence production to household food needs (livestock ownership and land access determinants of mothers BMI)

2. Reliance on market purchase for food access (due to small landholdings/high landlessness; limited irrigation/low yields; small stocks) (poor economic access to food)

3. Challenges in accessing market may impede food access

4. Potentially, poor intrahousehold food allocation
1. Low incomes from limited sources, agriculture-focused so vulnerable to climatic and economic shocks

2. Typicality of loan taking / credit purchase, for many, on unfavourable terms; i.e entrenched indebtedness

3. Poor economic access to food: high proportionate spends on food needs, much on rice (driving poor diversity of diets)
Challenges of physical access – affecting causes of undernutrition through different pathways?

- As the highest rates of sickness are in zone 2 it could be that factors associated with the zones could be ‘causing’ malnutrition, particularly poor infrastructure/service access.
CONCLUSIONS

1. The nutrition situation in the Dry Zone is more concerning than expected. Both acute and chronic malnutrition require attention, as well as the nutrition status of mothers, particularly pregnant and lactating mothers.

2. Zone 3 (irrigated/flood plains) is generally better off, but the situation in the whole Dry Zone warrants attention. The population of Zone 2 (highland farming) may be particularly vulnerable due to access issues as well as poorer food security.

3. Children’s nutrition status is associated with mother’s nutrition status and may be poor from birth, so a life cycle approach is vital.
4. Individual explanatory variables explain only a small proportion of variance of nutrition indicators. This highlights that a multisector approach is needed.

5. Sickness is a key driver of undernutrition, particularly in older children and in zone 2.

6. Deficiencies in the water, sanitation and hygiene environment are implicated.

7. Poor diets are an important driver of undernutrition, in children and mothers.

8. The relationship of nutrition with household economy / poverty is not clear, but widespread low incomes, high debts and insecure livelihood need to be tackled to improve diets and nutrition.
Questions / Comments?
Spare slides in case of questions about some specifics
Key preventative health interventions (children)

- **Bed net use** (6 - 50 months)
- **Measles vaccination** (12 - 23 months)
- **Antihelmint coverage** (12 - 59 months)
- **Vitamin A supplementation** (6 - 59 months)
- **TB vaccination by BCG scar** (0 - 59 months)
Ante-natal Care provision

- **Doctor**: Zone 1 > Zone 2 > Zone 3
- **Nurse**: Zone 1 > Zone 2 > Zone 3
- **Auxiliary midwife**: Zone 2 > Zone 3
- **Traditional birth attendant**: Zone 2 > Zone 3
- **Other**: Zone 2 > Zone 3
Mother’s micronutrient supplementation

Iron during pregnancy
- Zone 1
- Zone 2
- Zone 3
- Aggregated

Vitamin B1
- Zone 1
- Zone 2
- Zone 3
- Aggregated

Postpartum Vit A
- Zone 1
- Zone 2
- Zone 3
- Aggregated

Proportion (%)

5 days a week
- Zone 1
- Zone 2
- Zone 3
- Aggregated

3 - 4 times a week
- Zone 1
- Zone 2
- Zone 3
- Aggregated

1 - 2 times a month
- Zone 1
- Zone 2
- Zone 3
- Aggregated

Mother's micronutrient supplementation

1 - 2 times a month
1 - 2 times a week
3 - 4 times a week
5 days a week
Drinking water treatment

- Boiling
- Cloth filtration
- Leaving it to settle
- No filtration
- Other

[Bar chart showing proportions for different zones and aggregated data]
Food group consumption (mothers, 24 hour recall)
The graph shows the proportion of different agroecological zones across three categories: Adequate (HDDS >4), Moderate (HDDS 3-4), and Severe (HDDS <3). The aggregated data indicates a significant proportion in the Adequate category, followed by Moderate, with a minimal portion in the Severe category.
Households engaged in agriculture:

- Zone 1
- Zone 3
- Aggregated

Proportion of households (%)
The graph shows the proportion of households by the acres owned by the household and the proportion of accessed land irrigated.

- **Landless**: The proportion of households is around 40% in Zone 1 and Zone 3, with an aggregated proportion around 45%.
- **< 2 acres**: The proportion of households is around 10% in Zone 1 and Zone 3, with an aggregated proportion around 20%.
- **2 - 4 acres**: The proportion of households is around 30% in Zone 1 and Zone 3, with an aggregated proportion around 35%.
- **5 - 10 acres**: The proportion of households is around 20% in Zone 1 and Zone 3, with an aggregated proportion around 30%.
- **> 10 acres**: The proportion of households is around 5% in Zone 1 and Zone 3, with an aggregated proportion around 10%.

The proportion of accessed land irrigated is shown in the inset graph. The proportion is around 50% in Zone 1 and Zone 3, with an aggregated proportion around 55%.
Households with staple stocks in Zone 1, Zone 2, Zone 3, and Aggregated.
Median days of stock available per household

- Zone 1
- Zone 2
- Zone 3
- Aggregated
% Households with iodised salt

Zone 1  Zone 2  Zone 3  Aggregated
Reported problems to meet food needs in the last 12 months

Reported problems to meet food needs in the last 7 days

Daily coping

Proportion (%)

Zone 1
Zone 2
Zone 3
Aggregated
No income | Zone 2 | Zone 3 | Aggregated
---|---|---|---
1 income | 20 | 25 | 22
2 incomes | 40 | 40 | 40
3+ incomes | 35 | 30 | 35

Proportion (%)
Wage labour

Agricultural

Non-agricultural

Selling paddy

Selling pulses/beans

Proportion (%)

Zone 1
Zone 2
Zone 3
Aggregated
The chart displays the expenditure (kyat) in three different zones and aggregated data for last month and last six months. The categories include Total, Food, Non-food, Education, Adult health, Child health, and Transport. The expenditure ranges from 50,000 to 250,000 kyat.

- **Total** expenditure for Zone 1 is approximately 150,000 kyat, while for Zone 2 it is around 100,000 kyat, and for Zone 3 it is approximately 50,000 kyat.
- **Food** expenditure shows a similar trend with Zone 1 having around 100,000 kyat, Zone 2 around 50,000 kyat, and Zone 3 approximately 20,000 kyat.
- **Non-food** expenditure for Zone 1 is around 50,000 kyat, Zone 2 approximately 30,000 kyat, and Zone 3 around 10,000 kyat.
- **Education** expenditure is minimal across all zones, with Zone 1 having less than 10,000 kyat, Zone 2 around 5,000 kyat, and Zone 3 less than 5,000 kyat.
- **Adult health** expenditure is negligible for all zones, with Zone 1 less than 1,000 kyat, Zone 2 around 500 kyat, and Zone 3 less than 500 kyat.
- **Child health** expenditure is minimal, with Zone 1 less than 1,000 kyat, Zone 2 around 500 kyat, and Zone 3 less than 500 kyat.
- **Transport** expenditure is negligible across all zones, with Zone 1 less than 1,000 kyat, Zone 2 around 500 kyat, and Zone 3 less than 500 kyat.

The aggregated data for last month expenditure shows a significant increase compared to last six months expenditure except for Total expenditure, which remains relatively constant.
Below national poverty line

- Zone 1: 28%
- Zone 2: 23%
- Zone 3: 25%
- Aggregated: 26%

Below food poverty line

- Zone 1: 6%
- Zone 2: 5%
- Zone 3: 4%
- Aggregated: 5%
Methods (2/5) More on Sample Size

Nutrition and IYCF: 1,800 children 0-59 months, including 522 0-24 month olds:
- For anthropometric indices: using stunting 39% in 0-59 month olds, precision 5%, power 90%, design effect 1.5, 10% refusal = 426 0-59 month olds per zone (9 per village cluster)
- For IYCF: exclusive breastfeeding 8% in 0-5 month olds, precision 5%, power 90% = 80 infants per zone, * 4 and design effect of 1.5 = 480 0-24 month olds
- Estimate 8.8% U5s (2.6% U2s) in Dry Zone, and 31% HH with a child U5 = 12 children U5 in 39 households, of which 3 U2

And their mothers

Food security, wealth/poverty and WASH: 1,500 households (with/without U5s), including 560 HH with child nutrition and household food sec data
- Prevalence 50%, precision 10%, power 90%, design effect 5 = 340 HH per zone (7 per village cluster), BUT 7HH=2U5. Increase pragmatically to 13 (10 minimum) households
Methods: Data management and processing

- Anthropometry data double entered & processed in ENA for SMART (2011)
- Other data entered in Excel / SPSS
- Data entry complete September
- Datasets merged & analysed in ‘svy’ in STATA (12.0)
- Data weighted at cluster & strata level for child/mother/household level estimates, & strata level for analysis of village data
Undernutrition
Child stunting (HAZ score / <-2 HAZ (y/n)), wasting (WHZ score / <-2 WHZ (y/n))
Maternal undernutrition (BMI score / < 18.5 (y/n))

Inadequate diet
IYCF practices: exclusively breastfed (y/n), meal frequency / min meal freq (y/n), dietary diversity score** / min diet diversity (y/n), min adequate diet (y/n)
Mother’s dietary diversity score**

Inadequate care environment

Disease
Recent morbidity (y/n)

Poor public health environment
Antihelminth (y/n); Vitamin A supplementation (y/n)
Hand washing with soap
Child’s faeces disposal in latrine (y/n)
Drinking water on the premise (y/n)
Clinic in village (y/n) and time to travel to the clinic
Latrine access (y/n)**

Household food insecurity
Travel time to market
Household Dietary Diversity Score**
Food Consumption Score, including adequacy (y/n)**
Income amount
Food expenditure and food expenditure amounts
HH subsistence production (y/n)**
Livestock ownership (y/n)**

Household poverty and demography
Probability of falling below national poverty line
Sex of household head (m/f)
Number of people in the household
Dependency ratio
Labour migration (y/n)
Detecting significant associations

Requires variability in the population, as well as a sufficiently powered sample. No evidence of association or risk does not mean no association or risk exists. e.g. poverty
Significant associations

Nutrition indicators as explanatory variables

• Outcome HAZ, explanatory variable birthweight, $R^2 = 13.1\% \ (0.1, \ 0.4)$
• Outcome WHZ, explanatory variable birthweight, $R^2 = 7.8\% \ (0.1, \ 0.3)$
• Outcome WHZ, explanatory variable mother’s BMI, $R^2 = 1.4\% \ (0.0, \ 0.1)$
• Outcome stunting, explanatory variable wasting, OR 1.68 (1.16, 2.42)
• Outcome stunting, explanatory variable low birth weight, OR 10.66 (2.47, 45.98)
• Outcome wasting, explanatory variable mother’s BMI, OR 0.93 (0.87, 0.98)

Diet indicators as explanatory variables

• Outcome HAZ, explanatory variable adequate HDDS, $R^2 = 2.2 \ (0.1, \ 1.3)$
• Outcome HAZ, explanatory variable adequate FCS, $R^2 = 1.8 \ (0.1, \ 0.7)$
• Outcome BMI, explanatory variable mother’s IDDS, $R^2 = 1.3 \ (0.5, \ 0.0)$
• Outcome stunting, explanatory variable Minimum Meal Frequency, OR 1.73 (1.07, 2.8)
• Outcome wasting, explanatory variable Minimum Adequate Diet, OR 3.24 (1.06, 9.9)

Public Health environment as explanatory variables

• Outcome BMI, explanatory variable latrine access, $R^2 = 3.4 \ (-0.7, \ 0.0)$
Household food security indicators as explanatory variables

• Outcome **BMI**, explanatory variable HH livestock ownership, $R^2 = 2.3$ (-0.0, 0.0)
• Outcome **BMI**, explanatory variable HH subsistence production, $R^2 = 1.9$ (1.8, 0.0)
• Outcome **stunting**, explanatory variable adequate HDDS, OR 0.43 (0.18, 0.99)