

Module 6: Dietary Diversity Score

1. Justification

Poor households, women of reproductive age, and young children living in resource-poor settings are at high risk of inadequate micronutrient intakes when diets lack diversity. Diets of the poor are dominated by staple foods, which often supply 60-70% of their calories, but fail to provide adequate quantities of micronutrients essential for health. Comparative information on diet quality is scarce, and quantitative data on nutrient intakes are expensive and difficult to gather. At the household level, it is a measure of access to food ([Hoddinott and Yohannes, 2002](#)). At the individual level, it has been validated as a proxy for assessing the adequacy of micronutrient intakes of women and children. A number of studies have been conducted to explore how simplified *diet diversity* indices using major food groups correlate with more detailed consumption data, so that cut of points for determining the likelihood of achieving micronutrient adequacy can be established using easy to collect, diet diversity scores. (Arimond, 2010; [Arimond et al., 2011](#); WHO, 2008).

2. Objectives

Dietary Diversity Scores (DDS) are qualitative measures of food consumption that reflect access to a variety of foods, and can serve as proxies for nutrient adequacy of the diet of individuals. This module will:

- a. Review the different DDSs currently in use
- b. Present a simple tool for collecting information concerning consumption of different food groups during the past 24 hours that will enable the user to calculate a number of different Dietary Diversity Scores
- c. Introduce a special food group category for *Biofortified crops* like orange-fleshed sweetpotato or orange maize that the user can choose to include in the final score calculation or not.
- d. Discuss when dietary diversity data should be collected

3. Tools

a. Overview

There are a number of DDS currently in use that have been validated against other methods.

a. *Household Dietary Diversity Score (HDDS)* is the number of unique food groups consumed by household members over a given period. It measures in a snapshot form, the economic ability of a household to access a variety of foods. Thus, items that require resources to obtain such as condiments, sugar and sugary foods, and beverages, are included in the score. Household food access is defined as the ability to acquire a sufficient quality and quantity of food to meet all members' nutritional requirements that can be obtained from own produced food or the market.

b. *Individual Dietary Diversity Score (IDDS)* is meant to reflect the nutritional quality of the diet for a specific individual.

c. *Infant and Young Child Feeding Minimum Diet Diversity Score* is focused on the quality of diet for children 6–23 months of age, a critical period for growth. Dietary data from children 6–23 months of age in 10 developing country sites have shown that consumption of foods from at least 4 food groups out of the 7 total groups in this index on the previous day would mean that in most populations, the child had a high likelihood of consuming at least one animal-source food and at least one fruit or vegetable, in addition to a staple food (WHO, 2008).

d. *Minimum Dietary Diversity-Women (MDD-W)* Score assesses diversity of women’s diets at individual level and replacing the *Women’s Dietary Diversity Score (WDDS)* previously in use (<http://www.fao.org/3/a-i5486e.pdf>). The indicator reflects that women consuming foods from five or more food groups out of the 10 groups total in this index have a greater likelihood of meeting their micronutrient needs than women consuming foods from fewer food groups.

These are summarized in Table 1.

Table 1. Simple food group diversity indicators currently in use or advocated for use at population level

	HDDS ^a	IYCF MDD ^b	WDDS ^c	MDD-W ^d
Population sampled/unit of analysis	Households	Infants and young children aged 6–23 months	Women aged 15–49 years	Women aged 15–49 years
Validated against	Kilocalorie availability as assessed in household-level consumption surveys	Micronutrient density compared with desirable density for complementary foods, assessed by 24-hour recall or weighed food records	Micronutrient adequacy assessed by multiple 24-hour recalls	Micronutrient adequacy assessed by multiple 24-hour recalls
Meaning	Proxy for household-level access to kilocalories (dietary energy),	Proxy for the adequacy of the micronutrient density of infant and young child	Proxy for the probability of micronutrient adequacy of women's diets	Proxy for the probability of micronutrient adequacy of women's diets

Source: FAO and FHI 360, 2016.

The information generated from dietary diversity tool is particularly useful to develop effective food and nutrition security policies and programs that promote and provide nutritious foods and healthy diets (<http://www.fao.org/food/nutrition-assessment/food-basedindicators/en/>)

b. Method

DDS are user-friendly and easily administered, and low-cost assessment. The data analysis is straight forward, it needs a simple count of food groups that a household or an individual has consumed over the preceding 24 hours. The data collected can be used to estimate, household dietary diversity (HDDS), individual dietary diversity (IDDS), minimum dietary diversity for infants (IYCF MDD) and minimum dietary diversity for women (MDD-W). The optimal time of the year to measure dietary diversity depends on the objective of the survey or monitoring activities. If the objective of the survey or monitoring is to assess the food security situation of the rural,

agriculture based communities; the right time to measure dietary diversity could be during the period of greatest food shortage, immediately prior to the main harvest or immediately after emergency, such data can be used as the baseline for monitoring changes due to intervention effects or to investigate the seasonal distribution of the food security. To monitor the food security/ nutrition programs or agricultural intervention impacts, repeated DDS measures required to assess the impacts of intervention, conducted at the same time of the year as the baseline to avoid seasonal differences. The tools can be used to measure household food diversity status, to measure dietary quality (micronutrient density), to monitoring of food security/nutrition programs or agricultural interventions. What is key is not to compare dietary diversity scores from different seasons, as seasonality has a strong influence on the score. Thus, if you collect baseline data in March-April; then you should return at the same period of time for an endline comparison. Ideally, you would collect dietary diversity information at least twice per year—once during the hunger season and once during the main harvest season.

Qualitative information on the consumption of different food groups can be obtained by using standard questionnaire. After getting information on the food items consumed by the households, dietary diversity scores can be calculated by summing the number of food groups consumed in the household or by the individual respondent over the 24-hour recall period. The following steps are included in creating either the HDDS or MDD-W:

Step 1: Create new food group variables for those food groups that need to be aggregated. E.g. create food group called starchy staples: Starchy staples takes value of 1 if either cereals or white root tuber were consumed in the past 24 hours; value of zero if neither cereals nor white roots and tuber were consumed.

Step 2: Create a new variable termed either HDDS or MDD-W that captures the household or women dietary diversity scores.

Step 3: Compute values for the dietary diversity variable by summing all food groups included in the dietary diversity score (either 12 food groups for household or ten for women). To check the creation of variables corrected and the scores are within the acceptable ranges. The sum of HDDS must be maximum of 12 (eaten all food groups) and minimum zero (eat none of the food groups). The sum of food group for MDD-W, can be maximum of 10 (considering ten food groups) and zero (none of the food groups were eaten). You can also opt to consider *biofortified crops* as a unique food group in the dietary diversity scores. In this case, the potential maximum for HDDS will be 13 and for MDD-W will be 11.

The following questionnaire is designed to collect information using ODK that can serve to calculate either the HDDS, the MDD-W or the Infant and Young Child Minimum Diversity Score. When the project focuses on nutrition outcomes as the major goal, we recommend collecting this data for the reference women (mothers of the young children) and the young children, preferably 6-23 months of age. When the project has food security or marketing goals, collecting the HDDS and the HDDS for children under 5 years of age is recommended.

HOUSEHOLD LEVEL DIETARY DIVERSITY (OR WOMAN OF REPRODUCTIVE AGE (15-49)) AND YOUNG CHILD DIET DIVERSITY (Children 6-23 months for IYCF-MDD and 6-59 months for IDDS).

Instructions. Now I'd like to ask you about foods and drinks that you ate or drank yesterday during the day or night, whether you ate it at home or anywhere else. I am interested in whether you had the food items I will mention even if they were combined with other foods. For example, if you had a soup made with carrots, potatoes and meat, you should reply "yes" for each ingredient. However, if you consumed only the broth of a soup, but not the meat or vegetable, do not say "yes" for the meat or vegetable.

As I ask you about foods and drinks, please think of those you had as snacks or small meals as well as during any main meals. Please also remember foods you may have eaten while preparing meals or preparing food for others. You should have consumed at least a tablespoon of this food. Please do not include any food used in a small amount for seasoning (like chilies, spices, or fish powder). I will ask you about those foods separately. Then, I will ask you if the (name of the child) also consumed this food type.

	Woman		Reference Child			Woman		Reference Child	
	0-No	1-Yes	0-No	1-Yes		0-No	1-Yes	0-No	1-Yes
D03	Any foods made from grains (like maize, rice, wheat, sorghum, millet, noodles, bread)				D12	Any eggs			
D04	Any biofortified crops (orange-fleshed sweetpotato, orange maize, iron rich beans)				D13	Any fish or seafood, fresh or dried			
D05	Any vegetables or roots that are orange-colored inside (OFSP, pumpkin <i>(show pictures)</i>)				D14	Any beans or peas (fresh or dried deans, soybean, lentils)			
D06	Any white roots and tubers or plantains (white potatoes, manioc, white-fleshed sweetpotato)				D15	Any nuts or seeds (groundnuts or cashew-- whole or "butter", egusi, sunflower seeds)			
D07	Any dark green leafy vegetables (sweetpotato leaves, cassava leaves, pumpkin leaves)				D16	Any milk or milk products (such as chees or yogurt, but NOT butter, or ice cream)			
D08	Any fruits that are dark yellow or orange inside (ripe mango, ripe papaya, passion fruit)				D17	Any red palm oil			
D09	Any other vegetables (like eggplant, okra, tomatoes)				D18	Any sweets and sugar (Like sugar, honey, sweetened soda, candies, cookies)			
D10	Any meat made from animal organs (like liver, heart, kidney, blood-based foods)				D19	Any condiments or seasonings (used in small amounts for flavoring)			
D11	Any other types of meat or poultry (like beef, pork, goat, chicken, duck, wild birds)				D20	Any other beverages and foods (tea, coffee, alcohol, olives, etc.)			

D21A. Yesterday, how many times did the adults and older children (>13 years old) in this household eat?

D21B. the children 6 to 13 years old?

D21C. the reference child?

D22. IF THE CHILD ATE OFSP YESTERDAY: How many times did he/she eat OFSP during the entire day? (enter # or 88 if doesn't know or 99=N/A) **IF D19=99, then skip to the next section**

D23. Approximately how much OFSP did the child eat during the entire day? D14A. Number of roots D14B. Size 1-Very Small 2-Small 3-Medium 4-Larg (Show picture of root sizes)

D24A. Where did you get the OFSP? 1- Your field; 2- the market; 3- relative / neighbor; 4- Current Project 5- Other ; 8- Doesn't know / remember D24B. Specify other

Using ODK: Substitute HOUSEHOLD for YOU if the information is being collected for the HDDS in the questions.

- IN THE PAST 24 HRS DID YOU EAT ANY FOODS MADE FROM GRAINS (like maize, rice, wheat, sorghum, millet, noodles, bread)?
1. Yes 0. No ____ 1B. Child: 1. Yes 0. No ____
- IN THE PAST 24 HRS DID YOU EAT BIOFORTIFIED CROPS (Any staples that are Biofortified (OFSP, orange maize, iron rich beans)?
1. Yes 0. No ____ 2B. Child: 1. Yes 0. No ____
- IN THE PAST 24 HRS DID YOU EAT ANY VEGETABLES OR ROOTS THAT ARE ORANGE-COLORED INSIDE (like pumpkin, orange-fleshed sweetpotatoes, carrots or squash)?
1. Yes 0. No ____ 3B. Child: 1. Yes 0. No ____

4. IN THE PAST 24 HRS DID YOU EAT ANY WHITE ROOTS AND TUBERS OR PLANTAINS (like white potatoes, white yams, manioc)?
 1. Yes 0. No _____ 4B. Child: 1. Yes 0. No ____
5. IN THE PAST 24 HRS DID YOU EAT ANY DARK GREEN LEAFY VEGETABLES (Like sweetpotato leaves, amaranths, cassava leaves, kale, spinach, wild leaves that are dark green)?
 1. Yes 0. No _____ 5B. Child: 1. Yes 0. No ____
6. IN THE PAST 24 HRS DID YOU EAT FRUITS THAT ARE DARK YELLOW OR ORANGE INSIDE (Like ripe mango, ripe payaya, or passion fruit) or 100% juice fruits juice made from these fruits)?
 1. Yes 0. No _____ 6B. Child: 1. Yes 0. No ____
7. IN THE PAST 24 HS DID YOU EAT ANY OTHER FRUITS (Like avocado, oranges, bananas, pineapple, watermelon)?
 1. Yes 0. No _____ 7B. Child: 1. Yes 0. No ____
8. IN THE PAST 24 HRS DID YOU EAT ANY OTHER VEGETABLES (Like eggplant, okra, onions)?
 1. Yes 0. No _____ 8B. Child: 1. Yes 0. No ____
9. IN THE PAST 24 HRS DID YOU EAT ANY MEAT MADE FROM ANIMAL ORGANS (Like liver, heart, kidney, or blood-based foods including from wild game)?
 1. Yes 0. No _____ 9B. Child: 1. Yes 0. No ____
10. IN THE PAST 24 HRS DID YOU EAT ANY OTHER TYPES OF MEAT OR POULTRY (Like beef, pork, goat, sheep, rabbit, chicken, duck, guinea fowl or wild birds)?
 1. Yes 0. No _____ 10B. Child: 1. Yes 0. No ____
11. IN THE PAST 24 HRS DID YOU EAT ANY EGGS?
 1. Yes 0. No _____ 11B. Child: 1. Yes 0. No ____
12. IN THE PAST 24 HRS DID YOU EAT ANY FISH OR SEAFOOD, FRESH OR DRIED?
 1. Yes 0. No _____ 12B. Child: 1. Yes 0. No ____
13. IN THE PAST 24 HRS DID YOU EAT ANY BEANS OR PEAS (Like fresh or dried beans, soya bean, lentils)?
 1. Yes 0. No _____ 13B. Child: 1. Yes 0. No ____
14. IN THE PAST 24 HRS DID YOU EAT ANY NUTS OR SEEDS (Like groundnuts, cashews, sunflower seeds, egusi, butters or pastes made from nuts or seeds)?
 1. Yes 0. No _____ 14B. Child: 1. Yes 0. No ____
15. IN THE PAST 24 HRS DID YOU EAT ANY MILK OR MILK PRODUCTS SUCH AS CHEESE OR YOGHURT (But **not** butter, ice cream, cream or sour cream)
 1. Yes 0. No _____ 15B. Child: 1. Yes 0. No ____

16. IN THE PAST 24 HRS DID YOU EAT ANY RED PALM OIL?
 1. Yes 0. No _____ 16B. Child: 1. Yes 0. No ____
17. IN THE PAST 24 HRS DID YOU EAT ANY OTHER FATS AND OIL (Like cooking oil, coconut milk, or butter)?
 1. Yes 0. No _____ 17B. Child: 1. Yes 0. No ____
18. IN THE PAST 24 HRS DID HOUSEHOLD EAT SWEETS AND SUGAR (Like sugar, honey, sweetened soda, candies, cookies, sweetened fruit juices)
 1. Yes 0. No _____ 18B. Child: 1. Yes 0. No ____
19. IN THE PAST 24 HRS DID YOU EAT ANY CONDIMENTS AND SEASONINGS (Such as items used in small amounts to give flavor, like chillies, spices, tomato paste, soy sauce, flavor cubes)
 1. Yes 0. No _____ 19B. Child: 1. Yes 0. No ____
20. IN THE PAST 24 HRS DID YOU EAT ANY OTHER BEVERAGES AND FOODS (Like tea, coffee, beer, wine, other alcohol, olives, etc.)
 1. Yes 0. No _____ 10B. Child: 1. Yes 0. No ____
21. YESTERDAY, HOW MANY TIMES DID THE ADULTS AND OLDER CHILDREN (>13 years old) IN THIS HOUSEHOLD EAT (INCLUDING SNACKS)? _____
 21B. ..the children 6 to 13 years old? ____ 21C. ..the reference child? _____
22. IF THE CHILD ATE OFSP YESTERDAY: HOW MANY TIMES DID HE/SHE EAT OFSP DURING THE ENTIRE DAY? _____
23. APPROXIMATELY HOW MUCH OFSP DID THE CHILD EAT DURING THE ENTIRE DAY:
 18A NUMBER OF ROOTS: _____.
24. ROOT SIZE
- 1 VERY SMALL (50 gms)
 - 2 SMALL (100 gms)
 - 3 MEDIUM (250 gms)
 - 4 LARGE (400 gms)
 - 5 VERY LARGE (600 gms)
25. WHERE DID YOU GET THE OFSP ROOTS?
- 1 YOUR FIELD
 - 2 FROM MARKET
 - 3 RELATIVE / NEIGHBOR/FRIENDS
 - 4 FROM CURRENT PROJECT
 - 5 OTHERS SOURCE (Specify)
 - 8 DOES NOT KNOW

4. Analysis

Both the Minimum Dietary Diversity for Women of Reproductive Age (MDD-W) indicator and the Infant and Young Child Feeding Minimum Dietary Diversity (IYCF MDD) indicator are dichotomous indicators based on consumption of a number of food groups the previous day or night. Table 2 compares key indicators in both measures:

Table 2. Comparison between key items in the MDD-W Score versus the IYCF-MDD Score

Groups on the MDD-W Questionnaire		10 Food Groups in the MDD-W	7 Food Groups in the IYCF-MDD
A	Foods made from grains	1. Grains, white roots and tubers, and plantains	1. Grains, roots and tubers
B	White roots and tubers and plantains		
C	Pulses (beans, peas and lentils)	2. Pulses (beans, peas and lentils)	2. Legumes and nuts
D	Nuts and seeds	3. Nuts and seeds	
E	Milk and milk products	4. Dairy	3. Dairy products
F	Organ Meat	5. Meat, poultry and fish	4. Flesh foods (meat, fish, poultry, organ meat)
G	Meat and Poultry		
H	Fish and Seafood		
I	Eggs	6. Eggs	5. Eggs
J	Dark green leafy vegetables	7. Dark green leafy vegetables	6. Vitamin A rich fruits and vegetables
K	Vitamin A rich vegetables, roots and tubers	8. Other vitamin A rich fruits and vegetables	
L	Vitamin A rich fruits		
M	Other vegetables	9. Other vegetables	7. Other fruits and vegetables
N	Other fruits	10. Other fruits	

Source: FAO and FHI 360, 2016.

These two minimum diversity scores can be presented as average scores over the target group of interest (women of reproductive age, or children 6-23 months of age). The maximum score possible is 10 for the MDD-W or 7 for the IYCF score. Or the scores can be presented as prevalences: the percent achieving minimum diversity scores. For women, this is consuming 5 or more of the 10 food groups above; for infants and young children, the percent consuming 4 groups or more of the 7 food groups above. If the category of *biofortified crops* is added, increase the cut-off point to at least 6 or more for women; and 5 or more for children.

Table 3 provides a comparison of the food groups included in the HDDS indicator and the IDDS applied to children. For either indicator, any disaggregated categories are combined into the representative category listed above. Then the represented category takes a value of 1 if any of the items in that food group were consumed. The maximum scores possible for HDDS and IDDS are 12 and 8, respectively. However, if biofortified foods are added as a separate group, the maximum possible scores increase to 13 and 9, respectively.

A STATA program has been developed that calculates these scores and is available upon request from CIP.

Table 3. Items in the HDDS compared to the IDDS applied to Children

HDDS Food Groups (Maximum Score: 0-12)	IDDS (Children) Food Groups (Score: 0-8)
1. Cereals	1. Grains, roots or tubers
2. Roots and tubers	2. Vitamin A-rich plant foods
3. Vegetables	3. Other fruits or vegetables
4. Fruits	4. Meat, poultry, fish, seafood
5. Meat, poultry, offal	5. Eggs
6. Eggs	6. Pulses/legumes/nuts
7. Fish and seafood	7. Milk and milk products
8. Pulses/legumes/nuts	8. Foods cooked in oil/fat
9. Milk and milk products	
10. Oils/ fats	
11. Sugar/honey	
12. Miscellaneous	

Source: Swindale and Bilinsky, 2006.

5. Key References

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