Minimum Dietary Diversity for Women (MDD-W) indicator is related to household food insecurity and farm production diversity

Evidence from rural Mali

Background

• Billions of people remain hungry and/or malnourished
  ~815 million people undernourished - 1 in 8 - in 2016
  ~2 billion suffering from lack of micronutrients

• Huge investments and renewed policies to improved nutrition, notably through nutrition-sensitive interventions
  ➢ Key role of Agriculture

• Need of appropriate indicators to monitor implementation of such interventions and impact on nutrition
Where does MDD-W fit into the SDG

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round

2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons

2.1.1 Prevalence of undernourishment

2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)

2.2.1 Prevalence of stunting (height for age <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age

2.2.2 Prevalence of malnutrition (weight for height >+2 or <-2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight)
Where does MDD-W fit into the SDG

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to sufficient, safe, healthy and nutritious food all year round and improve their nutrition and food security

2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons

2.1.1 Prevalence of undernourishment

2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)

2.2.1 Prevalence of stunting (height for age <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age

2.2.2 Prevalence of malnutrition (weight for height >+2 or <-2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight)
Where does MDD-W fit into the SDG

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, of sufficient and nutritious food throughout the year.

2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and on the prevalence of anaemia among women and men of reproductive age, with a particular focus on adolescent girls, and on the rate of prevalence of obesity.

2.1.1 Prevalence of undernourishment

2.1.2 Prevalence of moderate or severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES)

2.2.1 Prevalence of stunting (height for age $<-2$ standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age

2.2.2 Prevalence of malnutrition (weight for height $>+2$ or $<-2$ standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight)
Where does MDD-W fit into the SDG

**Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture**

2.1 By 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, for nutritious and safe food; achieve universal access to safe, affordable, nutritionally adequate, sustainable, safe and available food in line with national dietary guidelines.

2.1.1 Prevalence of undernourishment

2.1.2 Prevalence of moderate or severe food insecurity based on the Food Insecurity Experience Scale (FIES)

2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and on all forms of malnutrition in adolescents and adults.

2.2.1 Prevalence of stunting (height for age <-2 standard deviation from the median of the World Health Organization (WHO) Child Growth Standards) among children under 5 years of age

2.2.2 Prevalence of malnutrition (weight for height >+2 or <-2 standard deviation from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight)

**Objective of the study**

Provide information on relationships between MDD-W and other dimensions of food and nutrition security

- Appraisal of MDD-W potential to monitor nutrition-sensitive interventions
Agriculture to nutrition pathways

Source: Herforth and Ballard, 2016.6
Agriculture to nutrition pathways

**Food production**
- On-farm availability, diversity and safety of food
- Food environment in markets

**Food security**
- Food access
- Care practices
- Health and sanitation environment

**Food consumption**
- Diet
- Nutritional status
- Health

**Intervention**

*Source: Herforth and Ballard, 2016.*
Research questions

What is the relationship between MDD-W and:

- Farm production diversity (FPDS - Food Production Diversity Score)?
Research questions

What is the relationship between MDD-W and:

- Farm production diversity (FPDS - Food Production Diversity Score)?
- Household food security (HHS - Household Hunger Scale)?
Indicators

• **Minimum Dietary Diversity for Women (MDD-W)** *(FAO and FHI 360, 2016)*

- The proportion of Women of Reproductive Age (WRA) who consumed food items from at least five out of ten defined food groups the previous day or night

- An indicator of (one dimension of) **diet quality**

- Interpretation: **Groups** of WRA where a higher proportion consume ≥5 of the 10 food groups are likely to have higher micronutrient adequacy

---

Indicators

- **Farm Production Diversity Score FPDS**
  - Count of food crops cultivated and livestock reared by the household

### Food crops
- Cereals
- Tubers
- Beans, Peas & Pulses
- Vegetables & Fruits

### Livestock
- Cattle
- Poultry
- Goats & sheeps
- Pigs
- Camel

Range of the score: 0-9
Indicators

• **Household Hunger Scale (HHS)** *(Ballard, Coates, Swindale & Deitchler, 2011)*

  - Derived from the HFIAS *; includes only the three hunger-specific questions of HFIAS, related to the most severe experiences of food insecurity
  
  - Recall period = 30 days

Q1: Was there ever **no food to eat** of any kind in your house **because of lack of resources** to get food?

Q2: Did you or any household member **go to sleep at night hungry** because there was **not enough food**?

Q3: Did you or any household member **go a whole day and night without eating** anything at all because there was **not enough food**?

- Household Hunger Score => Household Hunger categories

  - **No**
    - Rarely?
    - Sometimes?
    - Often?

  - **Yes**
    - Little to no hunger
    - Moderate hunger
    - Severe hunger

*Household Food Insecurity Access Scale*
Data

⇒ From rural Mali: Kayes region
⇒ Cross-sectional survey conducted in 2013
⇒ Secondary data analysis of the baseline survey of a RCT
⇒ 5046 Women of Reproductive Age (4790 Households)
⇒ Dietary data collected through qualitative 24 hour recall
⇒ Other data:
  • Sociodemographic and socioeconomic characteristics
  • Child’s health and morbidity
  • Health facilities utilization
  • Mothers’ knowledge and practices on child health, nutrition, hygiene
  • Women empowerment and decision-making power
Methods

• Logistic regression analyses were used to assess the relationship between MDD-W and HHS or FPDS

Adjusted on confounders
✓ Individual and HH sociodemographic characteristics
✓ Wealth index
Results - Some sociodemographic characteristics of the sample

Sociodemographic characteristics, N=4790, Kayes, Mali, 2013

<table>
<thead>
<tr>
<th>Household size</th>
<th>Sources of income</th>
<th>Education (% of literate)</th>
<th>Marital status</th>
</tr>
</thead>
<tbody>
<tr>
<td>12% 2-5 people</td>
<td>Agriculture 96%</td>
<td>HHH 13%</td>
<td>84% Polygamous</td>
</tr>
<tr>
<td>63% 6 to 8 people</td>
<td>Livestock 73%</td>
<td>Women 1%</td>
<td></td>
</tr>
<tr>
<td>23% 9 to 15 people</td>
<td>Small Business 27%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2% 16 or more</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Results - Household agricultural practices

- **Crops cultivated**
  - TUBERS: 15%
  - PULSES: 72%
  - GROUNDNUT: 95%
  - FRUITS & VEGETABLES: 56%
  - RICE: 24%
  - MILLET, FONIO, SORGHUM: 94%

- **Livestock reared**
  - CAMEL: 3%
  - POULTRY: 50%
  - CATTLE: 52%
  - GOATS & SHEEPS: 35%

- **Farm production diversity**

  Distribution of the Farm Production Diversity Score (FPDS), N=4790, Kayes, Mali, 2013

  Mean FPDS: 3.9, S.D=1.5
Results — Household food (in)security

• Household Hunger Scale (HHS)

Frequency-of-occurrence questions, N=4790, Kayes, Mali, 2013

<table>
<thead>
<tr>
<th>Question</th>
<th>% HH</th>
<th>No</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
</tr>
</thead>
<tbody>
<tr>
<td>No food of any kind in the house</td>
<td>2%</td>
<td>6%</td>
<td>5%</td>
<td>87%</td>
<td></td>
</tr>
<tr>
<td>Go to sleep hungry because there was not</td>
<td>2%</td>
<td>4%</td>
<td>6%</td>
<td>89%</td>
<td></td>
</tr>
<tr>
<td>enough food</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Go a whole day and night without eating</td>
<td>1%</td>
<td>3%</td>
<td>4%</td>
<td>92%</td>
<td></td>
</tr>
</tbody>
</table>

HH food security status, N=4790, Kayes, Mali, 2013

- Little to no hunger in the HH: 91%
- Moderate hunger in the HH: 8%
- Severe hunger in the HH: 2%
Results - Dietary diversity

Distribution of the dietary diversity score (DDS10), N=5040, Kayes, Mali, 2013

- **MDD-W=0**: 73%
- **MDD-W=1**: 27%

Mean DDS10: 3.8 FG per day, S.D=1.2
Results - Dietary diversity

Percentage of food group consumption by dietary diversity scores
N=5040, Kayes, Mali, 2013

![Percentage of food group consumption by dietary diversity scores](image)

- **FG1** (n=76)
- **FG2** (n=570)
- **FG3** (n=1397)
- **FG4** (n=1589)
- **FG5** (n=934)
- **FG6** (n=368)
- **FG7** (n=101)
- **FG8** (n=5)

Legend:
- Other fruits
- Vitamin A-rich fruits & vegetables
- Meat, poultry and fish
- Dairy
- Pulses (beans, peas, lentils)
- Other vegetables
- Dark green leafy vegetables
- Eggs
- Nuts & seeds
- Grains, white roots & tubers, plantains

*Groundnut harvesting period*
Results

• How the MDD-W relates to Household food security status based on the Household Hunger Scale (HHS)?

The risk of not reaching the MDD-W was 1.6-fold higher (95%CI = 1.1-2.1) among women from HH with moderate/severe hunger compared to those from HH with little or no hunger.

Association remained after adjusting for wealth index.

Proportion of women achieving MDD-W by HHS categories*

*adjusted on sociodemographic characteristics
Results

- How the MDD-W relates to Farm Production Diversity?

An increase in FPDS by one food crop/livestock group was associated with greater odds of attaining the MDD-W *(OR: 1.10; 95%CI = 1.05-1.16)*

- Association remained after adjusting for wealth index
- Threshold effect between 4 and 5 pts of the FPDS?

Women achieving MDD-W depending on household FPDS*

*adjusted on sociodemographic characteristics

Partial mediation
1% of the relationship between FPDS and MDD-W mediated by HHS
Summary of results

• MDD-W indicator is related to household food security
  ➢ Women from household classified as food insecure with moderate and severe hunger were less likely to reach the MDD-W than women from food secure household

• MDD-W indicator is related to farm production diversity
  ➢ Farm production diversity was positively correlated with women diet diversity
  ➢ 1% only of the relationship between FPDS and MDD-W was mediated by HHS
Limitations

• FPDS: simple count of crops groups and livestock categories
  ⇒ roles of specific crop or livestock species?
  ⇒ unweighted categories → cultivating a single cereal variety and a single tuber variety confers a higher FPDS than cultivating a large variety of vegetables

• Pathway from Farm production to Food consumption
  ⇒ farm products for own consumption?
  ⇒ food purchased with income from the sale of farm products?
Perspectives

We showed that MDD-W was related to farm production and household food security

Need for more studies

- Magnitude of change in MDD-W?
- Time needed to see evidence of change in MDD-W?
- Do improved diets lead to better nutritional status?

⇒ Although MDD-W is a proxy of micronutrient intakes, do changes in MDD-W lead to changes in nutritional status?
Conclusion / take-home messages

- Our results confirm the association between women’s dietary diversity (measured by the MDD-W indicator) and household level indicators of hunger and farm production diversity.

- MDD-W is not a SDG monitoring indicator but may be relevant to monitor and evaluate nutrition-sensitive agriculture interventions.
Thank you

laura.adubra@ird.fr