



# **Strengthening Household Income and Expenditure Surveys as a Tool for Designing and Assessing Food Fortification Programs**

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European Organization for Economic Cooperation and Development



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## Abstract

Micronutrient deficiencies afflict one-third of the world's population and their consequences constitute an enormous disease burden. Deficiencies of vitamin A, iron, iodine and zinc are responsible for the loss of more than 1.5 million lives and 53 million disability adjusted life years (DALYs) annually. The primary cause of micronutrient deficiencies is inadequate dietary intake.

Nutritionists generally maintain that food intake surveys are the gold standard—the preferred source—for individual food consumption data. Food intake surveys, however, are expensive, difficult to administer and subject to considerable measurement error. As a result, they have generally only been available from small and not statistically representative studies, and generalizing their results is problematic. For many years, this food consumption information gap has been addressed using second-best, indirect, alternative data sources, including: the United Nations Food and Agriculture Organization's Food Balance Sheets, private industry data or industry experts' estimates. Each of these approaches has significant shortcomings.

There is now increasing recognition that Household Income and Expenditures Surveys (HIES) are another alternative, indirect measure of food consumption and one that can overcome many of the most important shortcomings of the alternative data sources that have been used to date. HIES are multiple-purpose surveys, but they were not originally intended to be used in the design or assessment of fortification programs. As a result, using them to inform fortification programming has shortcomings.

A number of characteristics of current HIES instruments that have been found to be common shortcomings for purposes of designing and assessing fortification programs can be eliminated or ameliorated with relatively minor modifications. These guidelines are intended to help improve HIES as a tool for designing and assessing fortification programs, and thereby aid in accelerating the development of more evidence-based fortification programs.

## About the Author

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The findings, interpretations, and views expressed in this paper are those of the author(s) and do not necessarily represent those of the member agencies of the International Household Survey Network.

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## The Purpose of These Guidelines

Micronutrient deficiencies afflict one-third of the world's population and their consequences constitute an enormous disease burden. Deficiencies of vitamin A, iron, iodine and zinc are responsible for the loss of more than 1.5 million lives and 53 million disability adjusted life years (DALYs) annually. Most of the burden of micronutrient deficiencies falls on children under-five and the poorest, most vulnerable groups in society (Caulfield, et al., 2006).

The primary cause of micronutrient deficiencies is inadequate dietary intake. The World Health Organization (WHO) and the Food and Agriculture Organization (FAO) have adopted four main strategies for improving micronutrient status: food fortification, supplementation, nutrition education and disease control measures (WHO 2006). Fortification—the addition of micronutrients to a processed food for the purpose of improving the food's nutritional quality—has long been regarded as the “best” of these four strategies because of a combination of considerations:

1. It does not require changing food habits: it piggy-backs on an existing food market, with existing distribution channels of industrially produced foods and thus generally has a high level of socially acceptability.
2. Once a fortification program is in place, it affects the micronutrient status of the fortified food's consumers without their having to be educated about the program and without their having choose to “participate” in the program.
3. It is relatively low cost and generally regarded as the most cost-effective of the four strategies for overcoming micronutrient deficiencies.
4. Once in place, it can affect micronutrient status relatively quickly.
5. Once introduced, it becomes part of the routine food production process and its implementation is led by the private sector, making it less likely to be subject to annual budget allocation competition than the other strategies; i.e., it is relatively more sustainable.

Despite fortification's advantages, the pace of progress in fortification in developing countries has been at best variable (with the exception of salt iodization). This has been due to a number of factors:

1. Inadequate appreciation of the significance of the public health and economic impact of micronutrient deficiencies;
2. Private sector concerns about the public's acceptance of altered (i.e., fortified) foods;
3. Uncertainties about what fortification will cost and who will pay for it;
4. Uncertainties about the competitive impact of fortification;<sup>1</sup>
5. Lack of empirical data about food consumption patterns; in particular
  - a. the proportion of the population consuming centrally processed potential food vehicles and
  - b. the probably additional intake of micronutrients which is a function of the quantities of potential food vehicles consumed by different potential target groups in the population, and particularly by the most at-risk/vulnerable.

Most food and nutrition experts agree that the last of these factors—the dearth of empirical data about individual food consumption patterns—has been among the most important impediments slowing the development of fortification programs. Without individual food consumption data, there have been no empirical data with which to directly address the two most fundamental issues involved in designing of fortification programs; namely, which foods to fortify

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<sup>1</sup> For example: Will it result in changing demand for the newly fortified food? Will it increase costs and either reduce profits or put upward pressure on prices? Will increased prices encourage consumers to substitute other, now relatively less expensive foods, for the newly fortified one?

and the amounts of micronutrients with which they should be fortified.<sup>2</sup>

Nutritionists generally maintain that food intake surveys are the gold standard—the preferred source—for individual food consumption data (see, for example, Gibson 2005). Food intake surveys, however, are expensive, difficult to administer and subject to considerable measurement error. As a result, they have generally only been available from small and not statistically representative studies, and generalizing their results is problematic. While the Philippines, Nigeria, South Africa, Guatemala and perhaps one or two other low- or middle-income countries have conducted national food consumption surveys, only the Philippines does them regularly: the vast majority of countries do not have data that meets this gold standard. Nor is there a reasonable expectation that they will have such data in the future. As a result, by default, fortification programs have been forced to turn elsewhere for information about food consumption patterns.

For many years, this food consumption information gap has been addressed using second-best, indirect, alternative data sources, including: the United Nations Food and Agriculture Organization's Food Balance Sheets, private industry data or industry experts' estimates.<sup>3</sup> Each of these approaches has significant shortcomings (Fiedler, et al., 2008). There is now increasing recognition that Household Income and Expenditures Surveys (HIES) are another alternative, indirect measure of food consumption and one that can overcome many of the most important shortcomings of the alternative data sources that have been used to date.

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2 The decision as to the amount of micronutrients that should be added to a food vehicle depends on three considerations: (1) the severity of the micronutrient intake gap, (2) the distribution of the usual daily intake of the micronutrient—the average but also including data for individuals with large intakes and (3) the distributional pattern (specifically the average amount and the dispersion in the amount) of the food candidates to be fortified. Although HIES have been used to estimate the usual daily intake of a micronutrients, energy and proteins, that application is not the topic of discussion here.

3 Another, less commonly used approach has been specially designed, abbreviated household questionnaires that ask only about the consumption of a few of what are judged the most likely fortifiable foods. These streamlined household questionnaires—known as Fortification Rapid Assessment Tools (FRAT)—were developed in the late 1990s by the Canadian Non-Government Organization, The Micronutrient Initiative. To date, they have been one-time, special studies conducted in eight countries, primarily in West and Central Africa. Guidelines are available at: [http://www.micronutrient.org/CMFiles/PubLib/FRATguidelines2003\\_Nov\\_20081PKE-1222008-1386.pdf](http://www.micronutrient.org/CMFiles/PubLib/FRATguidelines2003_Nov_20081PKE-1222008-1386.pdf)

The use of HIES data in the design and assessment of food fortification programs is growing rapidly (Rose & Charlton, 2002; Imhoff-Kunsch, et al., 2007; Fiedler, et al., 2008; Fiedler & Macdonald, 2008; Fiedler & Helleranta 2009; Fiedler 2009).

HIES are multiple-purpose surveys, but they were not originally intended to be used in the design or assessment of fortification programs. As a result, not surprisingly, using them to inform fortification programming has shortcomings. Common shortcomings include:

1. The failure to be able assess fortification possibilities because key potentially fortifiable foods may not all be included in the food list.
2. Overly optimistic assessment of fortification prospects because HIES do not distinguishing between food that households acquire that is potentially fortifiable and that which is not.
3. Systematic bias in the estimation of consumption because using HIES food acquisition data as a proxy food consumption fails to take into account households' ability to maintain supplies or stores. As a result, not all food that is purchased during the recall period is consumed during that time period and not all food that is consumed during the recall period is purchased during that time period.
4. How foods are distributed within the household is not identified in HIES, and requires making assumptions. Setting fortification levels requires estimating individual level consumption data—not household level data.
5. HIES rarely collect information on the purchase of foods intended for consumption outside of the home, and thus are subject to under-reporting of the purchases (and apparent consumption) of some foods.

Even with these shortcomings—many of which are also shortcomings of the other, alternative, indirect data sources—HIES, on the whole, are the most promising of them for a combination of reasons:

1. Setting fortification levels requires information about how the quantity of food is distributed among households so as to ensure that the public's safety is not put at risk by adding too much of a micronutrient to a particular

food. HIES go beyond a national average per capita figure and provide information about the distribution of food purchases, which, with a few assumptions, can be transformed into “apparent food consumption”, a proxy for food consumption.<sup>4</sup>

2. HIES are regularly financed and conducted by other government agencies, and as such, for this particular application they are a public good, virtually free of cost, and sustainable.<sup>5</sup>
3. A number of characteristics of current HIES instruments that have been found to be common shortcomings for purposes of designing and assessing fortification programs can be eliminated or ameliorated with relatively minor modifications.

These guidelines are intended to be an aid in helping to address point number 3 above; i.e., to help improve HIES as a tool for designing and assessing fortification programs, and thereby aid in accelerating the development of more evidence-based fortification programs.

## 1. The Scope and Approach

There are three different types of fortification programs: mass, targeted and market-driven. In mass fortification, government regulates the addition of micronutrients to commonly consumed foods, and usually mandates compliance with government-established standards and regulations. Mass fortification programs are generally motivated by public health concerns, the desire to increase the consumption of micronutrients and improve the general population’s health and nutrition status. In contrast, targeted fortification programs are designed for a specific population subgroup, and may be legally mandated or voluntary. The third type of fortification program is referred to as “market-driven” or “free market”. As its

name suggests, it is motivated by commercial interests, and is voluntary in nature, although it generally requires some type of legal authorization and functions within a government regulatory system (WHO, 2006).

**These Guidelines are motivated by the goal of improving public health and are intended foremost to aid in the design of mass fortification programs.**

The aim of fortification programs that are motivated primarily by public health concerns is to provide a predictable, supplementary quantity of micronutrients so as to improve the nutritional quality of the diet and thereby improve the nutritional status of persons who eat the food. The challenge of public health fortification programs is to develop evidence-based policies that ensure the provision of as much additional intake of the micronutrients as possible—thereby improving the deficient population’s nutrition and health status—as much as possible, while at the same time not providing too much more of the micronutrient so as to put persons who consume large quantities of the food at risk of excess intake of the micronutrients which are incorporated into the diet by this means. Sound fortification policy strikes a balance between these two countervailing public health goals: reducing micronutrient deficiencies and not putting individuals at risk of excess micronutrient consumption. Staples are foods that are generally (1) widely consumed, (2) regularly consumed (daily), and (3) consumed in relatively regular quantities by those consuming them. These characteristics of the consumption patterns of staple foods make them the ideal candidate vehicles for enabling fortification programs to strike this balance between impact and safety, and thereby achieving both of these public health goals. The focus of these Guidelines is on the mass fortification of six staple foods:

1. Wheat flour
2. Maize flour
3. Rice
4. Sugar
5. Vegetable oil
6. Salt

4 The HIES collects information about household food purchases, not consumption. There are a number of reasons why the quantity of food purchased by a household may vary from the quantity of food it consumes (as is discussed throughout this paper.) The food quantities identified using HIES data are most precisely described as measuring not food consumption, but “apparent food consumption.”

5 A good is referred to as a “public good” if it has two characteristics: (1) its consumption by one individual does not reduce the good’s availability for consumption by others and (2) no one can be effectively excluded from using the good.

**a. The focus: “Which Data to Collect,” not  
“What to do with HIES Data”**

The goal of these Guidelines is to provide fortification program-related, best-practice suggestions to officials of national statistics institutes/offices and others who are involved in the design, implementation and analysis of HIES surveys about how they can strengthen HIES surveys’ provision of information essential in designing and assessing of food fortification programs. These guidelines do not discuss the issues of fortification in significant detail; nor, however, do they completely disregard them. Recognizing that the guidelines are a tool for demonstrating the need for change in the status quo, they strive to provide a practical, minimal conceptual framework in the hope of not burdening the reader with too much information, yet still providing an adequate understanding of the issues involved, with the aim of motivating the adoption of the suggestions provided here. What to do with HIES data, how it should be analyzed to inform the designing and/or assessing of a fortification program, however, is not discussed here.

**b. A Minimalist Approach**

Globally there is enormous variation in food production, food purchasing and food consumption patterns, suggesting the difficulty of attempting to provide a “one-size fits all” approach.<sup>6</sup> These Guidelines do not attempt to provide a definitive listing of what each country’s HIES must contain if it is to optimally inform the country’s food fortification policy. Instead, the purpose of these guidelines is much more modest. What is provided here is a minimalist approach that strives to help to better inform what in most countries are important, still unaddressed or inadequately addressed, fortification program considerations, and doing so while not requiring or calling for too many too detailed and/or too country-specific an approach which might risk discouraging any change in current practices.

HIES have been conducted in most countries for many years to collect information on prices with which to construct price indices, to monitor living standards and poverty and to assess government programs. Given their long-standing and multi-purpose nature, HIES already have many users and many stakeholders. Recognizing this encourages us not to be overly

<sup>6</sup> Salt fortified with iodine is the sole exception. It is exceptional because the quantity of salt consumption worldwide is relatively homogenous and because the intake requirements of iodine for different members of the family are relatively similar.

ambitious in terms of identifying the best practice “must have” information which in many countries will require modifications in HIES questionnaires.

**c. Considerations in Assessing the  
Feasibility and Potential Benefit of  
Fortification: Some Basic Concepts**

The common root of the best practice suggestions contained in these Guidelines is the need to obtain more detailed information in order to better understand the feasibility and potential impact of fortifying six staple foods. The suggestions are designed to provide a “how-to” guide for collection information about the types of food purchased, the different forms a potentially fortifiable food takes (when, for example, wheat flour is used to produce bread or crackers or noodles), the frequency, quantity and locations where it is obtained and the means by which it is obtained. This additional information is intended to provide greater specificity and better understanding about potentially fortifiable food items themselves, as well as about the companies that produce them, both of which are important for assessing the feasibility of fortification.

**i. *Assessing the feasibility of fortifying  
foods requires knowing how many  
people purchase (and apparently  
consume) the food: The 30% rule of  
thumb***

A general rule of thumb used by food fortification technologists to gauge whether or not a food is popular “enough” to make it worthwhile to fortify for public health purposes is that it must be purchased by a minimum of 30 percent of the total population (Dary 2007).

**ii. *Assessing the feasibility of fortifying  
the six key staples requires  
understanding the various forms in  
which people purchase them***

In applying the 30 percent rule of thumb to the six key fortification vehicles to identify potentially promising fortification vehicles, however, it is important to recognize that most of these six foods are purchased and consumed in a number of different forms. Wheat flour, for instance, is purchased as wheat flour, but also as bread, rolls, pastries, cakes, crackers and noodles. Therefore, when assessing the potential coverage of fortified wheat flour, it is important to take into account not only wheat flour purchases, but purchases of the other principal foods that contain wheat flour as well.

This is not a difficult task. It generally requires asking about only a few additional products, which are identified below.

***iii. Food Industry characteristics are an important factor in determining the feasibility of fortification***

Assessing the feasibility of fortifying the six staple foods also requires an understanding of the characteristics of the food processing plants that are producing the foods. Some, usually more specific, food types are often associated with particular production processes or market structures, thus asking more questions about more detailed food types, can help to improve understanding about these producer or supply-side characteristics that may affect the feasibility of fortifying.

Foods that are produced by more traditional means (i.e., not centrally processed) generally use simple technologies and are more likely to have large numbers of producers, most of whom produce a relatively small amount of the food. Such foods are generally less attractive fortification candidates because fortifying them is logistically and technically more demanding for the Government, and relatively more costly for the smaller scale producers. For mandatory fortification to be effective, it is necessary for government to identify all of the producers to ensure that they participate in the program and that they are subsequently monitored and regulated. Generally, because of their smaller levels of output and the fact that their production processes involve more simple technologies and more human input, they are more subject to error.

In addition, if there is a large number of plants—and especially if there is a diversity of plant sizes—it will be more likely that producers employ different technologies and that they will be differentially affected—in terms of their production costs—by the introduction of fortification. When this is the case, it is likely to complicate efforts to introduce fortification, as those companies that believe they will be more adversely affected by the introduction of fortification, will resist it. Moreover, if the fortification program is still successfully established, other things equal, such conditions are more likely to limit the program's effectiveness, coverage and sustainability, as these conditions are more likely to encourage non-compliance. Therefore it is useful in assessing fortification possibilities if (other things equal) the industry consists of only a few plants producing a relatively homogeneous product than if it

consists of a large number of plants of diverse size and technologies.<sup>7</sup>

The companies producing these six key fortifiable foods are often very large. In part this is because these foods are staples, which by definition, means they are foods that are eaten by most of the population on a regular basis. Thus the companies producing them are likely to be producing large quantities of the foods, and usually use highly mechanized production processes, which makes it more likely that they are produced by a few large producers. This is most typically the case for producers of sugar, wheat and vegetable oil in particular. If there are relatively few producers/processors of the potential food vehicle or a large proportion of the food is imported by a relatively small number of firms, fortification is likely to be more feasible (other things being equal). It is possible to modify the HIES by adding a few additional questions about more specific food types and/or about the usual place of purchase, and thereby providing some insights about the industrial structure of the foods that will make the HIES much more powerful for purposes of developing fortification programs.

***iv. Information requirements for the design of an evidence-based fortification program***

There are three key decisions involved in the design of a fortification program:

1. Which food(s) should be fortified?
2. Which micronutrients should be used to fortify?
3. What levels of micronutrients should be added to food fortification vehicles?

The first of these decisions involves two sets of considerations that have already been discussed: (1) the proportion of households that purchase (apparently consume) the food and (2) characteristics of the food's industrial structure (namely, the number and size of companies producing the food). The second of these decisions involves considerations about the types of

<sup>7</sup> There are likely to be other, better—i.e., more direct, valid and reliable measures—of the size and other key characteristics of a candidate food fortification vehicle's industrial structure. Many countries' statistical offices conduct economic surveys or industrial censuses periodically in which they develop an inventory of existing companies and classify them by their key outputs using standard international classification (SIC) codes. Generally these surveys/censuses include various measures of the size of the company which may be helpful in assessing the feasibility and level of effort involved in introducing and monitoring a fortification program.

micronutrient deficiencies that plague the population. The third of these issues involves considerations about the quantities of the food that households purchase (apparently consume). The HIES can be used to provide information for addressing two of these three key decisions; the first and the third.

## 2. Prioritizing the Best Practices and Ranking Their Additional Resource Requirements

The suggested HIES best practice guidelines are organized around eight issues:

1. The minimal set of key potentially fortifiable foods that should be included in the HIES food list.
2. Individual foods that contain significant quantities of the six key potentially fortifiable foods that should be included in the HIES food list.
3. Distinguishing “fortifiable” foods-1: Identifying how the food was obtained.
4. Distinguishing “fortifiable” foods-2: Identifying where the food was purchased.
5. Strengthening food purchase data as a proxy for food consumption (usual purchases: usual frequency, usual quantities).
6. Identifying who within the household usually consumes potentially fortifiable foods.
7. Estimating the quantities of these foods consumed outside of the home.
8. Some additional considerations

The eight issues are ordered in the list above in a manner that roughly reflects two considerations: (1) the importance of their being addressed, with the first being the most important, the last being the least important, and (2) in reverse order of their complexity or the additional field and analytic work involved in addressing them—with the first being the easiest and the last being the hardest to address.

The first two issues discussed in these Guidelines attempts to strengthen the HIES by adding a few additional, more specific forms of potential food vehicles so that there is improved understanding of the

total amounts of these foods that people are purchasing to ensure that fortification opportunities to improve public health are not being overlooked.<sup>8</sup>

### ISSUE #1: THE FOOD LIST-1: Be sure to include questions about key potentially fortifiable foods

As already noted, the six key potentially fortifiable foods are: wheat flour, maize flour, rice, sugar, vegetable oil and salt. Not all of these foods are staples in all countries of the world. Maize flour, for instance, is generally only a staple in Africa and, to a lesser extent, in some Latin American countries, and rice is a staple in many Asian countries. In most countries, however, the HIES should and usually does collect information about households’ purchases of each of these six most frequently consumed foods items. In all countries in which they are staples, there should be separate purchase questions about each these foods.

#### a. Distinguish between different types of grains and cereals: Do not simply ask about “grains” or “cereals”.

Some countries’ HIES questionnaires ask simply about purchases of general types of grain or cereals products, such as “wheat” or “maize” or “rice”. These foods can take many different product forms. They can be purchased as raw, unprocessed grains, as flours, breads, noodles or a variety of other processed food products. To be useful for designing fortification programs it is necessary to better understand the form in which households purchase them. Knowing the form in which they are purchased provides greater understanding about the companies that are producing the food, which is critical information if the fortification program is to secure participation of the industry. If the HIES questionnaire includes a question asking about the purchase of grains, it is essential to ask specifically about wheat grain, maize grain and rice grain. If other types of grain-based food purchases are significant and asked about, they should also be asked about to enable distinguishing between different types of grains and grain-based foods (and will be further discussed below).

<sup>8</sup> To access a comprehensive collection of HIES (and other household surveys) questionnaires from around the world, and gain or learn how to access them go to: <http://www.ihnsn.org/home/?lvl1=activities&lvl2=catalog&lvl3=surveys> and select “Income/Expenditure/Household Survey” from the “Type of survey” drop-down menu.

**b. Distinguish between different types of flours: Do not simply ask about “flours” or “cereal flours”.**

Some countries’ HIES questionnaires ask simply about purchases of “flours” or “cereal flours.” Oftentimes different producers specialize in one or a few flours and the characteristics of the firms may vary by the type of grain they process. For instance in many countries in Africa, the producers of maize flour are numerous, low technology, small scale operations, that (for reasons discussed earlier) are unattractive prospects for a fortification program. The same country, however, may have large scale wheat flour mills that may be prime candidates for forming a sound foundation for a fortification program. Thus, for informing fortification program design it is necessary to distinguish between the different kinds of flour that households purchase: most commonly between wheat flour and maize flour, but in Asian countries in particular it is likely to be important to ask specifically about rice flour.

**c. Distinguish between white, brown and raw sugar**

In many countries, refined or granulated white sugar is refined in large, modern industrial plants, whereas brown (or yellow or dark) sugar is more likely to be produced in homes or in artisan-sized or small-scale plants. Foods that are generally produced in homes or only in small scale plants are much less likely to be good fortification candidates because they are difficult to identify and bring into the program, and once in the program they require far greater effort and cost to adequately monitor and regulate.

The HIES of many countries—including Cambodia, Cameroon, Malawi, Mozambique, Peru, Philippines and South Africa, among others—already include separate questions about white and brown sugar, and some also ask about raw sugar or sugarcane. In sugar producing countries in particular, asking separate questions about each of these types of sugars is useful and important for assessing sugar fortification feasibility. The purpose for distinguishing among these types of sugar is for more carefully identifying that portion of sugar that is “fortifiable.” It is usually that the brown and raw sugar types are produced domestically or by cottage operations. However, in some countries as Colombia, brown sugar is produced and commercialized by large sugar mills. Each country should adjust the questionnaire to its own conditions.

Also, in some countries (Indonesia, for example) palm sugar is commonly consumed as a substitute for white granulated sugar. Usually palm sugar is a home-produced or small-scale producer product and efforts to fortify it are likely to face the same logistics and technical difficulties as those of brown sugar noted above. Therefore, in countries where palm sugar is commonly produced in homes or small-scale plants, the HIES should ask about purchases of white granulated sugar, brown sugar and palm sugar.

**d. Ask separate questions to distinguish animal oils and fats from vegetable oils and fats**

Most, but not all, countries’ HIES already ask separate questions about animal and vegetable oils and fats. Some countries ask about “edible oils” which is generally meant to refer only to vegetable oils, but is often misinterpreted as being either animal- and/or vegetable-based. These are very different types of foods, generally produced by very different kinds of companies, using very different technologies and having very different fortification possibilities. It is important, therefore, to ask specifically about both “animal fats and oils” and “vegetable fats and oil” in order to keep them separate.

Similarly in South Asia (India, Pakistan and to a lesser extent Bangladesh), ghee which is traditionally a clarified butter made from animal milk is being increasingly substituted for by less expensive vanaspati, Dalda or “vegetable ghee”, and the HIES should ask specifically about them to enable distinguishing them. (The vanaspati, Dalda and vegetable ghee may be grouped together in a single question.)

**e. In East and Central Africa and other countries in which red palm oil or peanut oil are produced, it is important to list them separately to enable distinguishing them from other vegetable oils and fats.**

Red palm and peanut oil are commonly home-produced or produced in small scale plants. Therefore, to provide greater understanding of the fortifiability of vegetable oils and fats, it is important to enter them separately in the HIES questionnaire food list.

**ISSUE #2: THE FOOD LIST-2: Include in the HIES food list specific, commonly purchased foods that contain one or more of the six key potentially fortifiable foods**

**a. Include commonly purchased, wheat flour-based foods in the HIES food list.**

Most HIES collect information about households' direct purchases of these six specific foods items; i.e., households' purchases of these six final consumer goods. It is important to recognize, however, that these six staples are often used as industrial inputs into the production of other foods, as well. In some cases the proportion of households purchasing these other foods and the quantities they purchase of them are larger than—and thus from a fortification policy perspective these other foods can be as important as, or more important than—the staple itself. The consumption of wheat flour purchased in the form of bread is a prime example. While the types of foods that should be included will vary somewhat by country, there are some universal food types (or near-universal food types) that can be identified.<sup>9</sup>

This concern about the use of fortifiable staple foods as an input in the production of other processed foods is primarily an issue for wheat flour and wheat flour-based products. The following is the recommended list of wheat flour-based foods to include in the HIES questionnaire. Many countries already have all or many of these items in their questionnaires, but may have combined several of the items into a single category. For purposes of maximizing the usefulness of this information for fortification programs, it is best to ask about the following specific items or combinations of foods. These specific food categories are needed because their wheat flour content varies (as a percent of the item's total weight—as indicated below), and to set fortification levels as high as possible and yet safely,

9 Staple foods that are not subject to industrial processing in a given country—including maize, beans, sorghum, cassava (also referred to as manioc or yucca)—if consumed frequently and in sufficient quantities by the poor and unprotected segments of the population may also be subject to a distinct kind of fortification: BIO-fortification. See Bouis 2002 and other articles in this special symposium dedicated supplement available (free-of-charge) at: <http://jn.nutrition.org/cgi/reprint/132/3/491S?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=1&author1=bOUIS&title=PLANT+BREEDING&andorexacttitle=and&andorexacttitleabs=and&andorexactfulltext=and&searchid=1&FIRSTINDEX=0&sortspec=relevance&resourcetype=HWCIT> (Accessed June 23, 2009).

it is essential to know how much wheat flour people consume.<sup>10</sup>

- Wheat flour: 100 percent
- White bread (European, western style): 60 percent
- Flat bread (unleavened): 75 percent
- Whole wheat bread: 75 percent
- Sweet breads: 65 percent
- Crackers: 90 percent
- Biscuits and cookies: 60 percent
- Pasta (may be asked about as an all-inclusive category, or broken down into the following categories, depending on national norms): dried pasta, 90 percent; wet/cooked pasta, 28 percent
  - Noodles
  - Spaghetti
  - Macaroni
  - Other pasta
- Cake: 55 percent
- Pies and pastries: 35 percent<sup>11</sup>

**b. Include dehydrated noodle soups in the food items purchased questions**

In many countries, the past few years have seen rapid growth in purchases of dehydrated soups. Most dehydrated soups contain fortified or fortifiable noodles. If these soups are not already included in the HIES, they should be added and those containing noodles should be distinguished from those not containing them.

There are two common ways in which dehydrated soups are packaged, in envelopes and in disposable plastic (polystyrene or Styrofoam) cups. While there may be a large number of brand-names of each of these products, generally the soups in envelopes are relatively homogenous and those in disposable cups are relatively homogeneous, but the two products vary in important ways. The cups are generally more standardized in terms of size and they are more likely to contain additional dehydrated foods, such as vegetables in addition to the noodles, and to contain more of them. Given that we want to be able to estimate the wheat flour content of the dehydrated soup packages as a percent of the total weight of the item, the preferred

10 In setting wheat flour fortification standards, the food fortification specialist analyzing HIES data will develop a measure of the total wheat flour purchased (apparently consumed) by the household. This will entail quantifying the amount of wheat flour consumed in all forms by summing the wheat flour content of all commonly eaten foods in a specified period of time.

11 These wheat flour content estimates were provided by wheat flour fortification specialist Quentin W. Johnson of Quican, Inc.

HIES approach would be to include each of them in the food list, independently, so that this can be done more accurately.

**c. Where rice noodles are popular, it is important to ask separately about wheat noodle purchases and rice noodle purchases.**

In many countries of South Asia and Southeast Asia where both rice noodles and wheat noodles are popular, the HIES should include separate questions about both of them. They have very different fortification technologies and are usually produced by different companies, and therefore for fortification purposes they need to be considered independently.

**d. Include commonly purchased, maize/corn flour-based foods in the HIES food list.**

As noted earlier, except for some countries in Latin America and Eastern and Southern Africa, maize (or corn) flour is less commonly a staple than wheat flour. Like wheat flour, maize flour is also used as an input in producing other foods. In the case of maize, however, there are only a few other products that may be popular enough to warrant asking specifically about them. The most common items that should be considered for inclusion in the HIES are:

- Maize/corn flour (or maize meal)
- Maize/corn tortillas
- Maize/corn tortilla flour mix
- Maize/corn bread
- Maize/corn biscuits
- Maize/corn porridge

**ISSUE #3: Distinguishing “fortifiable” foods-1: Identify how the food was obtained. Was it home-produced, purchased, received through a social program, received as payment in-kind or traded?**

Most HIES identify the specific sources of foods obtained by the household and distinguish between food that is purchased and that which is home-produced. For fortification programs, this is an essential distinction that must be introduced and/or retained in all countries’ HIES. Food that is home-produced is assumed not to have been fortified and not to be fortifiable. In assessing the potential coverage of a fortified or fortifiable food,

only food that is purchased should be included in the analysis. The HIES’s differentiating the quantities of key fortifiable foods that are home-produced from those that are purchased is perhaps its single most valuable contribution to improving our understanding of the coverage of fortified or fortifiable foods—enabling us to get beyond the total supply of the food available in the country. This is an indispensable piece of evidence in making the decision about what to fortify or whether or not to fortify.

In many countries food may be received through the United Nations World Food Program, or more generally from some other social program or from neighbors, friends or relatives (in which case it is referred to as “donated” or “gifted”), or it may be received as an in-kind payment or for-work payment. Many countries’ HIES already ask about these alternative ways of obtaining food. All countries should ask about them. They are important because they provide additional information useful for assessing alternative ways in which fortified foods may be introduced, and in cases where these alternative methods are already being provided, they enable better understanding the additional incremental impact that fortification may have.

Boxes 1 and 2 present examples of common HIES questions used to obtain this information.

**ISSUE #4: Distinguishing “fortifiable” foods-2: Identify where foods are regularly purchased**

As noted earlier in the discussion, information about where foods are purchased can be useful for providing insights about how the food is processed and whether or not it is likely to be available for fortification. Very few HIES ask where foods are purchased. One approach to obtaining this additional information would be to ask where the key potential fortification vehicles are usually purchased. An example is provided in Box 3.<sup>12</sup>

Alternatively, a more simple, less time-consuming, though less precise approach would be to ask the usual place of purchase of broad categories of food types, such as breads and baked goods, fruits and vegetables,

<sup>12</sup> An alternative format would be to include an additional column in the table containing the listing of specific foods. In this instance, after the questions asking “Did you buy any x” followed by “How much of X did you buy?” and “How much did you pay for X?” amount paid, a column could be added to ask “Where did you buy X” with the options identified in Box 1 listed as pre-coded potential responses.

**Box 1 Identifying How Food Was Acquired--Example 1**

Purchased Foods					
1. In the last 12 months, did you or another member of your household buy (.....) to be consumed in the home? Yes.....1 No.....2 ==> Question 5	2. During how many months did you buy (.....)?  (No. of months)	3. How much do you normally spend in a month buying (.....)?  (Monetary value)	4. In the last 15 days, what quantity of (.....) did you purchase and how much did you spent on it in total?		
			(Quantity)	(Unit of Measure)	(Monetary value)
Food Type 1					
Food Type 2					
Food Type 3					
Food Type 4					

**Home-Produced Foods or Foods Obtained Without Being Purchased**

5. In the last 12 months, did you or another member of your household acquire (.....) from your own production or otherwise obtain it without having to purchase it? Yes.....1 No.....2 ==> Next Food Type	6. In the last 12 months, during how many months did you acquire (.....) without having to purchase it?  (No. of months)	7. What quantity of (.....) do you normally obtain in a month without having to purchase it?  (Quantity) (Unit of Measure) (Monetary value)		8. In the last 15 days, what quantity of (.....) did you obtain without having to purchase it?  (Quantity) (Unit of Measure) (Monetary value)		9. From where do you usually obtain it?  1 = Own production 2 = Gift/ donation 3 = In-kind payment 4 = From business 5 = Trade/barter
Food Type 1						
Food Type 2						
Food Type 3						
Food Type 4						

**Box 2 Identifying How Food Was Acquired--Example 2**

1. In the last 14 days, did you or another member of your household acquire / purchase /consume any (.....)? Yes.....1 No.....2 ==> Next item	2. How much was purchased?  (Quantity) (Unit of Measure) (Monetary value)			3. How much of what was purchased was consumed?  (Quantity)	4. How much was consumed from own-production?  (Quantity) (Unit of Measure)		5. How much was consumed from own stock?  (Quantity) (Unit of Measure)		6. How much was consumed from figts and other sources?  (Quantity) (Unit of Measure)		7. How much in total did your household consume in the past 14 days?  (Quantity) (Unit of Measure)	
Food Type 1												
Food Type 2												
Food Type 3												
Food Type 4												

**Box 3 Identifying Where Potentially Fortifiable Foods Are Purchased--Example 1**

1. Where do you usually purchase [FOOD ITEM]?	Bakery	Market (open air)	Store	Supermarket	Mini-market	Kiosk	Neighbors	Truck, car or cart	Street Vendor	Other (specify)	Don't purchase
1. Wheat flour											
2. White bread											
3. Wheat bread											
4. Sweet breads											
5. Cake											
6. Pies/Pastries											
7. Crackers											
8. Biscuites/Cookies											
9. Noodles / Pasta											
10. Rice											
11. White sugar											
12. Brown sugar											
13. Vegetable oil											

and dry goods. In both approaches, the usual places of purchase, as well as the single most common place of purchase could be identified. The food category approach is exemplified in Box 4.

Box 4 Identifying Where Potentially Fortifiable Foods are Purchased--Example 2	
1. Where do you usually purchase <b>BREAD</b> and <b>BAKERY PRODUCTS</b> ?	
1 Bakery	7 Neighbors
2 Market (open air or wet market)	8 Truck, car or cart
3 Store	9 Street vendor
4 Supermarket	10 Other (specify):
5 Mini-market	11 Don't purchase
6 Kiosk	
a. If more than one answer is given: Where do you purchase <b>BREAD</b> most frequently?	
___ (Enter code from sources above)	
2. Where do you usually purchase <b>FRUITS</b> and <b>VEGETABLES</b> ?	
1 Market (open air or wet market)	6 Neighbors
2 Store	7 Truck, car or cart
3 Supermarket	8 Street vendor
4 Mini-market	9 Other (specify):
5 Kiosk	10 Don't purchase
a. If more than one answer is given: Where do you purchase <b>FRUITS and VEGETABLES</b> most frequently?	
___ (Enter code from sources above)	
3. Where do you usually purchase <b>DRY GOODS</b> , such as grains, flours and canned goods?	
1 Market (open air or wet market)	6 Neighbors
2 Store	7 Truck, car or cart
3 Supermarket	8 Street vendor
4 Mini-market	9 Other (specify):
5 Kiosk	10 Don't purchase
a. If more than one answer is given: Where do you purchase <b>DRY GOODS</b> most frequently?	
___ (Enter code from sources above)	

**ISSUE #5: Improving the precision of estimates of “apparent consumption”: Identify the usual frequency of purchase and the usual amount of the key potential food fortification vehicles purchased.**

All HIES questionnaires are shaped by concerns of how best to balance ensuring the validity and reliability of the food purchase data that is collected, while at the same time ensuring that the food purchase data collected is as comprehensive as possible (Deaton & Grosh 2000:100-111). Survey research has demonstrated that more valid and reliable data is generally obtained when respondents are asked about a specific event—such as the last time a specific food item was purchased and how much of that specific food was purchased—rather than simply asking about what types of foods are purchased, how frequently and in what amounts. Generally, unpacking a broad, general expenditure question into a series of more specific questions forces the respondent to focus

more on the specific events, and generally seem to give more accurate expenditure estimates (Xu et al, 2007).<sup>13</sup>

Concerns about the validity and especially the reliability effects of the fading of people’s memory also encourage the use of shorter recall periods, whereas concerns about obtaining comprehensive data encourage the use of longer recall periods. Obviously if the recall period is too short, some food purchases that are made less frequently will not be identified. Those that will be most commonly missed are most likely to be:

- foods that are not purchased frequently because they are not eaten as often, or
- foods that are purchased in large bulk quantities and the household maintains a relatively large stock of the food on hand at most times.

The latter is particularly likely to be characteristic of staples, which (as already noted) are generally promising food vehicles for fortification programs. Thus having a recall period that is too short is likely to miss identifying the purchases of potentially promising food fortification vehicles and thereby under-estimate their potential coverage and discourage their being fortified.

In seeking to achieve the twin objectives of being as comprehensive as possible while at the same time obtaining reliable data, HIES generally contain (1) a question about the household’s “usual” purchase of a particular food item or its purchase over a long period of time—usually the preceding 12 months—for greater comprehensiveness, and (2) a question that asks about food purchases in the past 15 days (or the past two weeks)—for greater reliability. The way in which countries’ sequence these two questions and how they use them as screens varies. The two most common ways in which they are generally structured is shown in Box 5.

**1. The first pattern** uses purchases in the past 12 months as a screen to ask about the normal frequency of purchases and the amount of money spent on the item. Then the respondent is asked if the item has been purchased in the past 15 days, which serves as a second

<sup>13</sup> The focus of Xu et al.’s analysis was not identical to the topic here—food expenditures. Their focus, instead, was specifically on health and total household expenditures, and they analyzed data from 87 different surveys of different types, including World Health Surveys, HIES, Household Budget Surveys and Living Standard Measurement Surveys.

Box 5 Two Common HIES  
Approaches to the Food Purchase Questions

HIES Question Pattern #1:

1. In the past 12 months, did you or some other member of the household purchase [FOOD ITEM] for household consumption?
2. If the response is positive, they are then asked: During how many months was it purchased?
3. How much money is usually spent in a month on the purchase of [FOOD ITEM]?
4. In the last 15 days, what quantity of [FOOD ITEM] was purchased and how much money was spent on it in total?

HIES Question Pattern #2:

1. During the last 15 days, did a member of this household purchase [FOOD ITEM]?
2. If the response is positive, they are then asked: How often is [FOOD ITEM] usually purchased?
3. What quantity of [FOOD ITEM] is usually purchased, with what frequency and in what unit of measure?

screen.<sup>14</sup> If there have been no purchases in the past 15 days, no information is collected about the frequency or quantity of the purchase, although the amount of money usually spent in a month on the item has been identified and can be used to calculate the average quantity purchased—assuming the average price is the same as in the past 15 days, where it can be estimated as: (the total money spent on the item divided by the quantity of the item purchased).

For purposes of designing and assessing fortification programs, this HIES questionnaire structure is amenable to providing quality information and striking an acceptable balance between precision and comprehensiveness.

**2. The second pattern** uses food purchases in the past 15 days as the screen, and then asks about the usual frequency of purchase and the usual quantity purchased. If the item has not been purchased in the past 15 days no information on frequency or quantity of purchase is collected. Clearly, this will under-report purchases of some foods, and will result in under-estimating the potential coverage of a fortifiable food, and there will be bias in the underreporting, if richer people can buy larger quantities less frequently.

The 2006 Guatemalan HIES questionnaire follows pattern #1. Graph 1 presents data from the 2006 Guatemalan HIES, showing the percentage of

14 HIES recall periods vary by country. The most common is 15 days, but 7, 14 and 30 day recall periods are also common. These Guidelines will use only 15 days in order to simplify the discussion, but it should be kept in mind that the appropriate number is whatever number is consistent with the country's usual recall period.

households that reported purchasing various potentially fortifiable food items in the past 12 months as a percent of households reporting purchasing the same item in the past 12 months to demonstrate how significant this under-estimation can be. On average—as measured by the mean—the proportion of households that reported purchasing these foods in the past year is nearly twice the percentage purchasing it in the past 15 days. The median value is 163 percent. If Guatemala had followed the HIES questionnaire pattern #2, the potential annual coverage of a program fortifying these foods would have been under-estimated by between 40 and 50 percent (depending on whether the mean or median is used as the reference point).

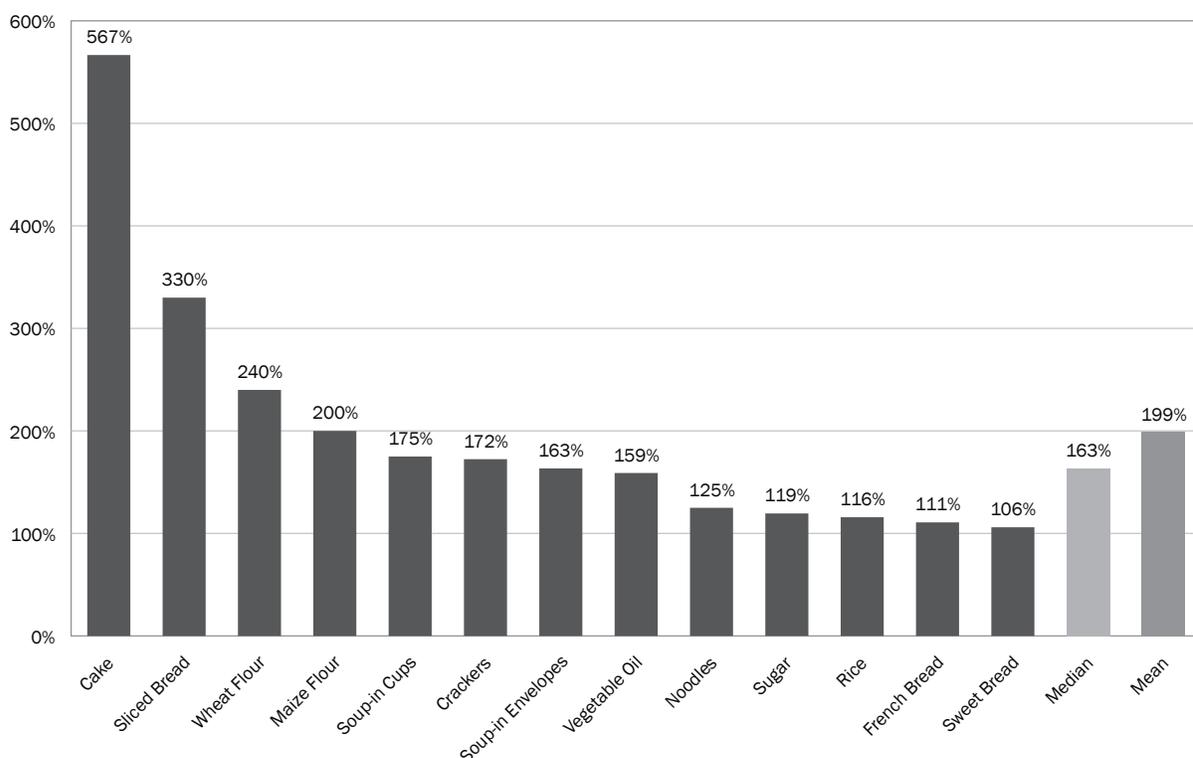
The first and most important empirical question for assessing the feasibility of fortifying a particular food item is whether or not an adequate proportion of the population purchases (apparently consumes) it. From the perspective of assessing the potential of a fortification program, the discrepancy between what is identified as the household's "usual purchases" using a 15 day recall period and what are its "usual purchases" as defined using a one year recall period results in what are regarded as false-negatives. A false-negative response is a household that (because of how the questionnaire is designed) is identified as not being a purchaser of any of a particular food item, when in fact the household actually does purchase some the food item. It is suggested that in order to minimize what are seen as false-negative responses for the fortification program that countries in which the HIES is structured as in question pattern #2 (Box 5), that the additional questions presented in Box 6 be asked for those foods that are likely to be potentially fortifiable foods in that country.

A more radical change would be to introduce a new question asking specifically about the amount of each food that was consumed during the recall period. A few countries already do this. (Refer back to Box 2 for an example drawn for the Kenyan HIES.)

**ISSUE #6: Who usually consumes the food that was purchased in the last two weeks?**

HIES are designed to learn about household behaviors. The design of food fortification programs, however, must be informed about individual (person-level) behaviors because the safety concern of excess micronutrient consumption is an individual's personal behavioral risk factor. In order to use the HIES food purchase data to proxy as apparent consumption it is necessary to make

Graph 1 **Percent of Households that Purchased Selective Fortifiable Foods in the Last 12 Months as a Percent of Those that Purchased in the Last 15 Days, Guatemala 2006**



some important assumptions to estimate individual food consumption levels from household purchases is to calculate (1) the total number of grams of the food in question purchased and (2) the number of female adult consumption equivalent units (using the Food and Agriculture Organization’s methodology presented in the Annex), and, dividing the former by the later, to derive the number of grams per day per female adult consumption equivalent units. This implicitly assumes that the distribution of all foods within the household is in direct proportion to biological need (as captured by the FACE units).

Studies have shown, however, that not all foods are shared among all members of the household and that they are not divided equally or necessarily in direct proportion to biological need (Bouis & Novenario-Reese, 1997; Doss, 1996; Haddad, et al., 1996; Thomas, 1990). The discrepancies appear to be greatest for South Asian and, to a lesser extent, Southeast Asian countries, but with considerable variation within both regions. These studies suggest that the FACE-based adjustment is likely to be a best case scenario for intra-household food distribution scenario that results in some degree of over-estimation of the food received

by some members of the household. To the extent that it does so, it undermines the validity of equating the level of household coverage of fortified foods with the level of individual coverage, and over-estimates the additional intake of micronutrients attributable to the consumption of fortified foods.

In other words, at present, the FACE-adjustment procedure simply assumes that the intra-household distribution of food is consistent with biological need as captured in the FAO consumption equivalents algorithm. Rather than simply assuming how food purchases are distributed within households, it would be preferable to have some indication, however crude and approximate, of how accurate that assumption might be. Given that it appears that the distortion caused by the FACE-adjustment procedure described above is greater for South Asian and Southeast Asian countries, HIES officials in these countries in particular are urged to collect additional information with which to better understand how purchased food is distributed within the household for consumption.

There are two ways in which some additional information that would cast some light on this important

Box 6 Additional Questions to Better Ensure Capturing Less Frequently Purchased Potentially Fortifiable Foods					
1. Do you or members of your household ever purchase [FOOD ITEM]?		2. When was the last time you or a member of your household purchased [FOOD ITEM]?		3. How often do you or a member of your household usually purchase [FOOD ITEM]?	
FOOD ITEM	CODE	1: Last Month 2: 2 months ago 3: 3 months ago 4: 6 months ago 5: More than 6 months ago		1: Monthly 2: Once every 2 months 3: Once in 3 months 4: Once in 4 months 5: Once in 5 months 6: Once in 6 months 7: Once a year 8: Other (specify)	
				a. QUANTITY	b. UNIT OF MEASURE
1. Wheat flour	a. Yes b. No		----> 5		
2. White bread	a. Yes b. No		----> 5		
3. Wheat bread	a. Yes b. No		----> 5		
4. Sweet breads	a. Yes b. No		----> 5		
5. Cake	a. Yes b. No		----> 5		
6. Pies/Pastries	a. Yes b. No		----> 5		
7. Crackers	a. Yes b. No		----> 5		
8. Biscuites/Cookies	a. Yes b. No		----> 5		
9. Noodles / Pasta	a. Yes b. No		----> 5		
10. Rice	a. Yes b. No		----> 5		
11. White sugar	a. Yes b. No		----> 5		
12. Brown sugar	a. Yes b. No		----> 5		
13. Vegetable oil	a. Yes b. No		----> 5		

Note: ---> signifies: Go to next question-question #5

issue might be gathered relatively easily. The simplest approach would be to ask the respondent who in the household consumes each of the fortifiable food items that the household purchases, without attempting to quantify how much each person consumed. Box 7 shows an example of a questionnaire that could be used for gathering this information by person.

### ISSUE #7: Food purchased and consumed outside of the home<sup>15</sup>

The types and quantities of food purchased and consumed outside of the home is a topic that is largely unaddressed by HIES and similar surveys. Where it is addressed, it is thought to generally be under-reported and under-estimated (Deaton & Grosh, 2000, p.107). A recent study of Kenyan school children (6 to 16 years

old), found that 13 and 19 percent of daily energy intake in the food shortage season and the harvest season, respectively, were accounted for by foods consumed outside of the home (Gewa, Murphy & Neumann, 2007). This suggests that this is an important source of under-reporting of food consumption and of micronutrient intake. HIES should include additional questions to address this issue. It is important to note that this information must be individual specific, which will make capturing it particularly difficult; both because it is individual-specific and because much of out-of-home consumption is, by its very nature, likely to be unobserved by the principal respondent. This suggests that it would be wise to limit this inquiry to understanding the general order of the magnitude of the practice, rather than the amount of foods involved or the composition of the food. Box 8 presents a suggestion for some of additional information that could be easily collected, as a first step in addressing this important and neglected area. The two questions in Box 8 ask about “food” (which is underscored). This is likely to

<sup>15</sup> This does not include foods prepared at home and eaten outside of the home, which should be captured in the standard questionnaire.

**Box 7 Identifying Which Household Members Consume Some of Each Fortifiable Food-Example 1**

Which persons usually eat some of the [FOOD ITEM] consumed by the household?  
(For each food item, enter an X in the column of the household members who consume some of the food.)

Food Item	Individual Household Members							
	Person #1	Person #2	Person #3	Person #4	Person #5	Person #6	Person #7	Person #8
1. Wheat flour								
2. White bread								
3. Wheat bread								
5. Sweet breads								
6. Crackers								
7. Biscuits, cookies								
8. Pasta								
9. Cake								
10. Pies, pastries								
11. Dehydrated soups-in envelopes								
12. Dehydrated soups-in cups								
13. Bouillion cubes								
14. Sugar-White								
15. Sugar-Brown								
16. Rice								
17. Rice								

**Box 8 Questions to Better Understand the Significance of Food that is Purchased for Consumption Outside of the Home**

1. Do any members of your household commonly purchase food that they consume outside of the home?

a. No ==> Go to Question #x

b. Yes ==> Who?

Household Member #1	a. Does	b. Does not
Household Member #2	a. Does	b. Does not
Household Member #3	a. Does	b. Does not
Household Member #4	a. Does	b. Does not
Household Member #5	a. Does	b. Does not
Household Member #6	a. Does	b. Does not
Household Member #7	a. Does	b. Does not
Household Member #8	a. Does	b. Does not

2. How often do they purchase a food that they consume outside of the home?

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Average Number per Week
Household Member #1								
Household Member #2								
Household Member #3								
Household Member #4								
Household Member #5								
Household Member #6								
Household Member #7								
Household Member #8								

be most appropriate in lower income countries and in less urbanized societies where eating away from home is relatively uncommon. In middle and higher income countries and in more urbanized societies where eating away is relatively common, it may be more appropriate to ask about “meals” rather than “food” to capture more quantitatively significant patterns.

**ISSUE #8: Some additional considerations**

**a. Additional food items to include for assessing the potential of biofortification.**

Biofortification consists of breeding new food crops to increase the amount of micronutrients—such as

iron, provitamin A and zinc—that they contain, and thereby help to reduce micronutrient deficiencies. Biofortification uses conventional plant breeding practices and typically does not involve genetically modifying (GM) crops.

Crops for which conventionally bred biofortified varieties now exist (or which are in the pipeline) include high pro-vitamin A maize, cassava and sweet potato; high iron beans and pearl millet; and high zinc rice and wheat. To better understand the potential of these crops in a country it would be useful if the HIES included food item questions that distinguish these types of potentially bio-fortified staple food crops:

1. Cassava
  - a. Fresh white or yellow cassava
  - b. Dry cassava
  - c. Cassava flour
2. Sweet potato
  - a. Orange flesh sweet potato
  - b. White flesh sweet potato
  - c. Yellow sweet potato
3. Beans (single or mixed varieties)
  - a. White beans
  - b. Brown beans
  - c. Black beans
  - d. Mottled beans

**b. Include a question about the purchase of nutritional or dietary supplements in the food item list.**

Over the past few years the use of the nutritional or dietary supplements has grown rapidly throughout the world, including in many lower and middle income countries. At present, no information is collected on supplements and it is not known what proportion of the

population takes them or what types of micronutrients are in commonly taken supplements. This is useful information for setting appropriate fortification levels and it would be especially useful if the individuals in the household that consume them could be identified, as in the example shown in Box 9.

**c. Include bouillon cubes (dehydrated broth cubes or powder) in the list of food items.**

Bouillon cubes are inexpensive and widely purchased throughout the world by even the poorest households.<sup>16</sup> They are overlooked in most countries' HIES and as a result their potential is unknown. In four, low income countries of Africa where they have been included in the HIES, they were purchased by more than 70 percent of households, and thus constitute a promising potential new fortification vehicle. The high salt content of bouillon cubes has prompted discussion of using them as a new vehicle for iodine, but they may have other possibilities as well. They should be included in the food item list of HIES.

Box 9 Nutritional or Dietary Supplements		
1. Do any members of your household regularly take dietary supplements?		
a. Household Member #1	Yes <input type="checkbox"/>	What is the name of the brand they regularly take? _____
	No <input type="checkbox"/>	
b. Household Member #2	Yes <input type="checkbox"/>	What is the name of the brand they regularly take? _____
	No <input type="checkbox"/>	
c. Household Member #3	Yes <input type="checkbox"/>	What is the name of the brand they regularly take? _____
	No <input type="checkbox"/>	
d. Household Member #4	Yes <input type="checkbox"/>	What is the name of the brand they regularly take? _____
	No <input type="checkbox"/>	
e. Household Member #5	Yes <input type="checkbox"/>	What is the name of the brand they regularly take? _____
	No <input type="checkbox"/>	
f. Household Member #6	Yes <input type="checkbox"/>	What is the name of the brand they regularly take? _____
	No <input type="checkbox"/>	
g. Household Member #7	Yes <input type="checkbox"/>	What is the name of the brand they regularly take? _____
	No <input type="checkbox"/>	
h. Household Member #8	Yes <input type="checkbox"/>	What is the name of the brand they regularly take? _____
	No <input type="checkbox"/>	

<sup>16</sup> "A bouillon cube (US) or stock cube (UK) is dehydrated broth (bouillon in French) or stock formed into a small cube about 15 mm wide. It is made by dehydrating vegetables, meat stock, a small portion of solid fat (such as hydrogenated oil), salt (usually well over 50%) and seasonings and shaping them into a small cube. Dehydrated broth is also available in granular form. (Accessed on May 1, 2009 at: [http://en.wikipedia.org/wiki/Bouillon\\_cube](http://en.wikipedia.org/wiki/Bouillon_cube) ).

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[http://www.who.int/nutrition/publications/guide\\_food\\_fortification\\_micronutrients.pdf](http://www.who.int/nutrition/publications/guide_food_fortification_micronutrients.pdf) (Accessed May 20, 2009)
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Annex <b>Food and Agriculture Organization (FAO)</b> <b>Factors for Calculating Adult Food Consumption Equivalents</b>		
<b>Age (yr)</b>	<b>Males</b>	<b>Females</b>
< 1	0.27	0.27
1-3	0.45	0.45
4-6	0.61	0.61
7-9	0.73	0.73
10-12	0.86	0.78
13-15	0.96	0.83
16-19	1.02	0.77
≥ 20	1.00	0.73



In February 2004, representatives from developing countries and development agencies participated in the Second Roundtable on Development Results held in Marrakech, Morocco. They reflected on how donors can better coordinate support to strengthen the statistical systems and monitoring and evaluation capacity that countries need to manage their development process. One of the outcomes of the Roundtable was the adoption of a global plan for statistics, the *Marrakech Action Plan for Statistics* (MAPS).

Among the MAPS key recommendations was the creation of an International Household Survey Network. In doing so, the international community acknowledged the critical role played by sample surveys in supporting the planning, implementation and monitoring of development policies and programs. Further more, it provided national and international agencies with a platform to better coordinate and manage socioeconomic data collection and analysis, and to mobilize support for more efficient and effective approaches to conducting surveys in developing countries.

The IHSN Working Paper series is intended to encourage the exchange of ideas and discussion on topics related to the design and implementation of household surveys, and to the analysis, dissemination and use of survey data.

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