Dietary Diversity and Social Behavior Change
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Household Dietary Diversity Score

DIETARY DIVERSITY QUESTIONNAIRE
Please describe the foods (meals and snacks) that you ate or drank yesterday during the day and night, whether at home or outside the home. Start with the first food or drink of the morning.
- Write down all foods and drinks mentioned. When composite dishes are mentioned, ask for the list of ingredients.
- When the respondent has finished, probe for meals and snacks not mentioned.

<table>
<thead>
<tr>
<th>Breakfast</th>
<th>Snack</th>
<th>Lunch</th>
<th>Snack</th>
<th>Dinner</th>
<th>Snack</th>
</tr>
</thead>
</table>

[Households: include foods eaten by any member of the household, and exclude foods purchased and eaten outside the home]
When the respondent recall is complete, fill in the food groups based on the information recorded above. For any food groups not mentioned, ask the respondent if a food item from this group was consumed.

HDDS measures household dietary diversity as a proxy measure of household food access or socio-economic status of household. Modified to Individual Dietary Diversity Score (IDDS) as a proxy measure of the nutritional quality of an individual’s diet.

Uses:
- Monitor seasonal fluctuations in food access.
- Measure the impact of a project on household food access.
- Serve as an indicator within an early warning system.
Dietary Diversity

Number of different food groups consumed is calculated.

The 12 food groups used to calculate the HDDS:
A. Cereals
B. Root and tubers
C. Vegetables
D. Fruits
E. Meat, poultry, offal
F. Eggs
G. Fish and seafood
H. Pulses/legumes/nuts
I. Milk and milk products
J. Oil/fats
K. Sugar/honey
L. Miscellaneous

<table>
<thead>
<tr>
<th>Question number</th>
<th>Food group</th>
<th>Examples</th>
<th>YES=1 NO=0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CEREALS</td>
<td>corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these (e.g. bread, noodles, porridge or other grain products) + insert local foods e.g. ugali, sukuma, porridge or paste</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>WHITE ROOTS AND TUBERS</td>
<td>white potatoes, white yam, white cassava, or other foods made from roots</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>VITAMIN A RICH VEGETABLES AND TUBERS</td>
<td>pumpkin, carrot, squash, or sweet potato that are orange inside + other locally available vitamin A rich vegetables (e.g. red sweet pepper)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>DARK GREEN LEAFY VEGETABLES</td>
<td>dark green leafy vegetables, including wild forms + locally available vitamin A rich leaves such as amaranth, cassava leaves, kale, spinach</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>OTHER VEGETABLES</td>
<td>other vegetables (e.g. tomato, onion, eggplant) + other locally available vegetables</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>VITAMIN A RICH FRUITS</td>
<td>ripe mango, cantaloupe, apricot (fresh or dried), ripe papaya, dried peach, and 100% fruit juice made from these + other locally available vitamin A rich fruits</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>OTHER FRUITS</td>
<td>other fruits, including wild fruits and 100% fruit juice made from these</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>ORGAN MEAT</td>
<td>liver, kidney, heart or other organ meats or blood-based foods</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>FLESH MEATS</td>
<td>beef, pork, lamb, goat, rabbit, game, chicken, duck, other birds, insects</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>EGGS</td>
<td>eggs from chicken, duck, guinea fowl or any other egg</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>FISH AND SEAFOOD</td>
<td>fresh or dried fish or shellfish</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>LEGUMES, NUTS AND SEEDS</td>
<td>dried beans, dried peas, lentils, nuts, seeds or foods made from these (e.g. hummus, peanut butter)</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>MILK AND MILK PRODUCTS</td>
<td>milk, cheese, yogurt or other milk products</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>OILS AND FATS</td>
<td>oil, fats or butter added to food or used for cooking</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>SWEETS</td>
<td>sugar, honey, sweetened soda or sweetened juice drinks, sugary foods such as chocolates, candies, cookies and cakes</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>SPICES, CONDIMENTS, BEVERAGES</td>
<td>spices (black pepper, salt), condiments (soy sauce, hot sauce), coffee, tea, alcoholic beverages</td>
<td></td>
</tr>
</tbody>
</table>

Household level only
Did you or anyone in your household eat anything (meal or snack) OUTSIDE the home yesterday?

Individual level
Did you eat anything (meal or snack) OUTSIDE the home yesterday?
### HDDS vs. IDDS

<table>
<thead>
<tr>
<th>What the tool measures</th>
<th>Household level questionnaire</th>
<th>Individual level questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Household economic access to food (dietary energy)</td>
<td>Quality of the individual’s diet; for women probability of micronutrient adequacy of the diet</td>
</tr>
<tr>
<td>Respondent</td>
<td>Person responsible for food preparation for the household on the previous day</td>
<td>Women aged 15-49 years or individuals in other age/sex groups</td>
</tr>
<tr>
<td>Target of interest</td>
<td>The household (all persons living under the same roof who share meals)</td>
<td>The respondent</td>
</tr>
<tr>
<td>Included and excluded foods</td>
<td>Includes foods</td>
<td>Does not include foods</td>
</tr>
<tr>
<td></td>
<td>Prepared in the home and consumed in the home or outside the home; or Purchased or gathered outside and consumed in the home</td>
<td>Purchased outside the home and consumed outside</td>
</tr>
<tr>
<td>Number of food groups included in the score</td>
<td>12 groups included in the HDDS</td>
<td>9 groups included in the WDDS</td>
</tr>
</tbody>
</table>
Household Food Production

- Ghanaian children in HH keeping poultry twice as likely to have minimum dietary diversity.

- In Burkina Faso, HHs collecting wild foods and those producing food rather than cash crops had better dietary diversity; also in Burkina, women’s BMI improved in a project promoting micronutrient-rich food consumption.

- In Rwanda, hemoglobin and serum ferritin both improved among those consuming high-iron beans. (HarvestPlus)

- OFSP (HarvestPlus), vitamin A cassava (Kenya), and iron pearl millet (India) also have some positive results.
Macronutrients and Micronutrients

- **Carbohydrate**  (4kcal/gm)
- **Protein**  (4kcal/gm)
- **Fat**  (9kcal/gm)
- **Water**  (0kcal/gm)
- **Alcohol**  (7kcal/gm) *Not a nutrient!*

- **Vitamins**  (water soluble: B Vits/C; fat soluble: Vit A, D, E, K)
- **Minerals**  (Larger amounts: calcium, phosphorus, magnesium, sodium, potassium, chloride and sulfur. Trace amounts: iron, manganese, copper, iodine, zinc, cobalt, fluoride and selenium.)
- **Antioxidants & Phytochemicals*
Cellular Composition

• Membrane that surrounds a cell is made up of proteins and lipids. Lipids can make up anywhere from 20 to 80 percent of the membrane, with the remainder being proteins. Cholesterol (not found in plant cells) is a type of lipid that stiffens the membrane.

• Cytosol contains salts, nutrients, proteins

NIH: Inside the Cell. 
https://publications.nigms.nih.gov/insidethecell/chapter1.html
GI Tract Cellular Growth

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Nutrient Requirements

Comparative proportional nutrient requirement per unit body mass

- Energy
- Carbohydrate
- Protein
- Vitamin A
- Vitamin D
- Vitamin E
- Vitamin C
- Folate
- Niacin
- Riboflavin
- Thiamin
- Vitamin B6
- Vitamin B12
- Calcium
- Phosphorus
- Magnesium
- Iodine
- Iron
- Zinc

Half of the 1000 days depends on Mother’s Nutrition and Health

Quality of pregnancy and breast-milk are essential.

Fortification & Supplementation

Population coverage

Additional intake per single dose

Mass fortification
Target fortification
Supplementation

Supplements for home “fortification” (MNP)

Dietary Diversity (“Nutrition”-Sensitive)

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Four planks to intensive nutrition programs:

- Regular, quality **contacts** with mothers/direct caregivers
- Behavior change **messages** reinforced by government, communities, and media
- **Nutrition-sensitive**, health, agriculture, WASH
- Improve quality and expanded collection and use of **data**
MSN Strategy: Changing Behaviors

- More intensive nutrition efforts (not just reach children but promote behavior change)
- This means regular, quality contacts with mothers, households and communities
- Reinforced by community leaders, the formal health system, agricultural extension, mass media, etc.
- Tracking impact of behavior change messaging
Alive and Thrive

Framework for Scaling up Nutrition

1. Advocacy
2. Interpersonal Communication & Community Mobilization
3. Mass Communication
4. Strategic Use of Data

Partnerships & alliances in the health system and other sectors for scale and sustainability

Improved knowledge, beliefs, skills, and environment

Improved breastfeeding & complementary feeding practices

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Alive and Thrive: Advocacy Approach

- Parliament
- Government Agencies
- Ministries
- Multilateral Organizations
- International NGOs
- Media Agencies
- Advocacy Meetings & Workshops
  - Champions
- Scientific
  - Socio-Cultural (current status)
  - Economic
  - International Status
- Strategic Communications
  - Policy Briefs
  - Media Placements
  - Presentations, Write-ups, Booklets

- Develop clear, specific policy goals and actions
- Tailor country strategies
- Develop evidence-based advocacy
- Identify the right stakeholders
- Advocate at national and subnational levels
- Engage with nontraditional stakeholders

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Alive and Thrive: Interpersonal Communication & Community Mobilization and Mass Communication Approaches

- Data-driven, prioritized and sharply focused
- Use multiple platforms
- Of sufficient intensity and saturation
- Created with commercial advertising firms and media partners
- Emotionally appealing
- Frequently monitored

- Prioritize behaviors by the child’s age
- Coach the mother to try a priority behavior
- Observe and help fix the household environment
- Address specific concerns
- Work with the whole family
Fact: Lord Carnarvon and 26 of his colleagues and associates met with “mysterious” deaths following the opening of King Tut’s tomb. Fiction: Deaths were the result of King Tut’s curse. Scientific studies revealed the presence of Aspergillus mold spores (extremely poisonous) in the tomb were at a high level when the tomb was opened. Inhalation or ingestion of the spores are the cited source for the numerous and mysterious deaths — the toxic mold had lain dormant in King Tut’s tomb for thousands of years before stones were removed for Lord Carnarvon’s and others’ entry. The wisps of in-rushing air and movement of all entering disturbed and dispersed the toxic spores into the air.

(In a similar story dating in the early 1970’s, 10 of the 12 scientists not wearing respirators and who unsuspectingly entered a mold infested Polish royal tomb, succumbed to the mold’s toxic effects.)
Aflatoxins: *Aspergillus flavus / A. parasiticus*

Liver failure
Liver cancer
Growth stunting
Immune deficiency or suppression
Grains – especially maize
Peanuts
Nuts

Photos courtesy of John Leslie, Kansas State University.
Aflatoxins: *Aspergillus flavus / A. parasiticus*

- 4 Aflatoxins: B1, B2, G1, G2. B1 is the predominate toxic form.
- Aflatoxin when ingested by animals is converted to two metabolite products, M1 and M2, isolated from milk of lactating animals.
- Aflatoxins occur pre-harvest, in the field, or post-harvest, due to delayed drying and/or improper storage at moisture levels.
- When consumed with leafy greens, aflatoxin not bioavailable for absorption. When absorbed, onion/garlic compounds convert to non-toxic compound in the liver. (Felicia Wu, MSU.)

![Properly stored corn](image1.png)  ![Corn exposed to moisture for 18 days](image2.png)
Tanzania’s 1000 days Kit Concept

SEED: conception to birth
SPROUT: birth to 6 months
BUD: 6-12 months
FLOWER: 12-24 months
• FAO Guidelines for Measuring Household and Individual Dietary Diversity. 2013. [link]


• Household Dietary Diversity Score. [link]
Thank you!

Questions?
Muscle

Constriction (Ca) vs. Relaxation (K, Mg)
To relieve muscle tension, try Epsom Salt baths.
Carotenoids

Orange-Yellow Pigments: contain Vitamin C, *carotenoids* and *bioflavonoids*, promote a healthy heart, vision health, healthy immune system, and lower risk of some cancers
Red pigments contain *lycopene* and *anthocyanins*, promote a healthy heart, memory function, urinary tract health, and lower risk of some cancers.
Anthocyanins

Blue-Purple Pigments: contain anthocyanins and phenolics, lower risk of some cancers and promote urinary tract health, memory function, and healthy aging.
Lutein

Green Pigments: contain *lutein* and *indoles*, promote vision health and strong bones and teeth, also lower risk of some cancers
Indoles

health benefits of kale

- weight loss aid
- antioxidant rich
- helps keep skin healthy and strong
- anti-inflammatory
- helps to activate detoxifying enzymes in the liver
- high in fiber, protein, thiamin, riboflavin, folic acid, iron, magnesium, phosphorous, calcium, potassium, copper and manganese, vitamins A, C, K, and B6

- metabolism boost
- high in protein
- protects against macular degeneration
- immune boosting
- packed with phytonutrients

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