

GUIDELINES FOR MEASURING HOUSEHOLD AND INDIVIDUAL DIETARY DIVERSITY

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Table of Contents

1. Introduction	3
2. Description of the questionnaire	3
2.1 Main differences between household and individual levels	5
2.2 Important considerations	7
3. When to measure dietary diversity	7
4. Translating and adapting the dietary diversity questionnaire	8
4.1 Translation and adaptation steps	9
4.2 Technical issues to discuss prior to beginning field work	10
5. Training survey interviewers	12
6. Instructions for administering the questionnaire	12
7. Analysing dietary diversity data	13
7.1 How to create HDDS	14
7.2 How to create IDDS	15
7.3 Using and interpreting dietary diversity	15
7.4 Creating indicators of special interest from specific food groups	16
7.5 Assessing diet composition at different dietary diversity levels	17
8. Conclusions	18
9. Citations	18
10. Annex: Reference note on deriving indicators of iron intake	20

1. Introduction

Obtaining detailed data on household food access or individual consumption can be time consuming, expensive, and requires a high level of technical skill both in data collection and analysis. The dietary diversity questionnaire is a tool providing a more rapid, user-friendly and cost-effective approach to measure changes in dietary quality at the household and individual level. Administration and scoring/analysis of the tools are straightforward and quick. Dietary diversity is a qualitative measure of food consumption that reflects household access to a wide variety of foods, and is also a proxy of the nutrient adequacy of the diet for individuals.

Dietary diversity scores are created by summing either the number of individual foods or food groups consumed over a reference period. The dietary diversity scores described in these guidelines consist of a simple count of food groups that a household or an individual has consumed over the past 24 hours. The guidelines describe the use of the dietary diversity questionnaire at both the household and individual level. The calculation of the score is slightly different if used at household or individual level, and household and individual scores have a different meaning.

The household dietary diversity score (HDDS) is meant to reflect, in a snapshot form, the economic ability of a household to consume a variety of foods. Studies have shown that an increase in dietary diversity is associated with socio-economic status and household food security (household energy availability) (Hoddinot & Yohannes, 2002; Hatloy et al., 2000).

The individual dietary diversity score (IDDS) aims to capture nutrient adequacy. Many studies in several different age groups have shown that an increase in individual dietary diversity score is related to increased nutrient adequacy of the diet. Dietary diversity scores have been positively correlated with increased mean micronutrient density adequacy of complementary foods (FANTA, 2006) and micronutrient adequacy of the diet in non-breastfeeding children (Hatloy et al., 1998; Ruel et al., 2004; Steyn et al., 2006; Kennedy et al., 2007), adolescents (Mirmiran et al., 2004) and adults (Ogle et al., 2001; Foote et al., 2004). Currently, research is being undertaken by FAO, IFPRI and others, to better understand the strength of the association between dietary diversity and micronutrient intake in women of childbearing age.

The dietary diversity tool being proposed and used by FAO can aid in understanding if and how diets are diversified, and can also assess if households or individuals consume foods of special interest (for example: vitamin A-rich vegetables, tubers and fruit). The questionnaire is standardized and was developed with the intention of universal applicability. As such, it is not culture, population, or location specific. Therefore, prior to using it in the field, it is necessary to adapt it to the local context.

This is the fourth version of the guidelines for measuring dietary diversity. The main changes in this version are i) update of the classification of individual food items into food groups ii) new questionnaire form with space for an open recall, followed by list based probing and iii) revised indicator for consumption of foods rich in vitamin A. The guidelines describe how to adapt and use the dietary diversity questionnaire and how to create indicators of interest from the data collected.

2. Description of the questionnaire

The questionnaire can be used at the household or individual level, depending on the purpose of the survey. The questionnaire form has been adapted from the FANTA (FANTA 2006) and the questionnaire used for women in the Demographic and Health Surveys (DHS). When using the questionnaire at individual level, it is appropriate for any individual above the age of three years. For children under three, the dietary diversity questionnaire used in the DHS surveys for young children is more appropriate.

DIETARY DIVERSITY QUESTIONNAIRE ¹

Please describe the foods (meals and snacks) that you ate yesterday during the day and night, whether at home or outside the home. Start with the first food eaten in the morning.

Write down all food and drinks mentioned by the respondent. When the respondent has finished, probe for meals and snacks not mentioned.

Breakfast	Snack	Lunch	Snack	Dinner	Snack

[Household level: consider foods eaten by any member of the household, and exclude foods purchased and eaten outside of 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.

Question number	Food group	Examples	YES=1 NO=0
1	CEREALS	corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these (e.g. bread, noodles, porridge or other grain products) + <i>insert local foods e.g. ugali, nshima, porridge or pastes or other locally available grains</i>	
2	VITAMIN A RICH VEGETABLES AND TUBERS	pumpkin, carrots, squash, or sweet potatoes that are orange inside + <i>other locally available vitamin-A rich vegetables (e.g. red sweet pepper)</i>	
3	WHITE TUBERS AND ROOTS	white potatoes, white yams, white cassava, or other foods made from roots	
4	DARK GREEN LEAFY VEGETABLES	dark green/leafy vegetables, including wild ones + <i>locally available vitamin-A rich leaves such as amaranth, cassava leaves, kale, spinach etc.</i>	
5	OTHER VEGETABLES	other vegetables (e.g. tomato, onion, eggplant) , including wild vegetables	
6	VITAMIN A RICH FRUITS	ripe mangoes, cantaloupe, apricots (fresh or dried), ripe papaya, dried peaches + <i>other locally available vitamin A-rich fruits</i>	
7	OTHER FRUITS	other fruits, including wild fruits	
8	ORGAN MEAT (IRON-RICH)	liver, kidney, heart or other organ meats or blood-based foods	
9	FLESH MEATS	beef, pork, lamb, goat, rabbit, wild game, chicken, duck, or other birds	
10	EGGS	chicken, duck, guinea hen or any other egg	
11	FISH	fresh or dried fish or shellfish	

12	LEGUMES, NUTS AND SEEDS	beans, peas, lentils, nuts, seeds or foods made from these	
13	MILK AND MILK PRODUCTS	milk, cheese, yogurt or other milk products	
14	OILS AND FATS	oil, fats or butter added to food or used for cooking	
15	RED PALM PRODUCTS	Red palm oil, palm nut or palm nut pulp sauce	
16	SWEETS	sugar, honey, sweetened soda or sugary foods such as chocolates, candies, cookies and cakes	
17	SPICES, CONDIMENTS, BEVERAGES	spices(black pepper, salt), condiments (soy sauce, hot sauce), coffee, tea, alcoholic beverages OR <i>local examples</i>	
			YES=1 NO=0
Individual level only	Did you eat anything (meal or snack) OUTSIDE of the home yesterday?		
Household level only	Did you or anyone in your household eat anything (meal or snack) OUTSIDE of the home yesterday?		

¹ FAO/Nutrition and Consumer Protection Division, version of May, 2007. Please acknowledge FAO in any documents pertaining to use of this questionnaire.

² This questionnaire may be used for any individual above the age of three years. For children under three, the dietary diversity questionnaire used in DHS surveys for young children is more appropriate.

2.1 Main differences between household and individual levels

The dietary diversity questionnaire can be used at either the household or individual level. The decision on which level to collect information depends in part on the purpose and objectives of the survey. If assessment of the nutrient adequacy of the diet is of primary concern, it would be best to collect information at the individual level by choosing one or two target individuals per household. For example, the respondent could be the head of household, a woman of reproductive age or an elderly person.

Another important consideration for the choice between household and individual is the frequency of meals/snacks purchased and consumed outside the home. If meals/snacks are purchased and consumed outside of the home on a regular basis by one or more family members, administering the questionnaire at the individual level is more appropriate as it is not possible to accurately capture meals/snacks purchased and eaten outside the home at the level of the household.

The following table describes the main differences between use of the questionnaire at household or individual level.

TABLE 1: Comparison of household and individual levels

	<i>Household level questionnaire</i>		<i>Individual level questionnaire</i>
What the tool measures	Household economic access to food (dietary energy)		The individual's dietary quality ¹ , including probability of adequate micronutrient intake
Respondent	Person responsible for food preparation of the household the previous day		An individual, as determined by survey objectives (for example: adolescents, women of reproductive age, preschool children, working men, elderly persons)
Target of interest	The household (all persons living under the same roof who share meals)		The respondent (except in the case of young children, where the respondent is the primary caretaker)
Included and excluded foods	Includes foods	Does not include foods	Includes <u>All</u> foods eaten by the individual of interest, consumed inside or outside the home, no matter where they were prepared.
	prepared in the home and consumed in the home or outside the home; or purchased or gathered outside and consumed in the home	purchased <u>outside and</u> consumed outside ²	
Number of food groups included in the score	<p>12 groups included in the HDDS (Household Dietary Diversity Score): Cereals; White root and tubers; Vegetables; Fruit; Meat; Eggs; Fish; Legumes, nuts and seeds; Milk; Oils and Fat; Sweets; Spices, Condiments, Beverages</p> <p>The last two groups (sweets; spices, condiments and beverages) are indicators of economic access to food, but do not contribute substantially to micronutrient intake.</p> <p>While the questionnaire includes specific groups on Vitamin A rich fruits, vegetables and tubers, these groups are collapsed for the scoring at household level. (See page 14).</p>		<p>14 groups included in the IDDS (Individual Dietary Diversity Score): Cereals; Vitamin A rich vegetables and tubers; White roots and tubers; Dark green leafy vegetables; Other vegetables; Vitamin A rich fruits; Other fruits; Organ meat; Flesh meat; Eggs; Fish; Legumes, nuts and seeds; Milk and milk products; Oils and fats</p> <p>Vitamin A rich food sources are counted separately and meats are sub-divided into two groups (organ meats and other).</p> <p>The last two groups in the questionnaire are not included in the score.</p>

¹ There is some evidence that women's dietary diversity is also a reflection of household economic access to food.

² Those foods are not included because the respondent may not know what others purchase and eat outside.

2.2 Important considerations

- Reference period

FAO uses a reference period of the previous 24 hours. Using one 24 hour recall period does not provide an indication of an individual's habitual diet, however, it provides an assessment of the diet at population level, and can be useful to monitor progress or target interventions (Savy *et al.*, 2005). There are various other valid time frames for recall, such as the past 3 or 7 days and in the case of some foods, the past month. The recall period of 24 hours has been chosen by FAO, as it is less subject to recall error, less cumbersome for the respondent and also conforms to the recall time period used in many other dietary diversity studies (Kennedy *et al.*, 2007; Ruel *et al.*, 2004; Steyn *et al.*, 2006; Savy *et al.*, 2005).

- Eating outside the home

It is an increasingly common practice to consume meals and snacks outside the home, even in developing countries. The last question in the questionnaire asks if anyone in the household for the household level, or the respondent for the individual level, ate anything outside of the home. This question is included as a means of capturing information on the prevalence of purchasing and consuming meals and snacks prepared outside the home.

For the household level questionnaire it is important to take into consideration that the validity of the information collected will depend on the frequency in which people usually eat outside the home³:

- Atypical consumption

Consumption patterns may be atypical during feast and celebration periods. It is not recommended to administer the questionnaire during national holidays/celebrations or during periods such as Ramadan, in which it is likely that the consumption does not reflect the usual diet. Questions related to atypical days may be added to the questionnaire either to screen out households or individuals or to use in analysis as appropriate to the purpose of the survey.

A question of this type can be worded in the following way "Was yesterday a celebration or feast day where you ate special foods or where you ate more, or less than usual?"

- Primary source of food procurement

Sometimes it may be advantageous to know the primary source of food procurement for the entire diet or for certain food groups of interest (cereals, fruits or vegetables). If it is desirable for the purpose of the survey to collect this type of information, the following type of question and coded responses can be added to the questionnaire:

"Could you please tell me the primary source for obtaining food (or list each food group of interest) for your household" (*example codes below*)

1= Own production, gathering, hunting fishing

2= Purchased

3= Borrowed, bartered, exchanged for labor, gift from friends or relatives

4= Food aid

5= Other

3. When to measure dietary diversity

The optimal time of year to measure dietary diversity in households or individuals depends upon the objective of the survey or monitoring activity.

³ This can be determined through interviews with key informants during the adaptation process, see page 7.

The following table describes several scenarios to assist potential users in planning surveys:

Table 2: When to measure dietary diversity

Objective	Timing	
Assessment of the usual diet of households/ individuals	In rural, agriculture-based communities	In non agriculture-based communities
	When food supplies are still adequate ⁴ (may be up to 4-5 months after the main harvest). → <i>Looking at dietary diversity at different points in the agricultural cycle is one way to investigate seasonality of food security⁵.</i>	Any time during the year (if seasonality is not an issue)
Assessment of the food security situation in rural agriculture-based communities	During the period of greatest food shortage, such as immediately prior to the harvest or immediately after emergencies or natural disasters. → <i>This may also serve as a baseline for monitoring change due to an intervention or for investigating seasonality⁶ of food insecurity</i>	
Assessment of the food security situation in non agricultural communities	At the moment of concern to identify a possible food security problem. → <i>May also serve as baseline for monitoring changes due to an intervention</i>	
Monitoring of food security/nutrition programmes or agricultural interventions such as crop diversification.	Repeated measures to assess impact of the intervention on the quality of the diet, conducted at the same time of year as the baseline (to avoid interference by seasonal differences).	

4. Translating and adapting the dietary diversity questionnaire

The standard English version of the questionnaire is not intended to be translated literally and used directly in the countries. Appropriate translation into local languages and adaptation of the food lists (to reflect locally available foods) is necessary, as well as translating terms used to describe key concepts (such as household, meal and snack).

FAO has collaborated with nutritionists in several countries to adapt and translate food security tools and has refined a series of steps to facilitate this work. Below is a list of the main steps

⁴ In this case, the best time should be determined through interviews with key informants.

⁵ Availability of wild foods may vary according to the traditional seasonal agricultural cycle, for example, wild food availability may be greatest during the rainy season, which occurs before harvest of main cereal crops

⁶ One study in Burkina Faso found women had higher dietary diversity during the 'hungry' season due to harvest of wild foods. (Savy *et al.* 2006)

that were used as part of field-testing exercises in Mozambique, Malawi and Kenya⁷ for the dietary diversity questionnaire.

4.1 Translation and adaptation steps

The following steps should be undertaken by the survey team prior to the beginning of field work.

a. Basic translation

The questionnaire is translated literally from English into the most appropriate major language as a starting point. Phrases written in italics are a reminder to the translator to fill in the cell with local examples, but these phrases should not be included in the questionnaire.

b. First review

The translated questionnaire is reviewed by the survey team, including the interviewers who will be conducting the field work. The team should agree on the appropriate wording of the questions and fill in the food group lists with all locally available foods, translated with commonly used, locally recognized names for each food. If questions arise about the way to categorize a certain food or whether it is considered, for example, a “vitamin A-rich food”⁸, food composition tables or nutrition experts may need to be consulted.

It is very important that the team discuss definitions of key terms such as household, meal and snack, and then decide upon the most appropriate local terms to reflect a consistent meaning. In most cases, the most appropriate term for “household” should be sought to reflect a group of persons who live under the same roof and share the same food pot.

The team should also attempt to identify foods which are typically fortified (cereals, oil) and note these in an annex. This information can be obtained from key informants and market visits.

c. Key informant and community meetings to refine the food lists and translations

The survey team should organize a series of meetings with key informants in each survey locality. This phase of adaptation is used to gather several critical pieces of information, including to:

- review and add locally available food items to the food groups,
- identify appropriate local terms for “food” and “meal”,
- discuss issues of food availability (such as season for consuming a particular fruit, insect or other food item) during the season when the questionnaire will be administered,
- identify any locally available fortified foods, such as iodized salt and availability of red palm oil or palm nuts
- gather information on ingredients used in local dishes, and local meal customs and terminology

It may be interesting to also know the customary number of meals eaten per day.

⁷ Mozambique in March 2006, Malawi in July 2006, and Kenya in August 2006. Activities were implemented within the EC/FAO Programme “Food Security Information for Action”.

⁸ Vitamin A rich fruits, vegetables and tubers contain at least 120 mcg of Retinol Equivalent / 100 g where 1RE = 6 µg β-carotene and 12 µg of all other provitamin A carotenoids.

Typical key informants:

- experts at national level if the work is not restricted to a single locality
- community leaders, agricultural or health extension workers at community level
- women in the community who are responsible for food planning and preparation for the household

This information will be very useful for the interviewers to help facilitate respondent recall. It will also supply context for interpreting the results across locations where customs may differ.

Information can also be obtained from the community on the frequency with which people take meals/snacks outside the home, and which household members are more likely to do so. This will help the team to decide whether it is appropriate to use the household level.

Lastly, team members should go to local stores and speak with community members to assess the availability and use of fortified food products.

d. Final translation of the questionnaire

Once key informants from each locality have been visited, the food group lists have been completed and appropriate terminology has been agreed upon, a final version of the questionnaire in the official national language should be created.

This final version of the questionnaire in the official national language should then be translated into the local dialects. It is recommended that the survey enumerators do not translate “on the spot” from one language to another, but that the questionnaire is translated and printed into each local language which will be used.

4.2 Technical issues to discuss prior to beginning field work

There are a few technical issues which the team should discuss prior to beginning data collection.

- ⇒ Minimum quantities: the team will have to decide prior to data collection, whether or not to count foods consumed in very small quantities

In principle, there is no attempt to set minimum quantities below which foods are not considered, so even small amounts of foods (for example, a very small portion of meat included in a mixed dish) will be counted. This is particularly true if the household questionnaire is to be used as a reflection of economic access to food, as even small quantities of the food item reflect some ability to purchase that item.

When the survey is undertaken to reflect adequate nutrient intake, it may be more prudent to exclude very small food quantities (<10g). For example, a dash of milk to just lighten the coffee may be considered too small an amount to count in the milk and milk products group.

- ⇒ Individual food items which could be classified into more than one food group: the team will have to decide the most appropriate food group classification for foods which can be classified into more than one food group

Some common examples of food items which can be classified in more than one food group are hot pepper which could be classified into either the other vegetables or spices, condiments and beverages food group, and fish powder which could be classified into either the fish or spices, condiments and beverages food group.

These decisions are best made after taking into consideration the particular local context; including the typical amount of the food consumed. For example, many cultures use hot

pepper as a spice or condiment added to meals. Depending on the context, this may mean that one small spoon of dried hot pepper flakes is added to an entire dish, or that several spoons of fresh hot pepper are eaten as an accompaniment to the meal. In the first case, the dried pepper may best be counted in the condiments and spices food group, while in the second case, as a larger quantity of fresh hot peppers is consumed, it is more appropriate to count this under the vegetable food group.

Once the decisions have been made, each individual food item for which there was uncertainty can be listed under the most appropriate group so that all enumerators are consistent in assigning this food item to the agreed upon food group.

⇒ Mixed dishes: the team will need to agree on a way to disaggregate mixed dishes in order to record all of the individual components into their respective food groups.

As a rule, some basic foods are listed only under their main ingredient, such as bread is put into the cereals group even if oil, eggs or sugar are added in small amounts during the making. However, many cultures have mixed dishes (such as casseroles or sauces that accompany a staple) that are commonly prepared and eaten. Particular attention should be made to certain ingredients that may not be spontaneously recalled, such as added fats or oils, or secondary ingredients such as small amounts of meat or vegetables.

Example: Githeri is a basic maize (corn) and beans stew, traditional among the Kikuyu people of Kenya. Not only are these two eaten together, they are often intercropped (grown together) in the same fields. At its simplest, githeri is just maize and beans. Sometimes potatoes, greens (kale or similar), or meat are added and the dish is often cooked with oil. Each ingredient belongs to a different food group, so it is necessary to ask the respondent the ingredients that went into the dish, in order to record correctly the diversity of foods in the dish.



⇒ Red palm oil: Another important item to ascertain in the community, area or country where the survey is taking place is whether **red palm oil** or palm nuts are consumed, as these are extremely high sources of vitamin A. When these foods are part of the culture, even if only used by a small percentage of persons, it is important to ask about them. The following line should be inserted into the questionnaire in areas where red palm products are available:

Question number	Food group	Examples	YES=1 NO=0
	RED PALM PRODUCTS	Red palm oil, palm nut or palm nut pulp sauce	

5. Training survey interviewers

Once translation and adaptation of the survey tool are completed, interviewers should be trained to conduct the interviews in the households. This includes classroom instruction, discussion and field practice. This will allow the interviewers to familiarize themselves with the food groups and the individual foods in each group in order to accurately place recalled food into the correct food groups. Role playing is an ideal method for familiarizing interviewers with the procedure for filling out the questionnaire in simulated circumstances.

Time should also be set aside as part of the field testing day for a debriefing session to answer any final questions and discuss any problems with the survey tool. Supervisors should always check over the questionnaires with the interviewers to ensure that all concepts covered during training were understood.

6. Instructions for administering the questionnaire

The approach to measuring dietary diversity is a qualitative 24-hour recall of all the foods and drinks consumed by the respondent (Individual level) or the respondent and/or any other household member (household level).

Individual level

To administer the questionnaire at individual level the population of interest should be chosen prior to the start of the data collection. At each household a member of the population of interest is randomly selected. The respondent is asked about all foods he/she consumed the previous day, inside and outside the home.

Household level

If the questionnaire is administered at household level, the respondent should be the person who was responsible for meal preparation for the household the previous day. The respondent is asked about all foods eaten inside the home the previous day and night, by ANY⁹ member of the household.

It was found through field work in three countries that the most effective way to elicit the information on dietary diversity is to allow the respondent to freely recall what was eaten the previous day¹⁰. This can be done as described below:

- Ask the respondent to list all the foods (meals and snacks) eaten yesterday during the day and night. Start with the first food/drink consumed yesterday morning.
- As the respondent recalls the foods, underline the corresponding foods in the list under the appropriate food group and write "1" in the column next to the food group if at least one food in this group has been underlined. If the food is not listed in any group, write it in the margin and discuss it with the supervisor.
- Probe for snacks eaten between main meals.
- Probe for special foods given to children or lactating/pregnant women.
- Probe for added foods such as sugar in tea, oil in mixed dishes or fried foods.
- If a mixed dish was eaten, ask about and underline all the ingredients of the dish.

⁹ In this questionnaire food consumed by only one member of the household and not the others is still recorded. For example if a child was given a piece of fruit to eat as a snack this is recorded as 'yes' for fruit even if no other members of the household ate fruit.

¹⁰ This method is also employed by others collecting data on dietary diversity. See for example, Savy et al. 2006

- Once the recall is finished, probe for food groups where no food was underlined. Write “0” in the right hand column of the questionnaire when it is ascertained that no foods in that group were eaten.

It is not necessary to read out to the respondent the exact name of the food group, but simply ask (for example) about fruits, vegetables or tubers if these groups were not previously indicated.

There are several advantages of the recall method compared with reading from the questionnaire all the foods in each group and asking the person if these foods were eaten:

- 1) it takes less time,
- 2) it is less tedious for the respondent rather than having to saying Yes or No to each food,
- 3) it actively involves the respondent in the interview process

7. Analysing dietary diversity data

Dietary diversity scores are calculated by summing the number of food groups consumed in the household or by the individual respondent over the 24 hour recall period.

Currently there is no international consensus on which food groups to include in the scores to create the Household Dietary Diversity score (HDDS) and Individual Dietary Diversity score (IDDS), although work is underway to determine the best set of food groups for IDDS as an indicator of adequate micronutrient intake.

For children 6-23 months of age a minimum acceptable dietary diversity of four or more food groups out of a standardized set of seven food groups has been validated.

The proposed FAO groupings for HDDS and IDDS are based on synthesis of currently available research and represent an attempt to achieve harmonization with other guidelines, such as those proposed by FANTA and DHS.

The HDDS and IDDS are calculated differently because the scores are used for different purposes. The HDDS is meant to provide an indication of household economic access to food, thus items that require household resources to obtain, such as condiments, sugar and sugary foods, and beverages are included in the score. The Individual Dietary Diversity Score (IDDS) reflects the nutrient adequacy of the diet and the food groups considered in this score place more emphasis on micronutrient intake.

The methods for the calculating HDDS and IDDS are described below.

7.1 How to create HDDS

For the household dietary diversity score, 12 food groups are proposed (the score will be referred as HDDS12).

The HDDS12 is the sum of the following 12 food groups (in brackets indicates question number in the questionnaire):

1. Cereals [1]
2. White roots and tubers [3]
3. Vegetables * [2, 4 and 5]
4. Fruits ** [6 and 7]
5. Meat*** [8 and 9]
6. Eggs [10]
7. Fish and other seafood [11]
8. Pulses, legumes and nuts [12]
9. Milk and milk products [13]
10. Oils and fats [14] (and red palm oil if applicable)
11. Sweets [15]
12. Spices, condiments and beverages [16]

To score the HDDS some food groups in the dietary diversity questionnaire are combined (see below). The score for these combined food groups is either 1 (if one or more of the original food groups used to create the combined group were consumed) or 0 (if none of the original food groups used to create the combined group was consumed).

* The vegetable food group is a combination of vitamin A rich vegetables and tubers, dark green leafy vegetables and other vegetables

** The fruit group is a combination of vitamin A rich fruits and other fruits

*** The meat group is a combination of organ meat and flesh meat

7.2 How to create IDDS

The food groups considered in the score for the IDDS put more emphasis on micronutrient intake¹¹, rather than economic access to food. For this reason, the IDDS excludes the last two food groups: Sweets, and Spices, condiments and beverages (questions 15 and 16). These groups may be used for additional analysis and considerations of bioavailability of micronutrients (consumption of coffee/tea, see Annex), but do not count as part of the IDDS.

The score includes the following 14 groups. It will be referred as IDDS14 (in brackets indicates question number in the questionnaire):

1. Cereals [1]
2. Vitamin A rich vegetables and tubers [2]
3. White tubers [3]
4. Dark green leafy vegetables [4]
5. Other vegetables [5]
6. Vitamin A rich fruits [6]
7. Other fruits [7]
8. Organ meat (iron rich) [8]
9. Flesh meat [9]
10. Eggs [10]
11. Fish [11]
12. Legumes, nuts and seeds [12]
13. Milk and milk products [13]
14. Oils and fats [14] (and red palm oil if applicable)

7.4 Using and interpreting dietary diversity

The population-level statistics of interest for dietary diversity are the mean dietary diversity score and a measure of distribution of the scores, such as terciles. Looking at the percent of households consuming each food group is another important analytical strategy. Dietary diversity scores and percent of households consuming each food group may be used as a one-time measure or for on-going monitoring. The dietary diversity scores facilitate the assessment of changes in diet before and after an intervention (improvement expected) or after a disaster such as failed crops (decline expected). The mean dietary diversity score allows comparison of sub-populations; for example, communities undergoing a nutrition intervention compared to control communities, or HIV-affected households compared to others.

A more detailed discussion on use of the mean dietary diversity score for definition of target levels can be found in the FANTA publication: Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide, VERSION 2, 2006, (<http://www.fantaproject.org/focus/household.shtml>)

When interpreting the dietary diversity score, it is important to keep in mind that:

¹¹ Research in infants and young children has shown that the fats and oils food group did not contribute to the micronutrient density of the diet. However, this group is included in the IDDS as it improves the absorption of plant source carotenoids and is an important consideration for the energy density of the diet.

- The dietary diversity score does not indicate the quantity of food consumed.
- Diet varies across seasons and some foods can be available in large quantities and at low cost for short periods.
- There may be urban/rural differentials in dietary diversity. Variety is often much greater in urban and peri-urban centers where food markets are vastly supplied and easily accessible.

7.5 Creating indicators of special interest from specific food groups

At the population level, percents can be calculated for households or individuals who consume food groups that are good sources of individual micronutrients, such as vitamin A or iron.

The table below itemizes key food groups of interest when investigating consumption of vitamin A¹² or iron rich foods.

Table 3: Micronutrients of interest and corresponding food groups in the dietary diversity questionnaire

Micronutrient	Question number & Food group
Vitamin A ¹³	<p>Plant-based food groups:</p> <p><i>question no. 2:</i> vitamin A rich vegetables or tubers</p> <p><i>question no. 4:</i> dark green leafy vegetables</p> <p><i>question no. 6:</i> vitamin A-rich fruits (eg. mangos, apricots)</p> <p><i>food group</i> with red palm oil or products made from red palm oil if appropriate</p>
	<p>Animal-based food groups:</p> <p><i>question no. 8:</i> Organ meat</p> <p><i>question no. 10:</i> Eggs</p> <p><i>question no 13:</i> Milk and milk products¹⁴</p>
Iron	<p><i>questions no. 8:</i> Organ meat</p> <p><i>question no. 9:</i> Flesh meat</p> <p><i>question no. 11:</i> Fish</p>

¹² The term vitamin A is used in this section for simplicity. It indicates foods containing retinol and foods of plant origin which contain retinol pre-cursor carotenoids

¹³ Traditionally these groups are considered to be rich in vitamin A. However, the inclusion/exclusion of some groups is currently being debated. The manual will be updated should there be consensus on altering the food groups considered rich in vitamin A.

¹⁴ Many types of cheese meet the defined cut-off of > 120 RE/100g for a source of vitamin A, however in most food composition tables, fresh milk and yogurt do not meet the criterion for the definition of a source of vitamin A.

The following indicators can be derived for consumption of vitamin A rich food groups:

- ⇒ Percent of individuals/households consuming plant foods rich in vitamin A (vitamin A rich vegetables and tubers, dark green leafy vegetables, or vitamin A rich fruits)
- ⇒ Percent of individuals/households consuming vitamin A rich animal source foods (organ meat, eggs or milk and milk products)
- ⇒ Percent of individuals/households consuming either a plant or animal source of vitamin A (vitamin A rich vegetables and tubers or dark green leafy vegetables or vitamin A rich fruits or organ meat, or eggs or milk and milk products).

The following indicator can be derived for consumption of iron rich food groups

- ⇒ Percent of individuals/households consuming **organ meat**, flesh meat, or fish¹⁵

The indicators above are calculated by summing the number of households or individuals who consumed ANY of the food groups listed in the questionnaire and then dividing by the total sample size of the survey.

Example: The percent of households or individuals, who consumed plant foods rich in vitamin A-rich during the last 24 hours, is calculated using the following formula:

$$\frac{\text{Sum of households/individuals who consumed vitamin A rich vegetables and tubers OR dark green leafy vegetables OR vitamin A rich fruits}}{\text{Total number of respondents}} \times 100$$

From qualitative dietary diversity data, it is not possible to establish thresholds below which populations are not consuming sufficient vitamin A or iron. In general, low percentages of households or individuals consuming food groups containing these micronutrients on a given day may be indicative of seriously inadequate diets that lead to morbidity related to micronutrient deficiencies.

As with the dietary diversity mean score, percentages of those consuming micronutrient rich food groups can be used as one-time measure of a population or sub-populations, for on-going monitoring or to assess changes in diet such as before and after an intervention. Sub-groups can also be compared, for example communities undergoing a nutrition intervention compared to control communities

7.6 Assessing diet composition at different dietary diversity levels

In addition to assessing the mean number of food groups consumed by populations, it is also important to know which food groups are predominately consumed at different levels of the dietary diversity score. This provides information on which foods are eaten by those with the lowest dietary diversity, and which foods are added for those with a higher score. The following example shows what diets look like in Central Mozambique (during mango season).

¹⁵ These three food groups all contain foods with heme iron, which is more bioavailable than non-heme iron and also enhances the absorption of non-heme iron. **Organ meats** are the richest source of heme iron.

Table 4: Food groups consumed by >50% of households by dietary diversity tercile in Central Mozambique

Lowest dietary diversity (≤ 3 food groups)	Medium dietary diversity (4 and 5 food groups)	High dietary diversity (≥ 6 food groups)
Cereals	Cereals	Cereals
Green leafy vegetables	Green leafy vegetables	Green leafy vegetables
Vitamin A rich fruit	Vitamin A rich fruit	Vitamin A rich fruit
	Oil	Oil
		Other vegetables
		Fish
		Legumes, nuts and seeds

Source: FAO, 2006

8. Conclusions

Dietary diversity as a measure of household food access and food consumption can be triangulated with other food-related information to contribute towards providing a holistic picture of the food and nutrition security status in a community or broader locations.

Dietary diversity questionnaires are increasingly included in food and nutrition security surveys to provide indicators of household food access or individual dietary quality.

Some examples of where the tool could be included in the context of food and nutrition security assessment are:

- baseline and follow-up assessment
- surveillance systems
- monitoring and evaluation¹⁶ processes
- national surveys
- emergency or routine food security analyses
- phase classification for identifying emergencies

¹⁶ In the case of evaluation of a programme, the tools will be used as outcome indicators. Programmes might include for example those that improve crop production diversity or market availability, or nutrition education projects to improve diet quality.

Citations

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Annex: Reference note on deriving indicators of iron intake

Dietary iron is found in both plant and animal foods. Heme iron, found only in animal source foods is absorbed more easily into the body than non-heme iron, found in both animal and plant foods (Tseng, M. et al. 1997 *Adjustment of iron intake for dietary enhancers and inhibitors in population studies: Bioavailable iron in rural and urban residing Russian women and children* J Nutr 127:1456-1468) There are several dietary factors which influence the uptake of iron by the body. Consuming vitamin C, or a heme iron source increases the bioavailability of non-heme iron consumed in the same meal, conversely, phytate (found in grains and legumes), polyphenols (found in coffee and tea), calcium and egg have an inhibiting effect on non-heme iron uptake when consumed at the same meal (Latham, M. 1997 Human Nutrition in Developing Countries). However, recent studies have found individual iron status has a much more profound effect on iron uptake than do dietary inhibitors and enhancers of iron (Hunt, J. 2001 *How important is dietary iron bioavailability?* Am J Clin Nutr 73:3-4).

The choice of indicators recommended for reporting purposes is driven by the following main factors: i) the survey instrument does not collect information at the level of the meal, where the effect of iron inhibitors and enhancers occurs, therefore it is not possible to associate these effects ii) the unknown iron status of the individual has a larger effect on iron absorption than do any dietary factors.